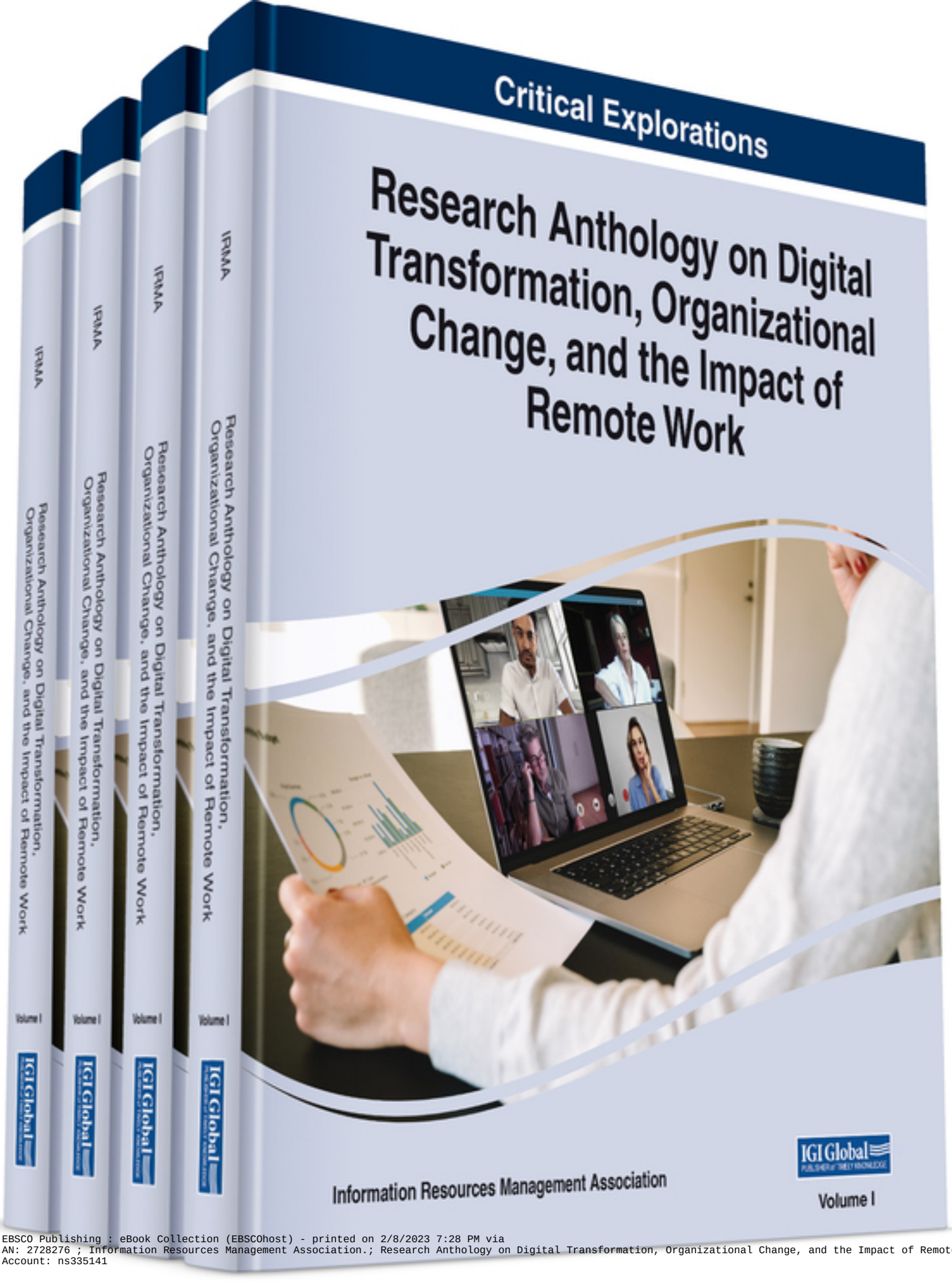


Copyright 2020. Business Science Reference. All rights reserved. May not be reproduced in any form without permission from the publisher, except fair uses permitted under U.S. or applicable copyright law.

EBSCO Publishing : eBook Collection (EBSCOhost) - printed on 2/8/2023 7:28 PM via
AN: 2728276 ; Information Resources Management Association.; Research Anthology on Digital Transformation, Organizational Change, and the Impact of Remote Work
Account: ns335141

Research Anthology on Digital Transformation, Organizational Change, and the Impact of Remote Work

Information Resources Management Association
USA

IGI Global
PUBLISHER of TIMELY KNOWLEDGE

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Published in the United States of America by
IGI Global
Business Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: http://www.igi-global.com

Copyright © 2021 by IGI Global. All rights reserved. No part of this publication may be reproduced, stored or distributed in any form or by any means, electronic or mechanical, including photocopying, without written permission from the publisher. Product or company names used in this set are for identification purposes only. Inclusion of the names of the products or companies does not indicate a claim of ownership by IGI Global of the trademark or registered trademark.

Library of Congress Cataloging-in-Publication Data

Names: Information Resources Management Association, editor.
Title: Research anthology on digital transformation, organizational change, and the impact of remote work / Information Resources Management Association, editor
Description: Hershey : Information Science Reference, 2020. | Includes bibliographical references and index. | Summary: "In understanding digital transformation in the workplace there needs to be advanced research on technology, organizational change, and the impacts of remote work on the business, the employees, and day-to-day work practices. This advancement to a digital work culture and remote work is rapidly undergoing major advancements, and research in this book is needed to keep up with both the positives and negatives to this transformation"-- Provided by publisher.
Identifiers: LCCN 2020043633 (print) | LCCN 2020043634 (ebook) | ISBN 9781799872979 (v. 4 ; hardcover) | ISBN 9781799872986 (ebook)
Subjects: LCSH: Information technology--Economic aspects. | Organizational change. | Telecommuting.
Classification: LCC HC79.I55 R467 2020 (print) | LCC HC79.I55 (ebook) | DDC 658.4/06--dc23
LC record available at https://lccn.loc.gov/2020043633
LC ebook record available at https://lccn.loc.gov/2020043634

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.

The views expressed in this book are those of the authors, but not necessarily of the publisher.

For electronic access to this publication, please contact: eresources@igi-global.com.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Editor-in-Chief

Mehdi Khosrow-Pour, DBA
Information Resources Management Association, USA

Associate Editors

Steve Clarke, *University of Hull, UK*
Murray E. Jennex, *San Diego State University, USA*
Ari-Veikko Anttiroiko, *University of Tampere, Finland*

Editorial Advisory Board

Sherif Kamel, *American University in Cairo, Egypt*
In Lee, *Western Illinois University, USA*
Jerzy Kisielnicki, *Warsaw University, Poland*
Amar Gupta, *Arizona University, USA*
Craig van Slyke, *University of Central Florida, USA*
John Wang, *Montclair State University, USA*
Vishanth Weerakkody, *Brunel University, UK*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

List of Contributors

Agúndez-Soriano, María Antonia / Colegio Universitario de Estudios Financieros, Spain 1022
Ahamad, Mohd Vasim / Aligarh Muslim University, India 485
Akca, Meltem / Istanbul University, Turkey 1177
Akella, Devi / Albany State University, USA 1451
Akgül, Yakup / Alanya Alaaddin Keykubat University, Alanya, Turkey 780
Akhtar, Nadeem / Aligarh Muslim University, India 485
Al-Hasan, Said / University of South Wales Business School, UK 332
Arnold, Marlen Gabriele / Chemnitz University of Technology, Germany 700
Azzam, Hammad / Independent Researcher, USA 1519
Barbosa, Armando / Federal University of Alagoas, Maceió, Brazil 1868
Beadle, Hazel / University of Chichester, Bognor Regis, UK 1266
Bilal Ahmad Ali Al-khateeb / Al Imam Mohammad Ibn Saud Islamic University, Saudi Arabia 263
Bittencourt, Ig Ibert / Federal University of Alagoas, Maceió, Brazil 1868
Borbolla-Albores, Alberto / Universidad Anahuac Mexico, Mexico 1100
Bosua, Rachelle / University of Melbourne, Australia 1119
Branco, Frederico / INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal 70
Brunet, Tom / IBM, USA 449
Burleson, Seterra D. / Old Dominion University, Norfolk, USA 614
Butler-Henderson, Kerryn / University of Tasmania, Australia 1616
Calado, Ivo / Federal Institute of Alagoas, Rio Largo, Brazil 1868
Canela, Miguel-Ángel / IESE Business School, University of Navarra, Barcelona, Spain 415
Castriotta, Manuel / University of Cagliari, Italy 761
Chan, Yuen Fook / Universiti Teknologi MARA, Malaysia 130
Chedid, Marcello / University of Aveiro, Portugal 1282
Chernyshenko, Serge V. / Open University for the Humanities and Economics, Russia 1138
Chigona, Wallace / Department of Information Systems, University of Cape Town, Cape Town, South Africa 1720
Chisanga, Tracy / Copperbelt University, Zambia 243
Chou, Paul / Department of Business Administration, Minghsin University of Science and Technology, Xinfeng, Taiwan 803, 1405
Cittadino, Antonio / Università degli Studi di Torino, Italy 311
Coldwell-Neilson, Jo / Deakin University, Australia 49
Cooper, Trudi / Edith Cowan University, Australia 49
Crawford, Joseph / University of Tasmania, Australia 1616
Cuevas-Cerveró, Aurora / Universidad Complutense de Madrid, Spain 1022

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Daidj, Nabyla / Institut Mines-Télécom Business School, France 1737
Daniel, Harold / University of Maine, USA 1678
Dash, Amar Ranjan / Berhampur University, India 374
De Wet, Lizette / University of the Free State, Bloemfontein, South Africa 1385
Denis, Constance / Université de Sherbrooke, Canada 1060
Di Guardo, Maria Chiara / University of Cagliari, Italy 761
Doore, Brian / University of Maine, USA 1678
Edoh, Thierry O. C. / Technical University of Munich, Germany 1533
Efimova, Yulia A. / Financial University Under the Government of the Russian Federation – Kursk, Russia 1223
Egbuta, Iheanyi Chuku / University of South Wales Business School, UK 332
Elhussein, Mariam Ahmed / University of Dammam, Saudi Arabia 590
Ernst van Aken, Joan / Design Science Research institute, The Netherlands 225
Eryılmaz, Mehmet / Uludağ University, Department of Business Administration, Bursa, Turkey 1889
Esteves, Francisco Madeira / Instituto Politécnico de Setúbal, Portugal 116
Fernandes da Anunciação, Pedro / Instituto Politécnico de Setúbal, Portugal 116
Ferrari, Filippo / Bologna University, Italy 41, 742
Ferreira, Ronaldo da Silva / Universidade de Aveiro, Portugal 501
Fichter, Rachel / Teachers College, Columbia University, New York City, NY, USA 23
Fiermonte, Francesco / Politecnico di Torino, Italy 311
Finogeev, Alexey G. / Penza State University, Russia 560
Firth, Janet / University of Wolverhampton, UK 1427
Fischer, Anne / Chemnitz University of Technology, Germany 700
Franck, Edwiygh / The Greatest You Yet!, USA 2011
Furda, Robert / Department of Information Systems, Faculty of Management, Comenius University, Bratislava, Slovakia 1704
Gajardo, Pablo Alfonso / University of Lleida, Lleida, Chile 886
Galli, Brian J. / Assistant Professor and Graduate Program Director, Master of Science in Engineering Management Industrial Engineering, Hofstra University, USA 1692, 1901
Gamidullaeva, Leyla A. / Penza State University, Russia 560, 1223
Garnero, Gabriele / Università degli Studi di Torino, Italy 311
Gavrilova, Olga / Petrozavodsk State University, Russia 1138
Glahn, Christian / Leiden-Delft-Erasmus Center for Education and Learning, Switzerland 908
Gloet, Marianne / University of Melbourne, Australia 1119
Gökmen, Aytaç / Çankaya University, Turkey 1340
Gonçalves, Ramiro / INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal 70
Goyal, Praveen / Department of Management, Birla Institute of Technology & Science, Pilani, India 1005
Graham, Christian / University of Maine, USA 1678
Gregus, Michal / Department of Information Systems, Faculty of Management, Comenius University, Bratislava, Slovakia 1704
Güçlü, Burçin / BES La Salle, Universitat Romon Llull, Barcelona, Spain 415
Guerreschi, Paola / Università degli Studi di Torino, Italy 311
Gupta, Manish / IBS, IFHE University, India 1998
Hambley, Laura A. / Work EvOHlution, Canada 279
Hamlin, Robert G. / University of Wolverhampton, UK 1792

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hannibal, Claire / Manchester Metropolitan University, UK 1427
Hrustek, Nikolina Žajdela / University of Zagreb, Zagreb, Croatia 540
Imanaka, Jessica L. / Seattle University, USA 1081
Ioffe, Anastasiia / Petrozavodsk State University, Russia 1138
Iqbal, Qaisar / Universiti Sains Malaysia, Malaysia 1578
Jääskeläinen, Pia / South-Eastern Finland University of Applied Sciences, Finland 2033
Jamil, George Leal / FUMEC University, Brazil 1834
Janssens, Jürgen / asUgo Consulting, Belgium 1199
Jones, Jenni / University of Wolverhampton, UK 1427
Justinek, Gorazd / Graduate School of Government and European Studies, Slovenia 432
Kamboj, Shampy / Department of Management Studies, Indian Institute of Technology, Roorkee, India 1005
Kanarev, Sergey / Penza State University, Russia 560
Kapondera, Sellina Khumbo / Mzuzu University, Mzuzu, Malawi & Royal Holloway University of London, London, UK 1720
Kerse, Gökhan / Karamanoğlu Mehmetbey University, Turkey 1
Kesim, Mehmet / Anadolu University, Turkey 1037
Khoury, Grace / Birzeit Univeristy, Palestine 1451
Kim, Hyojeong / Department of Hospitality Management, Kyung Hee University, Seoul, South Korea 1821
Kim, Junghwan / University of Oklahoma, USA 723
Kirche, Elias T. / Department of Information Systems and Operations Management, Lutgert College of Business, Florida Gulf Coast University, Fort Myers, USA 1300
Kofuji, Sergio Takeo / Universidade de Sao Paulo, Brazil 838
Konak, Abdullah / Penn State Berks, Reading, USA 1660
Kondratieva, Zoya A. / Financial University Under the Government of the Russian Federation – Kursk, Russia 1223
Kryachkova, Ludmila I. / Financial University Under the Government of the Russian Federation – Kursk, Russia 1223
Kuhn, Jane M. / University of Minnesota, USA 823
Kulturel-Konak, Sadan / Penn State Berks, Reading, USA 1660
La Paz, Ariel I. / University of Chile, Lleida, Chile 886
La Riccia, Luigi / Politecnico di Torino, Italy 311
Laitano, María Inés / LabSic, Université Paris 13, Villetaneuse, France 191
Larios-Hernandez, Guillermo J. / Universidad Anahuac Mexico, Mexico 1100
Lee, James J. / Seattle University, USA 1081
Levy, Moria / Bar Ilan University, Israel 990
Lim, Doo Hun / University of Oklahoma, USA 723
Lima, Ana / Polytechnic of Porto, Portugal 1916
Lima, Ana Carolina Oliveira / University of Aveiro, Portugal 501
Lison, Christelle / Université de Sherbrooke, Canada 1060
Loi, Michela / University of Cagliari, Italy 761
Loko, Laura Y. / National University of Sciences, Technology, Engineering and Mathematics, Benin 1533
Major, Debra A. / Old Dominion University, Norfolk, USA 614
Mândricel, Diana Andreea / Titu Maiorescu University, Romania 952

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Markosyan, Svetlana / HHH University, Australia 1138
Marku, Elona / University of Cagliari, Italy 761
Marsh, Elizabeth / Coventry University, Warwickshire, UK 1638
Martínez, Paloma / Department of Computer Science, Universidad Carlos III de Madrid, Madrid, Spain 354
Martins, Alaide Barbosa / Universidade de Sao Paulo, Brazil 838
Martins, Ana Isabel / Institute of Electronics and Informatics Engineering of Aveiro, Portugal 501
Martins, José / INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal 70
Matukin, Sergey V. / Penza State University, Russia 1223
Mbale, Jameson / Copperbelt University, Zambia 243
McCloskey, Donna Weaver / Widener University, USA 1955
Mekovec, Renata / University of Zagreb, Zagreb, Croatia 540
Mendes, Joana Catarina / Instituto de Telecomunicações Campus Universitário de Santiago, Portugal 501
Mendy, John / University of Lincoln, UK 93
Merkulova, Natalia S. / Kursk State University, Russia 1223
Miller, Christine Elizabeth / California State University – Sacramento, USA 1366
Mkrttchian, Vardan / HHH University, Australia 1138
Mohanty, Sasmita / University of Aveiro, Portugal 1245
Molnar, Robert M. / Technical College of Applied Sciences in Zrenjanin, Serbia 202
Moreno, Lourdes / Advanced Databases Group, Department of Computer Science, Universidad Carlos III de Madrid, Madrid, Spain 354
Mukhtar, Nusrah Ahmad / Universiti Teknologi MARA, Malaysia 130
Murdoch, Donna / Teachers College, Columbia University, New York City, NY, USA 23
Nafea, Rania Mohy El Din / Seneca College, Canada 1977
Nair, Jessy / PES University, India 165
Naniopoulos, Aristotelis / Aristotle University of Thessaloniki, Greece 1472
Nawaz, Rashid / University of Education, Pakistan 1578
Noordin, Norsidah Mohammed / Universiti Teknologi MARA, Malaysia 130
Ogunseyin, Michael / University of Wolverhampton, UK 1427
Ololube, Dennis Ogutum / Department of Public Administration,Faculty of Management Sciences,Ambrose Alli University, Ekpoma, Nigeria 1750
Ololube, Nwachukwu Prince / Department of Educational Management and Planning, Faculty of Education, Ignatius Ajuru University of Education,Port Harcourt, Nigeria 1750
Oncioiu, Ionica / Titu Maiorescu University, Romania 952
O'Neill, Thomas A. / University of Calgary, Canada 279
Ossiannilsson, Ebba S. I. / ICDE OER Advocacy Committee, Sweden 1935
Owens, Jonathan D. / University of Salford, UK 1496
Pacheco, Jorge / Polytechnic of Porto, Portugal 1916
Páscoa, Carlos / Portuguese Air Force Academy, Pêro Pinheiro, Portugal 1317
Patra, Manas Ranjan / Berhampur University, India 374
Patterson, Nick / Deakin University, Australia 49
Pawar, Pravin Amrut / Philips Research, India 1533
Pawliczek, Adam / Technical University of Ostrava, Czech Republic & Moravian University College Olomouc, Czech Republic 966
Peixoto, Carlos / INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal 70

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pihir, Igor / University of Zagreb, Zagreb, Croatia....540
Quast, Louis Neumann / University of Minnesota, USA....823
Rahman, Zillur / Department of Management Studies, Indian Institute of Technology, Roorkee, India....1005
Ramachandran, P. G. / IBM, USA....449
Raspor, Andrej / DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia....662
Reddy, D. Bhanu Sree / VIT University, India....165
Reynoldson, Katelyn R. / Old Dominion University, Norfolk, USA....614
Rocha, Nelson Pacheco / University of Aveiro, Portugal....501
Rössler, Miroslav / Moravian University College Olomouc, Czech Republic....966
Rozman, Tomislav / DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia....662
Sabri, Ehap / KPMG LLP, USA & University of Texas at Dallas, USA....640
Salem, Philip J. / Texas State University, USA....931
Sanchez, Marisa Analía / Universidad Nacional del Sur, Argentina....463
Santos, Tiago / Portuguese Air Force Academy, Pêro Pinheiro, Portugal....1317
Sedej, Tanja / Graduate School of Government and European Studies, Slovenia....432
Shkarupeta, Elena V. / Voronezh State Technical University, Russia....560
Silva, Rafael de Amorim / Federal University of Alagoas, Maceió, Brazil....1868
Silvius, Gilbert / LOI University of Applied Sciences, The Netherlands & University of Johannesburg, South Africa....152
Siqueira, Sean Wolfgand Matsui / Federal University of the State of Rio de Janeiro (UNIRIO), Rio de Janeiro, Brazil....1868
Širok, Klemen / University of Primorska, Slovenia....2033
Skowron-Mielnik, Beata / Poznan University of Economics and Business, Poland....1159
Stjepanovič, Tanja Kocjan / DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia....662
Streator, Joycelyn / Georgia Institute of Technology, USA....523
Suh, Chang Juck / Department of Management, Sogang University, Seoul, South Korea....1821
Surovitskaya, Galina V. / K. G. Razumovsky Moscow State University of Technologies and Management, Russia....560
Talat, Usman / University of Salford, UK....1496
Teixeira de Azevedo, Marcelo / Universidade de São Paulo, Brazil....838
Teixeira, Leonor / University of Aveiro, Portugal....1282
Telha, Ana / Portuguese Air Force Academy, Pêro Pinheiro, Portugal....1317
Thomas, Brychan / University of South Wales Business School, UK....332
Tolstykh, Tatyana O. / NUST MISIS, Russia....560
Toplu, Esra Kilicarslan / Seneca College, Canada....1977
Tsalis, Panagiotis / Aristotle University of Thessaloniki, Greece....1472
Turner, Paul Steven / Paul Turner HR Limited, UK....1770
Tyler, Whitney A. / Old Dominion University, Norfolk, USA....614
Varty, Christianne T. / Wilfrid Laurier University, Canada....279
Vasin, Sergey M. / Penza State University, Russia....560
Veretekhina, Svetlana / Russian State Social University, Russia....1138
Verkijika, Silas Formunyuy / University of the Free State, Bloemfontein, South Africa....1385
Vico, Franco / Politecnico di Torino, Italy....311
Vieira, Maria de Fatima Queiroz / Federal University of Campina Grande, Brazil....501

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wainwright, David W. / Northumbria University, UK 1593
Wang, Yan / Xidian University, China 687
Waring, Teresa S. / Northumbria University, UK 1593
Wojtkowiak, Grzegorz / Poznan University of Economics and Business, Poland 1159
Wu, Zhensen / Xidian University, China 687
Yadav, Mayank / Department of Management Studies, Indian Institute of Technology, Roorkee, India 1005
You, Jieun / Ohio State University, USA 723
Yucebas, Elif / Dokuz Eylul University, Turkey 866
Zhao, Fan / Department of Information Systems and Operations Management, Lutgert College of Business, Florida Gulf Coast University, Fort Myers, USA 1300

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table of Contents

Preface xxiv

Section 1
Fundamental Concepts and Theories

Chapter 1
Change and Change Management in Organizations 1
Gökhan Kerse, Karamanoğlu Mehmetbey University, Turkey

Chapter 2
From Doing Digital to Being Digital: Exploring Workplace Adoption of Technology in the Age of Digital Disruption 23
Donna Murdoch, Teachers College, Columbia University, New York City, NY, USA
Rachel Fichter, Teachers College, Columbia University, New York City, NY, USA

Chapter 3
Everything Must Change Because Nothing Changes: A History of Organizational Change in the Italian Banking Sector 41
Filippo Ferrari, Bologna University, Italy

Chapter 4
Capability Demands of Digital Service Innovation 49
Jo Coldwell-Neilson, Deakin University, Australia
Trudi Cooper, Edith Cowan University, Australia
Nick Patterson, Deakin University, Australia

Section 2
Development and Design Methodologies

Chapter 5
A Multi-Perspective Theoretical Analysis to Web Accessibility 70
Carlos Peixoto, INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal
Frederico Branco, INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal
José Martins, INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal
Ramiro Gonçalves, INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 6
Rethinking the Contribution of Organizational Change to the Teaching and Learning of Organizational Behaviour and Human Resource Management: The Quest for Balance 93
John Mendy, University of Lincoln, UK

Chapter 7
Challenges to Business Models in the Digital Transformation Context 116
Pedro Fernandes da Anunciação, Instituto Politécnico de Setúbal, Portugal
Francisco Madeira Esteves, Instituto Politécnico de Setúbal, Portugal

Chapter 8
Predictive Model of the Influence of Leadership Styles on Attitudes Towards Organizational Change Among Secondary School Teachers in Selangor 130
Yuen Fook Chan, Universiti Teknologi MARA, Malaysia
Nusrah Ahmad Mukhtar, Universiti Teknologi MARA, Malaysia
Norsidah Mohammed Noordin, Universiti Teknologi MARA, Malaysia

Chapter 9
Developing Project Management Maturity as an Organizational Change Process 152
Gilbert Silvius, LOI University of Applied Sciences, The Netherlands & University of Johannesburg, South Africa

Chapter 10
Leveraging Enterprise Resource Planning Systems to Digitize Business Functions 165
Jessy Nair, PES University, India
D. Bhanu Sree Reddy, VIT University, India

Chapter 11
Developing a Participatory Approach to Accessible Design 191
María Inés Laitano, LabSic, Université Paris 13, Villetaneuse, France

Chapter 12
Structural Change Management for Sustainable SME Development: Applying Classical Management Tools 202
Robert M. Molnar, Technical College of Applied Sciences in Zrenjanin, Serbia

Chapter 13
Design Science Research to Produce Instrumental Knowledge for Evidence-Based Practice in OCD 225
Joan Ernst van Aken, Design Science Research institute, The Netherlands

Chapter 14
Integration of ICTs in Radio Programs (II-RP) for Environmental Awareness for Peasant Farmers of Rural Zambia 243
Tracy Chisanga, Copperbelt University, Zambia
Jameson Mbale, Copperbelt University, Zambia

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 15
The Conceptual Framework for The Examination of a Successful Digital Entrepreneurship in 21st Century 263
Bilal Ahmad Ali Al-khateeb, Al Imam Mohammad Ibn Saud Islamic University, Saudi Arabia

Chapter 16
Leading Anywhere Workers: A Scientific and Practical Framework 279
Christianne T. Varty, Wilfrid Laurier University, Canada
Thomas A. O'Neill, University of Calgary, Canada
Laura A. Hambley, Work EvOHlution, Canada

Chapter 17
The Walkability of the Cities: Improving It Through the Reuse of Available Data and Raster Analyses 311
Luigi La Riccia, Politecnico di Torino, Italy
Antonio Cittadino, Università degli Studi di Torino, Italy
Francesco Fiermonte, Politecnico di Torino, Italy
Gabriele Garnero, Università degli Studi di Torino, Italy
Paola Guerreschi, Università degli Studi di Torino, Italy
Franco Vico, Politecnico di Torino, Italy

Chapter 18
Teleworking and a Green Computing Environment: A Conceptual Model 332
Iheanyi Chuku Egbuta, University of South Wales Business School, UK
Brychan Thomas, University of South Wales Business School, UK
Said Al-Hasan, University of South Wales Business School, UK

Section 3
Tools and Technologies

Chapter 19
Accessibility Compliance for E-Government Websites: Laws, Standards, and Evaluation Technology 354
Lourdes Moreno, Advanced Databases Group, Department of Computer Science, Universidad Carlos III de Madrid, Madrid, Spain
Paloma Martínez, Department of Computer Science, Universidad Carlos III de Madrid, Madrid, Spain

Chapter 20
Ensuring Quality of Web Portals Through Accessibility Analysis 374
Amar Ranjan Dash, Berhampur University, India
Manas Ranjan Patra, Berhampur University, India

Chapter 21
The Destructive Effect of Complex Analytics on Innovativeness 415
Burçin Güçlü, BES La Salle, Universitat Romon Llull, Barcelona, Spain
Miguel-Ángel Canela, IESE Business School, University of Navarra, Barcelona, Spain

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 22
Effective Tools for Improving Employee Feedback during Organizational Change 432
Tanja Sedej, Graduate School of Government and European Studies, Slovenia
Gorazd Justinek, Graduate School of Government and European Studies, Slovenia

Chapter 23
Accessible and Inclusive Content and Applications 449
Tom Brunet, IBM, USA
P. G. Ramachandran, IBM, USA

Chapter 24
How Internet of Things Is Transforming Project Management 463
Marisa Analía Sanchez, Universidad Nacional del Sur, Argentina

Chapter 25
Graph Tools for Social Network Analysis 485
Nadeem Akhtar, Aligarh Muslim University, India
Mohd Vasim Ahamad, Aligarh Muslim University, India

Chapter 26
Impact of Evaluating the Usability of Assisted Technology Oriented by Protocol 501
Ana Carolina Oliveira Lima, University of Aveiro, Portugal
Maria de Fatima Queiroz Vieira, Federal University of Campina Grande, Brazil
Ana Isabel Martins, Institute of Electronics and Informatics Engineering of Aveiro, Portugal
Nelson Pacheco Rocha, University of Aveiro, Portugal
Joana Catarina Mendes, Instituto de Telecomunicações Campus Universitário de Santiago, Portugal
Ronaldo da Silva Ferreira, Universidade de Aveiro, Portugal

Chapter 27
Collaborative Systems for Design-Based Learning 523
Joycelyn Streator, Georgia Institute of Technology, USA

Chapter 28
Developing and Validating Measurement Instrument for Various Aspects of Digital economy: e-Commerce, e-Banking, e-Work and e-Employment 540
Nikolina Žajdela Hrustek, University of Zagreb, Zagreb, Croatia
Renata Mekovec, University of Zagreb, Zagreb, Croatia
Igor Pihir, University of Zagreb, Zagreb, Croatia

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 29
Emergence of Industry 4.0 Technologies: Leapfrogging Opportunity for the Russian Federation 560
Leyla A. Gamidullaeva, Penza State University, Russia
Sergey M. Vasin, Penza State University, Russia
Elena V. Shkarupeta, Voronezh State Technical University, Russia
Tatyana O. Tolstykh, NUST MISIS, Russia
Alexey G. Finogeev, Penza State University, Russia
Galina V. Surovitskaya, K. G. Razumovsky Moscow State University of Technologies and Management, Russia
Sergey Kanarev, Penza State University, Russia

Chapter 30
Design Solutions Guided by User Behavior: A Practical Inquiry Approach 590
Mariam Ahmed Elhussein, University of Dammam, Saudi Arabia

Chapter 31
Women in STEM Workplaces and Computer-Mediated Communication: Obstacle or Advantage? . 614
Seterra D. Burleson, Old Dominion University, Norfolk, USA
Whitney A. Tyler, Old Dominion University, Norfolk, USA
Debra A. Major, Old Dominion University, Norfolk, USA
Katelyn R. Reynoldson, Old Dominion University, Norfolk, USA

Chapter 32
Mastering Change Management for Successful Digital Supply Chain Transformations 640
Ehap Sabri, KPMG LLP, USA & University of Texas at Dallas, USA

Chapter 33
An Analysis of Web-based Document Management and Communication Tools Usage Among Project Managers..... 662
Tomislav Rozman, DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia
Tanja Kocjan Stjepanovič, DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia
Andrej Raspor, DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia

Chapter 34
Evaluating Wireless Network Accessibility Performance via Clustering-Based Model: An Analytic Methodology 687
Yan Wang, Xidian University, China
Zhensen Wu, Xidian University, China

Chapter 35
Digitization and Sustainability: Threats, Opportunities, and Trade-Offs 700
Marlen Gabriele Arnold, Chemnitz University of Technology, Germany
Anne Fischer, Chemnitz University of Technology, Germany

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 4
Utilization and Applications

Chapter 36
Organizational Learning and Change: Strategic Interventions to Deal with Resistance 723
Jieun You, Ohio State University, USA
Junghwan Kim, University of Oklahoma, USA
Doo Hun Lim, University of Oklahoma, USA

Chapter 37
Facing Organizational Change: An Italian Perspective on Six Challenges for Organizational Change Practitioners 742
Filippo Ferrari, University of Bologna, Italy

Chapter 38
Mapping Innovation in the Digital Transformation Era: The Role of Technology Convergence..... 761
Elona Marku, University of Cagliari, Italy
Manuel Castriotta, University of Cagliari, Italy
Maria Chiara Di Guardo, University of Cagliari, Italy
Michela Loi, University of Cagliari, Italy

Chapter 39
The Accessibility, Usability, Quality and Readability of Turkish State and Local Government Websites an Exploratory Study 780
Yakup Akgül, Alanya Alaaddin Keykubat University, Alanya, Turkey

Chapter 40
Transformational Leadership and Attitude Toward Enterprise Resource Planning System: A Perspective of Organizational Change 803
Paul Chou, Department of Business Administration, Minghsin University of Science and Technology, Xinfeng, Taiwan

Chapter 41
Organization-Wide Culture Change in a Large Healthcare Organization: A Case History..... 823
Louis Neumann Quast, University of Minnesota, USA
Jane M. Kuhn, University of Minnesota, USA

Chapter 42
Digital Transformation in the Utilities Industry: Industry 4.0 and the Smart Network Water 838
Marcelo Teixeira de Azevedo, Universidade de São Paulo, Brazil
Alaide Barbosa Martins, Universidade de Sao Paulo, Brazil
Sergio Takeo Kofuji, Universidade de Sao Paulo, Brazil

Chapter 43
The Transformation of the Public Administration in the Multi-Level Governance Era 866
Elif Yucebas, Dokuz Eylul University, Turkey

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 44
Measuring Business-IT Alignment in a Digitally Revolutionized Economy 886
Pablo Alfonso Gajardo, University of Lleida, Lleida, Chile
Ariel I. La Paz, University of Chile, Lleida, Chile

Chapter 45
Measuring the Digital Transformation of Education and Teaching..... 908
Christian Glahn, Leiden-Delft-Erasmus Center for Education and Learning, Switzerland

Chapter 46
Transformative Organizational Communication Practices 931
Philip J. Salem, Texas State University, USA

Chapter 47
Reflections on the Effect of Organizational Restructuring: Evidence From Albania..... 952
Ionica Oncioiu, Titu Maiorescu University, Romania
Diana Andreea Mândricel, Titu Maiorescu University, Romania

Chapter 48
Knowledge of Management Tools and Systems in SMEs: Knowledge Transfer in Management..... 966
Adam Pawliczek, Technical University of Ostrava, Czech Republic & Moravian University College Olomouc, Czech Republic
Miroslav Rössler, Moravian University College Olomouc, Czech Republic

Chapter 49
Change Management Serving Knowledge Management and Organizational Development: Reflections and Review..... 990
Moria Levy, Bar Ilan University, Israel

Chapter 50
Impact of Social CRM Capabilities on Firm Performance: Examining the Mediating Role of Co-Created Customer Experience..... 1005
Shampy Kamboj, Department of Management Studies, Indian Institute of Technology, Roorkee, India
Mayank Yadav, Department of Management Studies, Indian Institute of Technology, Roorkee, India
Zillur Rahman, Department of Management Studies, Indian Institute of Technology, Roorkee, India
Praveen Goyal, Department of Management, Birla Institute of Technology & Science, Pilani, India

Chapter 51
Policies Information Literacy, Equality, and Gender: The Case of Spanish Prisons..... 1022
María Antonia Agúndez-Soriano, Colegio Universitario de Estudios Financieros, Spain
Aurora Cuevas-Cerveró, Universidad Complutense de Madrid, Spain

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 52
Culture, Technology, and Education in the Digital Age: A Conceptual Framework..... 1037
Mehmet Kesim, Anadolu University, Turkey

Chapter 53
Digital and Collaborative Work: Winning Couple?..... 1060
Christelle Lison, Université de Sherbrooke, Canada
Constance Denis, Université de Sherbrooke, Canada

Chapter 54
Theorizing Virtuality in Enterprise Social Systems 1081
James J. Lee, Seattle University, USA
Jessica L. Imanaka, Seattle University, USA

Chapter 55
Coworking Spaces and the Transcendence of Social Innovation Knowledge in the Smart Territory 1100
Guillermo J. Larios-Hernandez, Universidad Anahuac Mexico, Mexico
Alberto Borbolla-Albores, Universidad Anahuac Mexico, Mexico

Chapter 56
Telework and People with Disabilities: Perspectives of Managers and Employees from Australia. 1119
Rachelle Bosua, University of Melbourne, Australia
Marianne Gloet, University of Melbourne, Australia

Chapter 57
The Cross-Cultural Analysis of Australia and Russia: Cultures, Small Businesses, and Crossing the Barriers..... 1138
Vardan Mkrttchian, HHH University, Australia
Svetlana Veretekhina, Russian State Social University, Russia
Olga Gavrilova, Petrozavodsk State University, Russia
Anastasiia Ioffe, Petrozavodsk State University, Russia
Svetlana Markosyan, HHH University, Australia
Serge V. Chernyshenko, Open University for the Humanities and Economics, Russia

Chapter 58
The Flexibility of the Workplace and Working Time: Analysis of Employees' Preferences in Poland 1159
Beata Skowron-Mielnik, Poznan University of Economics and Business, Poland
Grzegorz Wojtkowiak, Poznan University of Economics and Business, Poland

Chapter 59
Strategic Leadership, Readiness for Change, and Innovative Work Behavior: A Field Study From Turkey 1177
Meltem Akca, Istanbul University, Turkey

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 60
Managing and Shaping Change in International Projects 1199
Jürgen Janssens, asUgo Consulting, Belgium

Chapter 61
Emerging Trends and Opportunities for Industry Development at the Sub-National Level in Russia 1223
Leyla A. Gamidullaeva, Penza State University, Russia
Natalia S. Merkulova, Kursk State University, Russia
Ludmila I. Kryachkova, Financial University Under the Government of the Russian Federation – Kursk, Russia
Zoya A. Kondratieva, Financial University Under the Government of the Russian Federation – Kursk, Russia
Yulia A. Efimova, Financial University Under the Government of the Russian Federation – Kursk, Russia
Sergey V. Matukin, Penza State University, Russia

Chapter 62
Restructuring and Globalization of Telecommunications Industry 1245
Sasmita Mohanty, University of Aveiro, Portugal

Chapter 63
The Significance of Trust to the Adoption of E-Working Practices Within Local Government 1266
Hazel Beadle, University of Chichester, Bognor Regis, UK

Chapter 64
The Knowledge Management Culture: An Exploratory Study in Academic Context 1282
Marcello Chedid, University of Aveiro, Portugal
Leonor Teixeira, University of Aveiro, Portugal

Chapter 65
ERP On-Premise or On-Demand 1300
Fan Zhao, Department of Information Systems and Operations Management, Lutgert College of Business, Florida Gulf Coast University, Fort Myers, USA
Elias T. Kirche, Department of Information Systems and Operations Management, Lutgert College of Business, Florida Gulf Coast University, Fort Myers, USA

Chapter 66
Online Organization: A Flexible, Agile and Adaptable Organizational Instrument 1317
Carlos Páscoa, Portuguese Air Force Academy, Pêro Pinheiro, Portugal
Ana Telha, Portuguese Air Force Academy, Pêro Pinheiro, Portugal
Tiago Santos, Portuguese Air Force Academy, Pêro Pinheiro, Portugal

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 5
Organizational and Social Implications

Chapter 67
Contemporary Change Management and Leadership in Local and International Businesses..... 1340
Aytaç Gökmen, Çankaya University, Turkey

Chapter 68
Leading Digital Transformation in Higher Education: A Toolkit for Technology Leaders 1366
Christine Elizabeth Miller, California State University – Sacramento, USA

Chapter 69
Determining the Accessibility of e-Government Websites in Sub-Saharan Africa Against WCAG 2.0 Standard 1385
Silas Formunyuy Verkijika, University of the Free State, Bloemfontein, South Africa
Lizette De Wet, University of the Free State, Bloemfontein, South Africa

Chapter 70
Workplace Social Support and Attitude toward Enterprise Resource Planning System: A Perspective of Organizational Change 1405
Paul Chou, Minghsin University of Science & Technology, Xinfen, Taiwan

Chapter 71
Factors Contributing to Organizational Change Success or Failure: A Qualitative Meta-Analysis of 200 Reflective Case Studies..... 1427
Jenni Jones, University of Wolverhampton, UK
Janet Firth, University of Wolverhampton, UK
Claire Hannibal, Manchester Metropolitan University, UK
Michael Ogunseyin, University of Wolverhampton, UK

Chapter 72
Resistance to Organizational Change in Academia: A Case Study From Palestine Investigating the Under-Reflected Role of Change Agents 1451
Devi Akella, Albany State University, USA
Grace Khoury, Birzeit Univeristy, Palestine

Chapter 73
Accessibility Improvement Interventions at Byzantine Monuments: Use of Technology for Facilitating Accessibility of Visitors With Sensory Disabilities 1472
Aristotelis Naniopoulos, Aristotle University of Thessaloniki, Greece
Panagiotis Tsalis, Aristotle University of Thessaloniki, Greece

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 74
Knowledge Transfer Openness Matrix Facilitating Accessibility in UK Management Education Teaching 1496
Jonathan D. Owens, University of Salford, UK
Usman Talat, University of Salford, UK

Chapter 75
Corporates in the Digital Age 1519
Hammad Azzam, Independent Researcher, USA

Chapter 76
Challenges Facing Health Service Delivery in Developing Countries and Solution Approaches: The Case of Benin, a West-African Developing Country 1533
Thierry O. C. Edoh, Technical University of Munich, Germany
Pravin Amrut Pawar, Philips Research, India
Laura Y. Loko, National University of Sciences, Technology, Engineering and Mathematics, Benin

Chapter 77
Rife Information Pollution (Infollution) and Virtual Organizations in Industry 4.0: Within Reality Causes and Consequences 1578
Qaisar Iqbal, Universiti Sains Malaysia, Malaysia
Rashid Nawaz, University of Education, Pakistan

Chapter 78
Enterprise Systems, Power and Improvisation: Equipping Universities for Mass Production? 1593
David W. Wainwright, Northumbria University, UK
Teresa S. Waring, Northumbria University, UK

Chapter 79
Digitally Empowered Workers and Authentic Leaders: The Capabilities Required for Digital Services 1616
Joseph Crawford, University of Tasmania, Australia
Kerryn Butler-Henderson, University of Tasmania, Australia

Chapter 80
Understanding the Effect of Digital Literacy on Employees' Digital Workplace Continuance Intentions and Individual Performance 1638
Elizabeth Marsh, Coventry University, Warwickshire, UK

Chapter 81
Impact of Online Teamwork Self-Efficacy on Attitudes Toward Teamwork 1660
Abdullah Konak, Penn State Berks, Reading, USA
Sadan Kulturel-Konak, Penn State Berks, Reading, USA

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 82
Virtual Leadership: How Millennials Perceive Leadership Attribution and Its Impact on Database System Development 1678
Christian Graham, University of Maine, USA
Harold Daniel, University of Maine, USA
Brian Doore, University of Maine, USA

Chapter 83
Critical Thinking of Human Resources in the Goal: A Research Note 1692
Brian J. Galli, Assistant Professor and Graduate Program Director, Master of Science in Engineering Management Industrial Engineering, Hofstra University, USA

Chapter 84
Impediments in Healthcare Digital Transformation 1704
Robert Furda, Department of Information Systems, Faculty of Management, Comenius University, Bratislava, Slovakia
Michal Gregus, Department of Information Systems, Faculty of Management, Comenius University, Bratislava, Slovakia

Chapter 85
Domestication of Telecentres by Malawian Rural Women..... 1720
Sellina Khumbo Kapondera, Mzuzu University, Mzuzu, Malawi & Royal Holloway University of London, London, UK
Wallace Chigona, Department of Information Systems, University of Cape Town, Cape Town, South Africa

Section 6
Managerial Impact

Chapter 86
Strategic and Business-IT Alignment Under Digital Transformation: Towards New Insights?..... 1737
Nabyla Daidj, Institut Mines-Télécom Business School, France

Chapter 87
Organizational Change Management: Perceptions, Attitude, Application, and Change Management Practices in Nigerian Universities 1750
Nwachukwu Prince Ololube, Department of Educational Management and Planning, Faculty of Education, Ignatius Ajuru University of Education,Port Harcourt, Nigeria
Dennis Ogutum Ololube, Department of Public Administration,Faculty of Management Sciences,Ambrose Alli University, Ekpoma, Nigeria

Chapter 88
Leading, Managing, and Facilitating Organizational Change 1770
Paul Steven Turner, Paul Turner HR Limited, UK

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 89
Organizational Change and Development: The Case for Evidence-Based Practice 1792
Robert G. Hamlin, University of Wolverhampton, UK

Chapter 90
Are Managers Making the Right Choice? IT Investment for Smart Work 1821
Hyojeong Kim, Department of Hospitality Management, Kyung Hee University, Seoul, South Korea
Chang Juck Suh, Department of Management, Sogang University, Seoul, South Korea

Chapter 91
The Information and the Strategy Business 1834
George Leal Jamil, FUMEC University, Brazil

Section 7
Critical Issues and Challenges

Chapter 92
The Use of Software Tools in Linked Data Publication and Consumption: A Systematic Literature Review 1868
Armando Barbosa, Federal University of Alagoas, Maceió, Brazil
Ig Ibert Bittencourt, Federal University of Alagoas, Maceió, Brazil
Sean Wolfgand Matsui Siqueira, Federal University of the State of Rio de Janeiro (UNIRIO), Rio de Janeiro, Brazil
Rafael de Amorim Silva, Federal University of Alagoas, Maceió, Brazil
Ivo Calado, Federal Institute of Alagoas, Rio Largo, Brazil

Chapter 93
A Discussion on the Relationship Between Information and Communication Technologies (ICT) and Entrepreneurship 1889
Mehmet Eryılmaz, Uludağ University, Department of Business Administration, Bursa, Turkey

Chapter 94
Continuous Improvement Maturity Models: How to View Them Effectively 1901
Brian J. Galli, Assistant Professor and Graduate Program Director, Master of Science in Engineering Management Industrial Engineering, Hofstra University, USA

Section 8
Emerging Trends

Chapter 95
New Trends and Tools for Customer Relationship: Challenges in Digital Transformation 1916
Ana Lima, Polytechnic of Porto, Portugal
Jorge Pacheco, Polytechnic of Porto, Portugal

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 96
Transhumanism and Innovative Leadership: A Question of Quality 1935
Ebba S. I. Ossiannilsson, ICDE OER Advocacy Committee, Sweden

Chapter 97
Exploring the Impact of Flexible and Permeable Work-Life Boundaries in a Mobile World 1955
Donna Weaver McCloskey, Widener University, USA

Chapter 98
Future of Education in Industry 4.0: Educational Digitization – A Canadian Case Study 1977
Rania Mohy El Din Nafea, Seneca College, Canada
Esra Kilicarslan Toplu, Seneca College, Canada

Chapter 99
Liquid Workforce: The Workforce of the Future 1998
Manish Gupta, IBS, IFHE University, India

Chapter 100
Distributed Work Environments: The Impact of Technology in the Workplace 2011
Edwiygh Franck, The Greatest You Yet!, USA

Chapter 101
What Does the Future Hold for Innovation Management Education? 2033
Klemen Širok, University of Primorska, Slovenia
Pia Jääskeläinen, South-Eastern Finland University of Applied Sciences, Finland

Index xxviii

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Preface

As technology advances and becomes increasingly integrated in the workplace, digital transformation research has been brought to the forefront of modern investigations on organizational success and business modeling. The continual improvement and utilization of technology, especially in a world that is relying more heavily on remote work, has led to innovation and change in virtually all types of workplace atmospheres. Understanding how to adapt to these changes, implement technology, and successfully navigate these new uncharted advancements is essential to successful business management in the changing work environment. Examining current research, case studies, and applications can lead to a greater understanding of the technological, economic, and social implications; advancements; and issues related to digital transformation, organizational change, and remote work.

Staying informed of the most up-to-date research trends and findings is of the utmost importance. That is why IGI Global is pleased to offer this four-volume reference collection of reprinted IGI Global book chapters and journal articles that have been handpicked by senior editorial staff. This collection will shed light on critical issues related to the trends, techniques, and uses of various applications by providing both broad and detailed perspectives on cutting-edge theories and developments. This collection is designed to act as a single reference source on conceptual, methodological, technical, and managerial issues, as well as to provide insight into emerging trends and future opportunities within the field.

The *Research Anthology on Digital Transformation, Organizational Change, and the Impact of Remote Work* is organized into seven distinct sections that provide comprehensive coverage of important topics. The sections are:

1. Fundamental Concepts and Theories;
2. Development and Design Methodologies;
3. Tools and Technologies;
4. Utilization and Applications;
5. Organizational and Social Implications;
6. Managerial Impact;
7. Critical Issues and Challenges; and
8. Emerging Trends.

The following paragraphs provide a summary of what to expect from this invaluable reference tool.

Section 1, "Fundamental Concepts and Theories," serves as a foundation for this extensive reference tool by addressing crucial examples essential to the understanding of how change, innovation, and the digitalization of businesses are transforming the modern workplace. This section opens with the chapter "Change and Change Management in Organizations" written by Prof. Gökhan Kerse of Karamanoğlu

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mehmetbey University, Turkey, which introduces the concept of change and offers some suggestions on change management, resistance to change, and leadership through change culture with applicable examples. Closing this section is, "Capability Demands of Digital Service Innovation," by Profs. Jo Coldwell-Neilson and Nick Patterson of Deakin University, Australia and Prof. Trudi Cooper of Edith Cowan University, Australia, which explores the demands that digital service innovation places on those stakeholders who use the digital service through three lenses: workers and workplace, digital literacy, and finally, digital education.

Section 2, "Development and Design Methodologies," presents in-depth coverage of the ways in which businesses are creating new models of operation and accessible design for the use of technology in the workplace. Opening this section is the chapter "A Multi-Perspective Theoretical Analysis to Web Accessibility" by Profs. Carlos Peixoto, Frederico Branco, José Martins, and Ramiro Gonçalves of INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal, which presents accessibility in information technology, accessibility problems and methods and chance mentalities in web accessibility implementation. Ending the section is the chapter "Teleworking and a Green Computing Environment: A Conceptual Model," authored by Profs. Iheanyi Chuku Egbuta, Brychan Thomas, and Said Al-Hasan of the University of South Wales Business School, UK, which considers strategic green issues of teleworking in terms of the environment, transport, location, office space, and resource use for modern organizations and business sectors and formulates a conceptual model of the processes involved.

Section 3, "Tools and Technologies," explores the various tools and technologies used to assist the online workplace and advance the performance of various aspects in digitalized business procedures. The chapter "Accessibility Compliance for E-Government Websites: Laws, Standards, and Evaluation Technology" by Profs. Lourdes Moreno and Paloma Martínez of Universidad Carlos III de Madrid, Madrid, Spain, opens this section by presenting the regulatory framework regarding accessibility, a survey of the technology, and a proposal of good practices concerning technology which evaluates accessibility as a support resource. To conclude this section, the chapter "Digitization and Sustainability: Threats, Opportunities, and Trade-Offs," written by Profs. Marlen Gabriele Arnold and Anne Fischer of Chemnitz University of Technology, Germany, provides a review of the literature on digitization and sustainability and compiles a SWOT table and a concept map for visualizing key topics in light of digitization and sustainability.

Section 4, "Utilization and Applications," describes how technology is being used and applied throughout various types of organizations and businesses in diverse fields of work. The opening chapter, "Organizational Learning and Change Strategic Interventions to Deal With Resistance," by Profs. Doo Hun Lim and Junghwan Kim of University of Oklahoma, USA and Prof. Jieun You of Ohio State University, USA, suggests that HR/HRD should play a role in building the learning organization and facilitating organizational learning for change as a change agent. The concluding chapter, "Online Organization: A Flexible, Agile, and Adaptable Organizational Instrument," by Profs. Carlos Páscoa, Ana Telha, and Tiago Santos of the Portuguese Air Force Academy, Pêro Pinheiro, Portugal, studies an online organization model that represents the concepts of organizational entities, job positions, resource management, and human resource management through competency management to predict future improved effectiveness and efficiency.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 5, "Organizational and Social Implications," includes chapters discussing the organizational and social impact of the implementation of change management and digital transformation into workplaces all around the world. This section starts with the chapter "Contemporary Change Management and Leadership in Local and International Businesses" by Prof. Aytaç Gökmen of Çankaya University, Turkey, which discusses the process of effective change and how this change process affects the organizations at a structural, managerial, and individual basis. The final chapter in this section, "Domestication of Telecentres by Malawian Rural Women," by Prof. Wallace Chigona of University of Cape Town, South Africa and Prof. Sellina Khumbo Kapondera of Mzuzu University, Malawi & Royal Holloway University of London, UK, uses domestication theory to explain the processes through which women in rural Malawi encounter technologies, deal with them, and integrate them into their lives.

Section 6, "Managerial Impact," discusses the impact of organizational change and digital transformation on organization management, managerial decisions, and leadership. The chapter "Strategic and Business-IT Alignment Under Digital Transformation: Towards New Insights?" by Prof. Nabyla Daidj of Institut Mines-Télécom Business School, France starts off this section by analyzing how digital transformation could affect strategic fit and IT-business alignment in modern companies. To conclude the section, "The Information and the Strategy Business" by Prof. George Leal Jamil of FUMEC University, Brazil explores business and information strategies and how managers and companies can adapt to the digital transformation overtaking society.

Section 7, "Critical Issues and Challenges," presents coverage of academic and research perspectives on challenges of technology implementation in the workplace and proposed models for improvement. Opening this section is the chapter "The Use of Software Tools in Linked Data Publication and Consumption: A Systematic Literature Review" by Profs. Armando Barbosa, Ig Ibert Bittencourt, Rafael de Amorim Silva, and Ivo Calado of Federal University of Alagoas, Brazil and Prof. Sean Wolfgand Matsui Siqueira of Federal University of the State of Rio de Janeiro (UNIRIO), Brazil, which investigates the use of software tools in Linked Data publication and consumption processes and explores how these software tools are related to process of publication or consumption of linked data. Concluding this section is the chapter "Continuous Improvement Maturity Models: How to View Them Effectively" by Prof. Brian J. Galli of Hofstra University, USA, which analyzes the need for continuous improvement maturity models in a company, the techniques and practice of these models, and the benefits of their implementation.

Section 8, "Emerging Trends," highlights areas for future research within this field. The final section of this resource work opens with the chapter "New Trends and Tools for Customer Relationship: Challenges in Digital Transformation" by Profs. Ana Lima and Jorge Pacheco of the Polytechnic of Porto, Portugal, which explores how digital transformation effects customer interaction and collaboration and recommends new technology and tools for customer support. Closing this reference book is the chapter "What Does the Future Hold for Innovation Management Education?" by Prof. Klemen Širok of the University of Primorska, Slovenia and Prof. Pia Jääskeläinen of South-Eastern Finland University of Applied Sciences, Finland, which aims to identify and describe emerging trends that will most likely put additional pressures on innovation management education and presents a concept of a future-oriented innovation management course.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Although the primary organization of the contents in this multi-volume work is based on its seven sections, offering a progression of coverage of the important concepts, methodologies, technologies, applications, social issues, and emerging trends, the reader can also identify specific contents by utilizing the extensive indexing system listed at the end of each volume. As a comprehensive collection of research on the latest findings related to the intersection of technology and business, the *Research Anthology on Digital Transformation, Organizational Change, and the Impact of Remote Work* provides researchers, administrators, engineers, academicians, managers, business professionals, and academicians with a complete understanding of the impact of digital transformation and organizational change in remote work and business settings. Given the current technological advancements taking place in organizations across all fields of work throughout the world, *Research Anthology on Digital Transformation, Organizational Change, and the Impact of Remote Work* encompasses the most pertinent research in technologies, change, and innovation being employed to improve workplace culture, business processes, and organizational success.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 1

Fundamental Concepts and Theories

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 1
Change and Change Management in Organizations

Gökhan Kerse
Karamanoğlu Mehmetbey University, Turkey

ABSTRACT

The aim of this chapter is to make it easier to understand the concept of change and offer some suggestions on how the change should be managed. In this direction, change, change management, and its importance have been dealt with, and a conceptual framework has been established through examples. Then, the types of change are discussed by explaining what environmental factors bring about the change. The process of managing change is reviewed; the resistance to change and the sources that reveal this resistance are examined, as well as how to overcome the resistance. Finally, the role of the leader in change management and creating change culture has been discussed.

INTRODUCTION

Modern organizations are open systems that take the input they obtain from their environment into a certain process and offer them back to the environment as output, with a relationship with environmental factors. These organizations analyze the variables and parameters around them, collect sufficient data about those variables and parameters and try to keep up with the changing environmental conditions in line with those data. This is because the phenomenon of "change" is gaining importance in modern organizations, in contrast to classical organizations which prioritize protecting their current status and avoiding risks. It is also emphasized that change at both individual and organizational levels is essential (Şimşek, Akgemci & Çelik, 2008, p. 415). Therefore, modern organizations perceive and understand the change emerging in the environment and try to adapt to the change and protect their balance.

In daily life, the concept of change means that something is transformed into something else in a planned or unplanned way in time. Change as mentioned in the management literature involves the change process that generally occurs in a planned way. Planned change aims to develop the organization's adaptive skills towards the developments in the environment and to change the employee behaviors (Robbins & Judge, 2013, p. 580). Thus, planned change requires managerial abilities. Management and change

DOI: 10.4018/978-1-7998-7297-9.ch001

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

are intertwined concepts that complete each other. In the journey of change, your purpose, destination, whom you will take with you on the journey and whom you will leave behind are determined in advance. Hence, activities such as planning, evaluation, implementation and control are carried out before and during the journey and change is tried to be managed.

It is possible to see many examples of businesses that demonstrate the importance of seeing changes in the environment in a timely manner, and managing it in order to gain competitive advantage. For example, Nokia, the leading player in the mobile industry for some time, did not follow the trend change and tried to hold on to the market with its traditional mobile devices while its competitors developed themselves according to changing trends and the result is clear… For this reason, change and change management for organizations is vital.

CHANGE AND ORGANIZATIONAL CHANGE

Think about your life for the last 5 years. What has changed in your life? Where were you five years ago and what business were you doing? Did the products you used change? Has your form of access to information and speed changed? Did the people in your life get diversified?

If you are a business owner, think about what has changed in your business so far from the days you have started it. Has your business provided product range? Have you experienced product, market or technology differentiation? Has the number and profile of your employees changed? Has customer expectation and applications of order delivery changed? Has the number of competitors increased or decreased? If you answer is "yes" to one or more of these questions, we can say that you are experiencing the change. What is the concept of "change", which is a fact of business life as well as private life?

Change in daily life refers to the fact that things alter and do not stay the same, they turn into something else. This transformation includes the change of both the places of people and objects and personal knowledge, ability, etc. to a different situation than its current situation. In the organizational context, change means that the organization comes to a different situation in terms of its activities (van de Ven & Poole, 1995, p. 512). Organizational change is to enter a new field and play the game according to the new rules (Ragsdell, 2000, p. 104). Organizational change is the alteration of the organization's strategy, structure and culture as a consequence of the shift occurring in the organization's environment, structure or technology (Passenheim, 2010, p. 7). This alteration and transformation can be performed in a planned way, or it can be unplanned as well.

In organizations, every work, technology, process and procedure is constantly changing (Nordin, Md Deros, Wahab & Rahman, 2012, p. 106). Constant change includes continuously differentiating and changing any aspect or situation of individuals or organizations (Çetin, 2008, p. 109). Organizations are constantly in the process of producing goods or services that are "cheaper, better quality and quicker" and, in doing so, they have to keep pace with the change. This effort of the organizations reminds the slogan of the Olympic Games known as "citius (quicker), altius (higher), fortius (stronger)" (Şimsek et al., 2008, p. 415). It is necessary for members of the organization to adapt to that kind of life in such an environment where there is a constant change. Because, as in the well-known expression, "the only thing that has not changed in organizations has become the change itself". The speed to respond to customer needs which is a fundamental dimension in today's management approach and stipulated by total quality management has become a demonstration of change in organizations. In today's economic conditions,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

organizations' living in and changing through innovation are seen as an important "life principle" (Koçel, 2011, p. 667-668).

The change has become the norm in most organizations (Quick & Nelson, 2011, p. 588). This norm suggests that there is a wide variation rather than stability and organizations must be "evolutionary organizations" depending on this norm. Otherwise, organizations can hit the glaciers as victims of the "Titanic Syndrome". Because an organization manager who is a victim of Titanic Syndrome cannot respond to environmental conditions just like administrators of the Titanic. These managers have the idea that the ship can sink, but they cannot see the ship sinking slowly by crashing into the glaciers that are seen (Naktiyok, 2004, p. 216). For this reason, it is necessary for organizations and organizational managers to know that the change is a fundamental characteristic of contemporary organizations.

CHANGE MANAGEMENT AND ITS IMPORTANCE

Organizational change is that an organization moves away from its current position and moves towards a desirable situation to increase its effectiveness. The future situation might include a new strategy, changes in organizational culture, a new technological transition, and so on (Champoux, 2011, p. 455). Well, why does an organization need to turn to a situation different from its current state? The answer to this question is that the business environment is constantly changing and the organization must adapt to changing environmental conditions in order to achieve competitive advantage and survive (George & Jones, 2012, p. 533).

Organizations operate in a climate of rapid environmental change, a global economy and intense national and international competition. In such an environment, they form strategies to achieve organizational goals and competitive advantage. These established strategies need to be shaped according to the needs of the environment. That is, organizational strategies should be formed and the change should be managed according to environmental changes and competition factors. Entropy arises if the organization does not adapt the constant change in the environment or if it is against the change (Naktiyok, 2004, p. 215). Therefore, the organization gradually acquires a bureaucratic character and eventually disappears. For this reason, achieving a competitive advantage and sustaining life takes place when organizations manage the change.

Change management is a process of constantly revising the direction, structure and capabilities of an organization in order to serve its ever-changing internal and external customer needs. (Moran & Brightman, 2000, p. 66). Change management is the structuring operation that is carried out so that the organization can renew itself, analyze the opportunities for change, utilize the potential and determine and use the most appropriate strategy in order to survive and outperform their competitors in an environment of constant change (Tunçer, 2013, p. 379). However, change management is not a structure that can come as a "fait accompli" since customer expectations, market status, technology, government regulations, economy, organizational strategies and the workforce structure are constantly changing in the organizational environment. Organizations operating in such an environment of constant change have to obtain new information, absorb this information and be dynamic and flexible at all times. Organizations that are dynamic and flexible towards their environment and meet their need for change in a timely manner continue to exist, whereas those that cannot keep up are faced with "Rigor Mortis". "Rigor mortis" in business is when organizations cannot change and fail to perform the process of change and transformation at the right time, in the appropriate manner with ease (Koçel, 2013, p. 671). An organization

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

down with this sickness will have difficulty in adapting to environmental changes. It will not be able to perform changes that emerge in products, services, technology, ways of doing business and managerial style, which in turn results in loss of competitive power and destruction. It is possible to see examples of firms that failed to realize the change process or couldn't fully complete the process or were too late for the change to occur and thus lost their competitive advantage among firms of both past and present.

For instance, the laptop computer that we use today was first produced by Osborne Computer, however, the company declared bankrupt two years after the official launch of the product in January 1981. Although the sales were satisfying during first 2 years, the technological advancements led companies such as IBM and Apple Computers to enter the market. Companies such as IBM and Apple Computers used the change in the market and the product range in an effective way and modified their organizational structure accordingly, whereas Osborne failed to implement this change. Therefore, one of the reasons that caused the bankruptcy of Osborne was that they lacked plans appropriate for crisis situations that occurred under conditions of uncontrolled change (Şimşek et. al, 2008, p. 416-417).

According to some authors, the phenomenon of change is a feature that defines contemporary organizations. For this reason, it is a key factor to implement and manage the change in the success of all organizations, whether in the private or public sector. On the other hand, today's change has a higher acceleration than previous changes. Hence, people no longer only talk about the change, but at the same time they feel it (Çetin, 2008, p. 109). For this reason, by becoming ordinary, the notion of change has become a part of both daily and business life.

FACTORS THAT BRING THE CHANGE

Factors that force organizations to change can be handled in two groups as internal and external factors. These factors are explained below:

Internal Factors

The internal factors that force organizations to change are related to events or situations within organizational boundaries. A crises arising in the organization might require the change. Strike or boycotts of employees in the organization may lead managers to change their wage structure (Quick & Nelson, 2011, p. 592). As a result of changing the administrators in the decision-making position of the organization, it might be necessary to make changes appropriate to the working habits, the field of expertise, the supervisory ability of the newcomers (Sabuncuoğlu & Vergiliel Tüz, 2005, p. 249). Emerging changes in employee expectations can trigger the change, because the expectations of today's young people are different from the expectations of older workers. The level of education of the workforce is another factor that elicits change. Although an educated workforce is advantageous for an organization, the demands of these workers from their employers are higher than those of low-educated workers (Quick & Nelson, 2011, p. 592). Like the level of job satisfaction, employee attitudes may also produce positive or negative consequences for change. The dissatisfaction of employees in the organization can increase the level of absenteeism, which can lead to changes in staff management or practices (Passenheim, 2010, p. 9). Low

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

productivity in the organization, decrease in sales, low morale and motivation levels, conflicts between individuals or groups are other factors that reveal organizational change (Koçel, 2011, p. 675).

External Factors

External factors that force organizations to change are elements outside the organizational context. When the organizations are dealt with from a system approach point of view; they transform the inputs they receive from the outside through a process with the help of specific information and technology, and presents them to the outside environment as output (Cummings & Worley, 2009, p. 89). The more formal and systematic the flow of this process in the organization, the higher the likelihood of success and achievement of the organization. On the other hand, this flow in the process will change itself according to elements outside the boundaries of the organization. If opportunities in the external environment are perceived, the organization will make changes to benefit from these new opportunities; if the external environment creates a threat or danger instead of an opportunity, it will make changes to reduce or eliminate those threats. Therefore, organizational changes are made according to factors outside the organization. These non-organizational factors that force organizations to change include (Passenheim, 2010, p. 7; Quick ve Nelson, 2011, p. 589; Özkalp & Kırel, 2013, pp. 435-436): customer expectations, technological changes, changes in economic conditions, globalization of the market and change in competition, changes in labor force diversity, legal regulations, social, cultural and demographic structure.

- **Customer Expectations:** Customer preferences and ratings have an important place in organizational change. As the customers' expectations for more and more quality and cheaper goods and service increase every day, they are looking for the opportunity to reach these goods and services and to receive after sales service whenever they want. This situation brings to the agenda the necessity of making changes in order for organizations to quickly adapt to changing customer demands and expectations.
- **Technological Changes:** New machinery, tools and equipment emerging from the technologies in production, communication, transportation, distribution, marketing, information and so on force the organizations to change to use this technology and equipment. These changes improve the quality of the product / service, increase the productivity and provide maintaining the organizational life. For example; if we had seen something called "e-commerce" 20-30 years ago, we would probably think it was a word mistake. But nowadays many businesses such as Amazon.com, Alibaba.com, JD.com, Hepsiburada.com, Markafoni.com, Yemeksepeti.com and so on are dealing with electronic sales activities.
- **Economic Conditions:** Situations such as changes in supply and demand related to goods and services, increases in inflation and interest rate, fluctuations in oil prices, appreciation and depreciation of stocks, recession and crisis events, etc. are other factors that put pressure on the change of organizations.

For example, in October 1987, stocks in the exchange stocks began to depreciate rapidly, which allowed businesses to make changes in their financial and investment plans. Many Wall Street financial institutions have had to implement a restructuring or merger strategy in order to survive (Özkalp & Kırel, 2013, p. 435-436).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Globalization and Competition:** With the globalization, the boundaries between the countries have been removed and the world has become a single market, which has led many local and international enterprises to contribute to the production and sale of goods/services. This situation has required organizational changes such as differing from competitors and improving goods / services, organizational structure and personnel quality, changing the sector, and merging or negotiating with competitors.
- **Labor Force Diversity:** The differentiation of the labor force structure compared to the past years has brought about the necessity of making some changes in the organization. Today's workforce is more flexible than the past, spending more time with family and friends, preferring short-term work, desiring to be rewarded immediately for success, and less workaholic and more utilitarian generations (Özkalp & Kırel, 2013, p. 431; Kicheva, 2017, pp. 108-109). Making organizational changes in line with the expectation of this workforce will ensure that qualified individuals apply for the employment and that the current workers will continue to be an organization member. On the other hand, compared to the past, it is seen that women are more active in business life today. This situation has brought about the necessity of organizational changes according to the needs of the working husbands and wives (the existence of kindergartens in the enterprise, the transfer between the branches, etc.).
- **Legal Arrangements:** Government legislations and regulations have great influence both on public and private businesses. For example, to reduce the harmful effects of smoking, regulations and taxes on tobacco products have put a lot of pressure on some large-scale organizations. These organizations now have to change in order to survive (Passenheim, 2010, p. 8).
- **Social, Cultural and Demographic Structure:** The increase in the number of universities, in the rate of higher education graduates, in the number of female students, the increase in the marriage-divorce rates, the changes in consumption preferences as well as social trends, population growth mobility, demographic trends are among the factors affecting the changes in organizations (Özkalp & Kırel, 2013, p. 436-438).

TYPES OF CHANGE

It is possible to make various classifications of the change. Some of these classifications are explained below.

Planned Change: Unplanned Change

The planned realization of change is related to the pre-determined and implemented phases of the change process (van der Voet, Groeneveld & Kuipers, 2014, p. 173). In the planned change, it is essential to change activities consciously and purposefully (Robbins & Judge, 2013, p. 581). This change is a systematic management effort in the transition to a new state of an organization or subsystem. Therefore, it includes consciously changing the organization design, technology, tasks, people, information systems and so on (Champoux, 2011, p. 456).

Unplanned change is the change whose purpose, orientation and the phases in the processes are not considered before and there is no other way but adapting it (Taşlıyan & Karayılan, 2011, p. 257). This change occurs when the oppression at the point of change is over the resistance to change. In fact, the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

management does not have such an expectation of change (Champoux, 2011, p. 456). But for example, there is no choice but to take precautions and decisions that s/he does not think of in order to overcome a crisis or to survive it. The phrase "Difficult breaks the game" in our language can be used for organizations that make unplanned change (Koçel, 2011, p. 673).

Evolutionary Change: Revolutionary Change

Evolutionary and revolutionary change take place on opposite poles of planned organizational change. Evolutionary change is a gradual change that takes place over time in order to adapt organizational design and processes to changes in the external environment. The evolutionary model of organizational change suggests that activity of change must take place in small steps that contribute to the total amount of change. In revolutionary change, big activities of change are carried out in a stable period, and these activities influence many parts of the organization. After a major change has taken place, another steady turn is passed (Champoux, 2011, p. 457-458). Therefore, there is an attempt to completely change the existing situation in revolutionary change. While evolutionary change takes place slowly and progressively; revolutionary change takes place swiftly, and it affects the all parts at the organization at same time (Greenwood & Hinings, 1996, p. 1024). Total quality management or kaizen are applications of evolutionary change while process development (reengineering), restructuring and innovation are the applications of revolutionary change (George & Jones, 2012, p. 540-546).

Macro Change: Micro Change

Macro and micro change are related to the number of issues that are subject to change in the organization. While the organization changes as a whole in macro change, there is a change about any topic at the lower or upper level in the organization in micro-change (Taşlıyan & Karayılan, 2011, p. 257-258). For example, organizing any phase of workflow or supply process in an organization is a micro change.

Proactive Change: Reactive Change

Proactive change is changing the work, activities and procedures in the organization by estimating the environmental conditions; so that when the estimated environmental conditions are met, the organization would be ready for this situation. Reactive change, on the other hand, is the change in order to adapt to actual conditions rather than change according to the predicted ones (Uçkun, 2002, p. 106). In reactive change, it is essential to react according to the conditions encountered. For example, in the economic crisis that began in the USA in 2008 and spread all over the world, some businesses were relatively prepared (proactive) through the restructure measures taken in the previous years (1999-2001), while some businesses had some reactive measures (stop producing, dismissal, etc.) to reduce the effects of the crisis (Koçel, 2011, p. 673-674).

Active Change: Passive Change

Active change is that the organization influences and changes its external environment by innovating. Passive change, on the other hand, is a change in organization's own structure in order to adapt to the conditions that occur in the external environment. For example, an enterprise that is striving to keep up

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

with technological changes is in a passive change. An enterprise that has developed and started to use a new technology is in an active change (Koçel, 2011, pp. 673-674).

CHANGE MANAGEMENT PROCESS (MODEL)

When the subject is the change in the management literature, it is often understood the change that takes place in a planned way. Planned change is intended to improve the ability of the organization to adapt to developments in its environment and to change employee behavior in the organization (Robbins & Judge, 2013, p. 580). In the literature, various change management models seem to be put forward to successfully manage and place the change. Some of these planned change models are (Sanrı, 2014, p. 50-54, Özkalp & Kırel, 2013, p. 452-458): Lewin's Three-Stage Change Model; Lippitt, Watson and Wesley's Five-Stage Change Model; Galakin's Change Management Wheel Model; Armenakis, Harris and Field Binary Change Model; Extended Process Model and Action Research Model. Below is a description of Lewin's Three-Stage Change Model and Action Research Model, which are seemed to be used more widely than the other models.

Lewin's Three-Step Change Model

Many of the models developed in the context of change processes and management in the literature are based on the change model developed by Lewin. According to this model, change refers to the difference between the previous state and the state that is followed and to be reached (Lewin, 1947, p. 151). According to Lewin, change is a process whose success depends on the application of three steps. These are: unfreezing, moving, refreezing (Quick & Nelson, 2011, p. 602). Lewin's change model is shown in Figure 1.

Figure 1. Lewin's change model
Source: (Quick & Nelson, 2011, p. 603).



Source: (Quick & Nelson, 2011, p. 603).

Unfreezing is the phase of "dissolving the ice" in the organization (Şimşek et al., 2008, p. 436). Unfreezing involves encouraging the individual to get rid of their old behavior by re-organizing the state of equilibrium that provides the continuation of the present situation (Quick & Nelson, 2011, p. 602). In this step, employees are informed about the situation to be changed. It is explained to the employees why the change is necessary, how the new situation will be when the change is realized, how the employees

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

will be affected by the change, and which positive outputs will be obtained as a result of it. Therefore, with these explanations, employees who are likely to resist the change are persuaded at this stage and they are made aware of the need for it.

Moving / change is the phase in which old attitudes, values and behaviors are replaced by the new ones (Quick & Nelson, 2011, p. 603). In this phase, action is taken for change and a new situation that is different from the current one is achieved in the organization. This may be related to a new operating system, the use of a new technology, or a new performance appraisal system.

The last phase of the change process, refreezing change, is the "hardening" or "freezing" of the new state to ensure the continuity of it (Cummings & Worley, 2009, p. 24). Therefore, all relations and procedures in the organization start to process based on this new situation. That is why, at this stage, it is important for organizational managers to encourage and reward behavior related to the new situation and punish the behavior related to the old situation (Quick & Nelson, 2011, p. 603-604). For example, an employee is sent to a course to learn a new computer program. After completing the course, if s/he continues to use the old program instead of the new one because it is familiar and easy to use, the freezing process does not take place (Özkalp & Kırel, 2013, p. 453-454). For this reason, the employee who learns the program should be encouraged to use the program s/he has learned by rewarding or punishing in different ways.

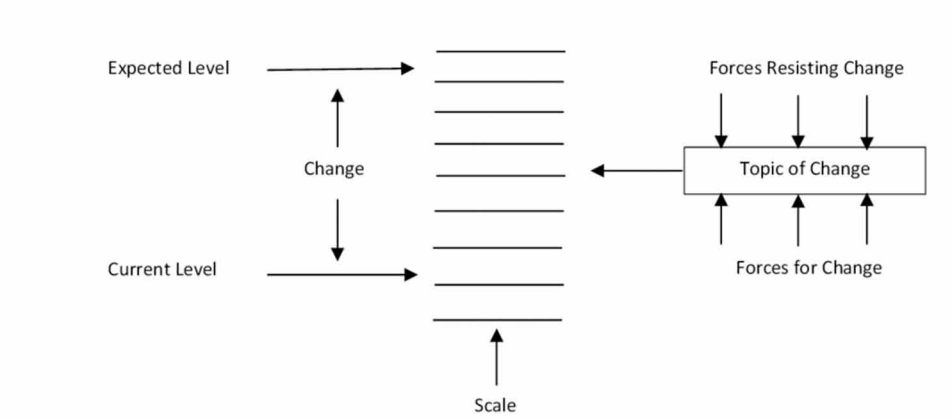
When the above-mentioned steps of change are taken as a whole (Koçel, 2011, p 676); firstly, the variables that are to be replaced are resolved from their current values and the current state is broken (unfreezing), then these variables that have been solved and softened are given the new form (moving / change), and finally these reshaped variables are re-frosted (refreezing). Therefore, the employees are prepared for change in the unfreezing step; the intended change is implemented in the change step; and the permanency of the change is provided in the refreezing step (Chadha, 2017, p. 17).

Another model that can be used in the realization and management of change is the Force Field Analysis model developed again by Lewin. According to Lewin, social systems are usually seeking a balance and want to maintain it at a certain equilibrium (Hellriegel & Slocum Jr., 2011, pp. 525-526; Stroh, Northcraft & Neale, 2002, pp. 432-433). This equilibrium refers to a constant state between the forces for change and the forces against the change (Yeniçeri, 2002, p. 193). Forces for change characterize the forces that put forward the change must take place; and the resistance forces characterize the "resistance to change" that is against the change. In organizations, the success of change activities depends on the dominance of the forces that encourage / force the change over those that resist it. The situation related to the model is presented in Figure2.

According to Figure 2, the internal or external forces that force to change must be determined first. Then, the possible resistance forces that would prevent the change should be estimated. Later, the intended change must be realized with the necessary measures that reduce the resistance to change and increase the intensities of the forces for change. This point of view of the model evokes the phenomenon of movement in the physics. The expression "the objects tend to stop" in physics means that the object desired to move needs to be subjected to more inverse force than the resistance that blocks the motion of it. If the force to move the object does not beat the resistance that prevents the movement of it, the object does not move (Koçel, 2011, p. 678).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Force field analysis
Source: (Koçel, 2011, p. 678).



Source: (Koçel, 2011, p. 678).

Action Research Model

The action research provides a scientific methodology for managing planned change. Action research is the systematic collection, analysis and implementation of change activity according to the results of the analysis (Robbins & Judge, 2013, p. 587). This research can be done to explain an existing or possible future problem in the organization, increase the organizational success or improve the knowledge of the organization. The investigator and the agent of change are responsible for conducting the action research. The investigator is the individual who is assigned to carry out the organizational research by the organization (Yeniceri, 2002, p. 207). The change agent is the person or group that undertakes the task of managing change in an organization (Quick & Nelson, 2011, p. 593). The change agent is therefore the person or group who manages and implements the change.

The action research process consists of five steps. These are (Robbins & Judge, 2013, p. 587; Özkalp & Kırel, 2013, p. 457) diagnosis, analysis, feedback, action, and evaluation.

The diagnostic stage is similar to the doctor asking his patient questions and making a diagnosis. At this stage, the change agent collects information about the issue or problem and identifies the changing viewpoints of the members of the organization. Information can be collected by revising the records or face-to-face interviews with employees.

The analysis phase is the synthesizing of the information obtained during the diagnostic phase. The problems in the organization, people related to those problems and the sources of the problems are determined and the possible actions are planned.

Feedback is the phase in which the findings from the first two steps are shared with employees. At this stage, employees are assisted by the change agent and develop action plans in line with the change activity needed.

At the stage of the action, the employees and the change agent perform the actions they specify in order to implement the change activity.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Finally, it is assessed how successful the action plan and change are in the evaluation phase.

The action research activity described above has two main benefits. The first of these is that the change agent investigates the problems objectively and determines which change action should be used according to the problem. The second is that the resistance to change is decreased as employees are involved in the process in action research (Robbins & Judge, 2013, p. 587).

RESISTANCE TO CHANGE

One of the most important problems encountered in carrying out the change activity is that the resistance to change is high in the organizations. Resistance to change is the unwillingness to change within the organization and the behavior to prevent it (Tuncer, 2013, p. 383). Although the goal of change in organizations is about the design of the organization, the work in the organization or the technology used, it also affects the social systems in the organization. When the change affects the social networks, it might create a strong resistance by the employees. Resistance can be in the form of lack of co-operation in change activity, intentional sabotage of change activity, or increased levels of conflict (Champoux, 2011, pp. 459-460).

Change is inevitable no matter if it is individual or organizational, and showing resistance to change at the individual or organizational level is a known fact. Moreover, the issue of resistance to change is not a current problem, but a problem that even tribal leaders encountered in ancient times (Şimşek et al., 2008, p. 420). Researches in the literature also show that resistance to change is common in organizations. For example; in their study carried out in Australia, Eisen et al. (1992) found that resistance to change is a major obstacle in adopting modern quality management practices. In the research by Bostan and Köse Ünal (2016), health care workers in private hospitals were found to show resistance to health transformation program practices in Turkey. The findings of these researches show that there is resistance to change in today's organizations because of various reasons.

Change activity is seen as an uncomfortable event for reasons such as deterioration and dismissal of the status quo, and anticipation of giving up the habits. The resistance to change can be explained by the friction phenomenon in physics. As it is necessary to apply more force than the friction to move an object, it is necessary to apply a kind of force (mental, physical or spiritual) in order to realize the change activity (Koçel, 2011, p. 679). But in doing so, it is necessary to explain to the employees why the change is needed and how it will be realized. Otherwise, even if the change is realized, it does not reach its original purpose and resistance can come out again after a certain period of time. Sezgin et al. (2016) found out that the change is perceived as utopian especially for public institutions and it has been determined that the perception of the change in the lower level employees are very different from those planned in the upper levels. It has been suggested that changes that are not based on a valid cause and imposed only as fashion reinforce resistance behavior. In addition, it is stated that especially in the imposed change activities, the resistance may be seen at every level of the organization and this resistance may become ossified after a while.

The resistance to change does not always come in a standard. Sometimes it can be seen as overt or covert, sometimes suddenly or delayed. From the point of view of the organization managers, it is easy to overcome a clear and sudden emergence of resistance, such as a complaint, a slowdown of work or a threat of strike. However, it is more difficult to overcome the resistance that emerges as covert or delayed. The loss of loyalty or motivation and increase in mistakes and absenteeism are examples of such resistance

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(Robbins & Judge, 2013, p. 581). Likewise, negative reactions such as disengagement, misidentification, disenchantment and disorientation can be considered within this type of resistance (Quick & Nelson, 2011, p. 600). In addition to these forms of resistance, suppressed behaviors can also be seen as a form of resistance. This form of resistance does not occur immediately; it can be seen weeks, months or years later. The changes made up to that point cause an accumulation in the employees, and as a result they show a great reaction to a very small change effort (Özkalp & Kırel, 2013, p.445).

One of the negative sides of the resistance to change is its preventing adaptation to environmental changes and organizational development. However, it is possible that the resistance to change at organizational level, provided that it is not either big or at an important level, may accelerate organizational change. Such a change can help to reveal some problems that cannot be seen by change managers and to take the necessary precautions (Tuncer, 2013, p. 384). Although resistance to organizational change is not desirable, this situation can be transformed into a functional conflict. In other words, the resistance to change in terms of use of a new technology, transition to new production methods, adoption of new wage systems, differentiation in a new product or service group, and so on can lead to a better discussion environment and better decisions.

Causes of Resistance to Change

Why do employees show resistance to change at the organizational level? This question may have different answers. Some people think that the change activity will cause to lose something they value. For example, the social status of an individual or group may decrease as a result of the change. If an individual or group values their current status, they are more likely to resist to change. The resistance to change may also emerge if change is believed to bring inequity in rewards in the future. Misunderstanding or not completely explaining the purpose of the change and the lack of confidence towards the agent of change regarding the realization of the change are also important reasons for resistance actions (Champoux, 2011, p. 460). Indeed, Sezgin et al. (2016) explain that the thoughts by employees that the managers do not fulfill the promises they have made and that they do not have sufficient qualifications for change are among the reasons for the resistance to change.

There can be many reasons for resistance to change in addition to the reasons mentioned above. The causes of resistance to change are discussed in four groups. These are job-related reasons, personal reasons, social reasons and organizational reasons.

- **Job-Related Reasons:** Job-related reasons are related to the work that the individual does and will do in the organization as a result of the change activity. These reasons may cause employees to occasionally resist to change, be unwilling for the change, or exhibit negative attitudes after the change. Resistance resources arising from job-related reasons are (Koçel, 2011, p.680):
  - Fear of technological unemployment,
  - Fear of increased workload,
  - Fear of lack of technical knowledge and skills,
  - Fear of change in the relation of work-wage-prize,
  - Perceiving change as technically impossible,
  - Fear of change in business conditions,
  - High costs.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Personal Reasons:** There may be some psychological (personal) reasons for counteracting change and trying to prevent change activities. These reasons are (Koçel, 2011, p. 680, Robbins & Judge, 2013, p. 582):
  - Not being able give up habits,
  - Security needs,
  - Fear of unknown,
  - Economic concerns (loss of interest, loss of wages),
  - Inadequacy of information about the change,
  - Believing in the failure,
  - Difficulty in learning new things,
  - Illiberality,
  - Personal experiences,
  - Lack of self-confidence,
  - Disruption of the comfort brought by familiarity,
  - Selective information processing (hearing what you want to hear).

Although some of the above reasons are related to each other, in general, the fact that individuals do not have knowledge of the subject of change, they are excluded from the phenomenon of change, and the fear of unknown are the main reasons for resistance to change (Bovey & Hede, 2001, pp. 534-535; Champoux, 2011, p. 460; D'Ortenzio, 2012, pp. 62-63). As previously stated, the changes that do not have a valid cause and are only an act of fashion and imposed on the workers reinforce their resistance behavior; this resistance becomes ossified after a while (Sezgin et al., 2016).

- **Social Reasons:** Another cause of resistance in organizations may be related to social relations. These causes are as follows (Şimşek et al., 2008, p. 423):
  - Differences between objectives of change and group norms and objectives,
  - Negative attitude and lack of trust to those who make the change,
  - Negative attitude to change of the close environment or group to which the employee belongs,
  - The desire not to give up on existing social relations,
  - Thought of staying outside the change activities,
  - Dislike from being led by outer forces,
  - Thinking that change will only serve the interests of a particular group.

Apart from the above mentioned reasons, the reason for resistance to change may also be the fear of what others will think. It is possible for an individual to show negative attitudes and resist to change in the organizations in which the group norms are the frontline and the group exhibits negative attitudes to change even if s/he accepts it (Özkalp & Kırel, 2013, p.474).

- **Organizational Reasons:** The sources of the resistance to change may also be rooted in the structure or functioning of the organization. The organizational reasons of resistance to change are (Şimşek et al., 2008, p. 423; Robbins & Judge, 2013, p. 582):
  - A non-functional organization structure,
  - Structural stability in the organization (built-in mechanisms that provide equilibrium),
  - Limited focus on the change (limited change in subsystems),

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- The existence of groups that are not organized for a purpose
- The absence of team work,
- Previous failed attempts to change,
- Perception of threat to expertise (seeing long-term power relations as a threat, with redistribution of decision-making authority).

Strategies Used to Overcome the Resistance to Change

It is not easy to realize the phenomenon of change, which has become part of everyday or business life. Because "resistance to change" is common as well as "change" phenomenon. The reasons for resistance to change are explained above. Now let's explain what can be done to overcome the resistance to change in the organizations. The methods (strategies) that can be used to remove the resistance are described below.

- **Participation:** Participation of those that will be affected by the change in the planning and implementation phases of it reduces the resistance to change (Wagner III & Hollenbeck, 2010, p. 289). What is important here is that the participants feel that they are not excluded from the event of change that will affect them rather than that their ideas are accepted. On the other hand, one thing to keep in mind is that the participation process can take a lot of time. For this reason, the individuals who support and oppose the change should be identified. When the individuals who are opposed to the change are brought to the decision-making positions, it will enable them to participate more because of the responsibility (Özkalp & Kırel, 2013, p. 450).
- **Communication and Training:** Many of the problems that arise in organizations stem from lack of communication. It can be useful in removing resistance to change if the communication which is defined as the transfer of data, information, thoughts and emotions between individuals and institutions is well-managed, and the employees are ready for the change (by training) (Şimşek et al., 2008, p. 425). Explaining employees why they will make changes, asking what their concerns are, telling when and how changes will take place and what will change and what will not change will facilitate the acceptance of change activity. Because people's not knowing the details cause them to show the tendency of assuming the worst result. Therefore, it is necessary to share the details of the change and to be prepare for the change by creating training classes (Chadha, 2017, p. 18-19).
- **Discussion and Compromise:** It is useful to use the method of discussion and negotiation if the groups or employees lose something important that they value as a result the activities of change and have a strong power to resist (such as a union). Discussing before the change helps the change activity to develop in a soft way (Özkalp & Kırel, 2013, p. 451). On the other hand, forming a connection between the change and other topics that individuals are interested in to increase the perception of the need for change will facilitate compromise. For example, business security may reduce the likelihood of accepting the change as a threat and may be a tool for change (Chadha, 2017, p. 18).
- **Manipulation and Cooptation:** Manipulation is introducing an event to the others by altering it, showing the event different from how really it is and providing people to understand it differently (Simşek et al., 2008, p. 426). It can be considered as manipulation to make the facts attractive by distorting them, to withhold knowledge and to spread false truths (rumors) to workers in order the change to be accepted. For example, if an organization is threatening its workers who resist a

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

nationwide salary deduction to shut down the production facility (even though it will not be), there is manipulation in this organization (Robbins & Judge, 2013, p. 583).

Cooptation, on the other hand, is to make individuals who are opposed to a particular subject a part of the problem and solution (Şimşek et al., 2008, p. 426). Cooptation is a concept that combines manipulation and participation. It is an example of the cooptation to propose an important position to the leader of a group that is opposed to change and bribe him/her. Although manipulation and cooption are cost-free strategies for gaining support from the other side, the strategy can cause a backlash when individuals understand that they are deceived or used (Robbins & Judge, 2013, p. 583).

- **Choosing the Right Time:** Timing is very important in the change activity. The implementation of major changes in organizations at one time and very quickly increases the likelihood that employees will resist it (Chadha, 2017, p. 19). For this reason, it will be beneficial for some changes to be done slowly and gradually. As well as reducing the resistance, the changes carried out in this way can provide workers to work productively.
- **Fair Implementation of Change:** It may also be beneficial for the organization to ensure that the change activity will be carried out in a fair way to reduce negative effects of change (Robbins & Judge, 2013, p. 583). When employees perceive decisions and implementation of change as fair, it reduces their resistance to change (Oreg & van Dam, 2009, p. 129-131). Visser (2013) has found that the perception of justice reduces resistance to change.
- **Using Force:** Using force, which lies at the end of the strategy list that can be used, is to directly threaten and apply force on individuals who resist to change (Robbins & Judge, 2013, p. 584). Employees may be exposed to threats such as reducing wages, being fired or transferred elsewhere, and writing a bad reference letter (Özkalp & Kırel, 2013, p. 451-452). This strategy can be used when other strategies do not fully meet expectations. Because it might cause an adverse effect on the employees.

THE ROLE OF LEADER IN MANAGING CHANGE AND CREATING CHANGE CULTURE

It is inevitable that changes and new formations will emerge in today's organizations. Because organizations are faced with the pressure of change, both from their own structures and environment. In the face of this pressure, the organization must initiate the change without losing time and maintain it successfully. But the change is not to remove the old in the evening and bring something new in the morning. On the contrary, change takes place as a result of pursuing better ways to do the targeted work, distributing the execution of the process at a certain time, and operating the processes properly to achieve the predetermined goals by following a leader (Ceylan & Summak, 1999, p. 521). So the role of leader and guidance is great in the success of the change process. I has been found out that about 70% of the change efforts in enterprises have failed, and one of the main reasons for these failures is the lack of guidance for the intended targets (Kang, 2015, p. 28).

The decision makers of the initiation and implementation of the change activity are undoubtedly top managers. For this reason, the top management makes decisions such as what the change will consist of, how the change process will go on and who will play an active role in the change. Therefore, the success

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of the change activity and the adoption of the change culture in the organization depend primarily on the managers' (or leaders') believing in the change movement, convincing the workers that the change will be successful (reassuring the employees) and supporting the change. It is possible to find examples showing that the leader has an active role in the success (or failure) of the change activity. Some of these examples are explained below (Chadha, 2017, p. 12-16):

After the World War-II, the Japanese automobile market loses its competitive power against American Ford and General Motors enterprises. As an engineer at Toyota, Taiichi Ohno suggests that success in keeping up with American competitors can be provided through his "just-in-time" approach, a new and exclusive practice in production. According to Ohno, rather than ordering and storing too much material and machinery, the purchase of the materials when they are needed will save space, time, money or energy, and will allow the use of available money for other emerging opportunities. Ohno's approach is applied even if it does not happen overnight. The approach leads to a transformation in Japanese automobile production and brings Ohno to an executive position.

Jack Welch is appointed to the top position of General Electric (GE) in 1981 and takes over the management of a company with a market value of $ 12 billion. In 1995, Welch thinks that the company needs revision in all its content and decides to implement Six Sigma, a method aimed at reducing errors and flaws in the process. Five years after that, GE will earn $ 10 billion. The market value reaches 280 billion dollars. Thus, Welch transforms GE into a very strong international company by creating a good team that manages change and managing them right.

When Amazon, the Seattle-based company, launches its first website activity, it only deals with book sales. Founder Jeff Bezos and his team expands the field of activity with things like CDs and DVDs in the following years. As the years go on, Amazon continues to change its product range and becomes a business that sells more than 200 million products to customers worldwide today. Bezos explains that Amazon will not confine with these and soon be delivering packages via drones. Bezos and his team constantly change and develop. They got three Oscars in 2017.

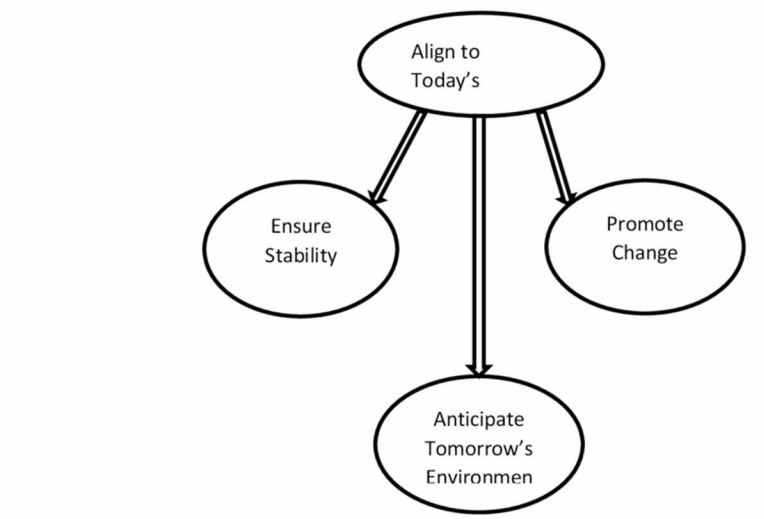
The above examples clearly demonstrate the role of leaders in implementing the change successfully in enterprises. The change leader responsible for the change activity encourages the change to prepare the organization for the tomorrow's environment, in addition to harmonizing it with today's environment. The change leader provides stability in the organization and gives employees confidence. On the other hand, they have a difficult task of encouraging the change in the periods when employees adopt stability. This situation is described as leadership paradox and is shown in Figure 3 (Moran & Brightman, 2000, p. 68).

The change activity within the organization can start with the leader forming (or changing) his own mind map, and creating a hand-held, accessible in time and impressive vision. On the other hand, values and missions, which are complementary elements of the vision, should be taken into consideration in this process. In the absence of a concrete and impressive vision, the final point to be reached will not be known, so the process will turn into chaos before it begins (Ceylan & Summak, 1999, p. 532).

It is necessary for leaders that can manage the change and create a culture of change in the organization (by encouraging innovation culture and creating a learning organization) to communicate with their followers through approaches different from traditional leadership approaches and leadership characteristics. The two main types of leadership that can be used in the process of change and creating culture

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Leadership paradox
Source: (Moran & Brightman 2000, p. 68).



Source: (Moran & Brightman 2000, p. 68).

are transactional and transformational leadership. In the transactional leadership, the leader rewards employees with the award they value when they perform what they are expected to do by the leader. Therefore, the relationship between leader and employee (follower) involves interdependence. In the transformational leadership, the leader enables organizational goals to overcome employees' personal expectations by deeply affecting them and increasing their self-confidence (Bass, 1990, p. 20-21; Ali, Jangga, Ismail, Kamal & Ali, 2015, p. 168). According to Burns, the transformational leader is aware of the material and physical needs of the employees that are fulfilled by the transactional leader (Bass, 1985, p. 14), and enables them to use their full potential by meeting their high-level needs in the Maslow hierarchy (Bass, 1985, p. 14; Jandaghi, Matin Farjami, 2009, pp. 275-276).

In change activities, transactional leaders promise employees that they will be awarded the prizes they deserve when the change is realized. They tell the employees that they should not resist to change and adopt change activities so that they can receive awards. Therefore, mutual bargaining is done for the change activity. For this reason, the expected benefit may not be achieved in the realization of organizational change.

It is the transformational leadership that facilitates the realization of change and transformation within the organization. Transformational leaders create a vision for the future during the renewal process of the organization and ensure that followers are involved in the change process. They have charisma or idealized influence, intellectual stimulation, and individualized consideration (Eisenbach, Watson & Pillai, 1999, p. 83-85). These features are very effective in the realization of change activity and reduction of resistance to change. Transformational leaders provide the successful realization of the change by creating a vision of change and gaining employee confidence (idealized impact), providing the employee's finding solutions to the problems that arise in change activity and thinking creatively (intellectual stimulation) and taking into account each employee's demands and needs (individualized thinking).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

Change is an experience that we live both in daily life and in business life both individually and organizationally. It is not possible for mankind and organizations created by mankind to escape from this experience. Resisting change and ignoring mean that putting individual and organizational life in danger. Because, the World we see enormously in distance has shrunk. In the today, increased global competition and e-commerce, organizations established and managed thousands of miles away are now as close as their door neighbors. For this reason, organizations have to constantly change their products, services, skills, Technologies, structures and direction in a planned manner; that is, organizations have to manage change.

Managing change is planning the change activity and implementing these activities in a systematic way. The implementation of the planned change improves competitiveness, effectiveness and performance of the organization. But, "implementing change" is not as easy as it is said. Because some people –the genius- do not like change and transformation. For this reason, the change is resistant. It is the responsibility of the leaders to reduce this resistance that emerges in organizations. Organization leaders can make employees part of change by using different leadership styles and resistance reduction strategies. In this way, the employee adopts the change activity and it is easy to make the change. Organizations gain competitive advantage and maintain their lives when the change is realized.

FUTURE RESEARCH DIRECTIONS

In this study, the concept of change management, which is crucial for companies to gain competitive advantage, has been dealt with and only a conceptual framework has been established. For this reason, this study does not include an empirical research on change management. In the future studies, the concept of change management can be considered in the sectoral basis and the importance of the competitive advantage of change management can be supported by empirical studies. In addition, leadership in change management is important. Future studies should focus on leadership that is important for change; and taking into consideration the cultural structure, it can be examined which leadership style will reduce the resistance and facilitate the change activity.

REFERENCES

Ali, N. M., Jangga, R., Ismail, M., Kamal, S. N. M., & Ali, M. N. (2015). Influence of leadership styles in creating quality work culture. *Procedia Economics and Finance*, *31*, 161–169. doi:10.1016/S2212-5671(15)01143-0

Bass, B. M. (1985). *Leadership and performance beyond expectations*. Collier Macmillan.

Bass, B. M. (1990). From transactional to transformational leadership: Learning to share the vision. *Organizational Dynamics*, *18*(3), 19–31. doi:10.1016/0090-2616(90)90061-S

Bostan, S., & Köse Ünal, A. (2016). Sağlıkta dönüşüm programı hakkında yönetici ve çalışan görüşlerinin karşılaştırılması üzerinden değişime direncin ölçülmesi. *Verimlilik Dergisi*, *3*, 55–74.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bovey, W. H., & Hede, A. (2001). Resistance to organisational change: The role of defence mechanisms. *Journal of Managerial Psychology*, *16*(7), 534–548. doi:10.1108/EUM0000000006166

Çetin, C. (2008). *Yöneticilerin liderlik stilleri: değişim yönetimi ve ekip çalışması arasındaki ilişkilerin çok yönlü olarak değerlendirilmesi*. İstanbul: İstanbul Ticaret Odası Yayınları.

Ceyhan, E., & Summak, M. S. (1999). Haşlanmış kurbağa ve değişim yönetimi [the boiled frog and change management]. *Kuram ve Uygulamada Eğitim Yönetimi*, *20*, 521–544.

Chadha, S. (2017). Change Before You Have To. *Human Capital, 21*(6), 12-19. Retrieved from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=0&sid=4cbad82f-4241-4006-874e-779c0a130a10%40sessionmgr4010

Champoux, J. E. (2011). *Organizational behavior: integrating individuals, groups, and organizations*. New York: Routledge, Taylor & Francis.

Cummings, T.G., & Worley, C.G. (2009). *Organizational development & change.* South-Western: Cengage Learning.

D'Ortenzio, C. (2012). *Understanding change and change management processes: A case study* (Doctoral Thesis). Canberra, Australia: University of Canberra.

Eisen, H., Mulraney, B. J., & Sohal, A. S. (1992). Impediments to the adoption of modern quality management practices. *International Journal of Quality & Reliability Management*, *9*(5), 17–41. doi:10.1108/EUM0000000001651

Eisenbach, R., Watson, K., & Pillai, R. (1999). Transformational leadership in the context of organizational change. *Journal of Organizational Change*, *12*(2), 80–88. doi:10.1108/09534819910263631

George, J. M., & Jones, G. R. (2012). *Understanding and managing organizational behavior*. Pearson Education Inc.

Greenwood, R., & Hinings, C. R. (1996). Understanding radical organizational change: Bringing together the old and the new institutionalism. *Academy of Management Review*, *21*(4), 1022–1054. doi:10.5465/amr.1996.9704071862

Hellriegel, D., & Slocum, J.W., Jr. (2011). *Organizational behavior.* South-Western: Cengage Learning.

Jandaghi, G., Matin, H. Z., & Farjami, A. (2009). Comparing transformational leadership in successful and unsuccessful companies. *African Journal of Business Management*, *3*(7), 272–280.

Kang, S. (2015). Change management: Term confusion and new classifications. *Performance Improvement*, *54*(3), 26–32. doi:10.1002/pfi.21466

Kicheva, T. (2017). Management of employees from different generations - challenge for Bulgarian managers and HR professionals. *Economic Alternatives*, *1*, 103–121.

Koçel, T. (2013). *İşletme yöneticiliği*. İstanbul: Beta Yayıncılık.

Lewin, K. (1947). Frontiers in group dynamics. *Human Relations*, *1*(1), 143–153. doi:10.1177/001872674700100201

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Moran, J. W., & Brightman, B. K. (2000). Leading organizational change. *Journal of Workplace Learning: Employee Counseling Today*, *12*(2), 66–74. doi:10.1108/13665620010316226

Naktiyok, A. (2004). *İç girişimcilik*. İstanbul: Beta Yayınları.

Nordin, N., Md Deros, B., Wahab, D. A., & Rahman, M. N. (2012). A framework for organisational change management in lean manufacturing implementation. *International Journal of Services and Operations Management*, *12*(1), 101–117. doi:10.1504/IJSOM.2012.046676

Oreg, S., & van Dam, K. (2009). Organisational justice in the context of organisational change. *Netherlands Journal of Psychology*, *65*(4), 127–135. doi:10.1007/BF03080135

Özkalp, E., & Kırel, Ç. (2013). *Örgütsel davranış*. Bursa: Ekin Basım Yayın Dağıtım.

Passenheim, O. (2010). *Change management.* bookboon.com.

Quick, J. C. & Nelson, D. L. (2011). *Principles of organizational behavior: realities and challenges.* South-Western: Cengage Learning.

Ragsdell, G. (2000). Engineering a paradigm shift? An holistic approach to organisational change management. *Journal of Organizational Change Management*, *13*(2), 104–120. doi:10.1108/09534810010321436

Robbins, S. P., & Judge, T. A. (2013). *Organizational behavior*. Pearson Education Inc.

Sabuncuoğlu, Z., & Vergiliel Tüz, M. (2005). *Örgütsel psikoloji*. Bursa: Alfa Aktüel Basım Yay. Dağ. Ltd. Şti.

Sanrı, Ö. (2014). *Denizcilik işletmelerinde örgütsel iletişimin değişim yönetimi üzerine etkisi ve bir örnek olay çalışması* (Doctoral Thesis). İzmir: Dokuz Eylül Üniversitesi, Sosyal Bilimler Enstitüsü, Denizcilik İşletmeleri Yönetimi Anabilim Dalı.

Sezgin, O. B., Tolay, E., & Sürgevil, O. (2016). Örgütsel değişim sinizmi: Çalışanların değişime karşı tutumlarının incelenmesine yönelik nitel bir araştırma. *Marmara Üniversitesi Öneri Dergisi*, *12*(45), 411–438.

Şimşek, M. Ş., Akgemci, T., & Çelik, A. (2008). *Davranış bilimlerine giriş ve örgütsel davranış*. Ankara: Gazi Kitapevi.

Stroh, L. K., Northcraft, G. B., & Neale, M. A. (2002). *Organizational behavior: A management challenge*. London: Lawrence Erlbaum Associates, Inc.

Taşlıyan, M., & Karayılan, D. (2011). Organizasyonlarda değişim ve yönetimi. In İ. Bakan (Ed.), *Çağdaş yönetim yaklaşımları: ilkeler, kavramlar ve yaklaşımlar* (pp. 253–269). Istanbul: Beta Yayınları.

Tunçer, P. (2013). Değişim yönetimi sürecinde değişime direnme. *On Dokuz Mayıs Üniversitesi Eğitim Fakültesi Dergisi, 32*(1), 373-406.

Uçkun, C. G. (2002). Değişim yönetimi. In İ. Dalay, R. Coşkun, & R. Altunışık (Eds.), *Stratejik boyutuyla modern yönetim yaklaşımları* (pp. 103–121). İstanbul: Beta Basım Yayım Dağıtım A.Ş.

van de Ven, A. H., & Poole, M. S. (1995). Explaining development and change in organizations. *Academy of Management Review*, *20*(3), 510–540. doi:10.5465/amr.1995.9508080329

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

van der Voet, J., Groeneveld, S., & Kuipers, B. S. (2014). Talking the talk or walking the walk? The leadership of planned and emergent change in a public organization. *Journal of Change Management*, *14*(2), 171–191. doi:10.1080/14697017.2013.805160

Visser, M. (2013). *Perceptions of justice in an organizational change situation: The effect on resistance to change and the mediating role of emotion regulation strategies* (Master Thesis). Amsterdam: University of Tilburg, Faculty of Social and Behavioral Sciences.

Wagner, J. A. III, & Hollenbeck, J. R. (2010). *Organizational behavior: Securing competitive advantage*. New York: Routledge.

Yeniçeri, Ö. (2002). *Örgütsel değişmenin yönetimi: sorunlar, yöntemler, teknikler, stratejiler ve çözüm yolları*. Ankara: Nobel Yayın Dağıtım.

ADDITIONAL READING

Benn, S., Edwards, M., & Williams, T. (2014). *Organizational Change for Corporate Sustainability*. London: Routledge. doi:10.4324/9781315819181

Bovey, W. H., & Hede, A. (2001). Resistance to Organizational Change: The Role of Cognitive and Affective Processes. *Leadership and Organization Development Journal*, *22*(8), 372–382. doi:10.1108/01437730110410099

Buchanan, D. A., & Huczynski, A. A. (2017). *Organizational Behavior*. Pearson Education Ltd.

Cameron, E., & Green, M. (2009). *Making Sense of Change Management: A complete guide to the models, tools & techniques of organizational change*. London: Kogan Page.

Carnall, C. A. (2007). *Managing Change in Organizations*. Harlow: Pearson Education Ltd.

Iqbal, R. (2011). Impact of Organizational Change to Achieve Competitive Edge. *European Journal of Business and Management*, *3*(4), 87–95.

Lim, B. T. H., Wang, Z., & Oo, B. L. (2017). Change Management for Sustainable Competitive Advantages: The Roles of Organisational Culture and Employees in the Chinese Construction Firms. *International Journal of Sustainable Building Technology and Urban Development*, *7*(3-4), 230–236. doi:10.1080/2093761X.2017.1302842

KEY TERMS AND DEFINITIONS

Action Research: The action research is to collect data related to a problem existing in the organization or a possible problem to occur, to analyze the data and to carry out the change activity according to the analysis results.

Change: It means that something is transformed into something else in a planned or unplanned way in time.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Change Agent: It is the individual who undertakes the task of carrying out change activities within the organization.

Change Management: It is to harmonize the organization and organizational structure with changing environmental conditions.

Change Process: The change activity generally occurs as a result of unfreezing, moving, refreezing stages.

Organizational Change: It refers to a different situation from an existing situation in the organization's activities, strategy, structure, and culture.

Planned Change: It is the conscious act of change activity; that is, each step is planned and implemented in advance.

Resistance to Change: The change that is desired to be realized is reluctance and conscious change prevention activity.

This research was previously published in the Handbook of Research on Contemporary Approaches in Management and Organizational Strategy; pages 383-404, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 2
From Doing Digital to Being Digital:
Exploring Workplace Adoption of Technology in the Age of Digital Disruption

Donna Murdoch
Teachers College, Columbia University, New York City, NY, USA

Rachel Fichter
Teachers College, Columbia University, New York City, NY, USA

ABSTRACT

In this article, it is explored how digital transformation is reshaping existing conceptions of technology adoption in the workplace and, as part of this, why the adoption of enterprise technology often lags behind consumer technology. The effect of business intractability towards technological advancement is examined. Also, the inability to quickly disseminate new information about technological changes puts additional stress on adoption by employees. This article then continues into suggestions to improve adoption of technology based on changes in the workplace in attitude and culture, promoting digital literacy and the establishment of new programs to facilitate them.

INTRODUCTION

At the heart of much recent dialogue about digital transformation in the workplace is the assumption that inconsistencies in technology adoption across organizations can be attributed to asymmetries in the technical knowledge of employees (Corbett, 2007). These asymmetries are often attributed to differences in the generations and manifestations of their immersion in digital culture. While we do not disagree with this proposition, we argue that digital transformation in organizations is change for everyone, regardless of technical prowess. Learning how to use workplace technology in the age of digital transformation is

DOI: 10.4018/978-1-7998-7297-9.ch002

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

less about the development of the knowledge and skills required to perform specific technology-enabled tasks and increasingly more about reshaping the learner's mindset to navigate the uncharted waters of technological and digital culture successfully. Indeed, it is our perspective that individuals with a continuous learning mindset are proactively able to identify and utilize relevant learning to adapt to and grow or evolve with their work. This view is in line with Friedman (2017), who commented that "when the pace of change gets this fast, the only way to retain a lifelong working capacity is to engage in lifelong learning" (Loc. 506). To do this, learning and work must also be fully integrated so that individual employees can readily locate necessary knowledge and gain requisite skills to achieve performance goals.

Several factors are involved in developing a digital mindset. On an instrumental level (e.g., Mezirow, 1975), to facilitate the adoption of new technologies, organizations should be mindful of the current state of consumer technology and be prepared to emulate its design, interface, and seamless interactions. Because digital natives (i.e., those who grew up in the digital world) and digital immigrants (i.e., those who learned to use digital tools at some point during their adult lives) have, to a large degree, embraced consumer technology, it will be easier for them to adopt workplace technology if it is similar to what they use in their personal lives. But that is not enough. Organizations must also identify and address cultural barriers to digital transformation. Leaders should ask themselves and other organizational members what is inhibiting learning and adoption. In our experience, this is often due to insecurity around the broader change at hand, which results in actions that, while well-intentioned, actually hinder the desired outcomes.

As scholars and practitioners of adult learning and leadership in the corporate world, our goal is to invigorate a broader discussion about the impact of technological and digital transformation on resistance to and engagement in workplace learning. To accomplish this, we question the relevance of current—and what we consider to be instrumental—models of technology adoption in this age of continuous transformation. Broader theories that promote communicative learning are preferable, such as Argyris and Schön's (1974) theory of action and Pietersen's (2002, 2004) model of strategic learning.

We begin with an overview of the current business environment, which is being dramatically transformed by technological advancements. We discuss impediments to learning in the digital workplace, noting how discrepancies between consumer and enterprise technology contribute to learning resistance. Next, we review models of technology adoption and outline their limitations with respect to technological and digital transformation. For the purposes of this paper, we define digital transformation as "the use of technology to radically improve performance or reach of enterprises" (Westerman, Bonnet, & McAfee, 2014, p. 153). We argue that existing approaches reinforce an artificial separation between the organization and the individual, which can lead to frustration and resistance. We then move to a discussion of the theory of action (Argyris & Schön, 1974), a social constructivist view of how individuals interact on an ongoing basis to shape and evolve individual and organizational knowledge. Unlike models of technology adoption, we posit that Argyris's theory-in-use model offers a robust framework for understanding resistance to and engagement in the adoption of a digital mindset (what we refer to as being digital). We also look to Pietersen's (2002, 2004) model of strategic learning for additional insights into the challenges of learning and change, which have historically often been (mis)treated as one-time events that simply get "you stuck in a new place" (p. 2).

Next, using our practitioner lens, we apply our understanding of these theories to a hypothetical case of technology change. It is here that we see the emergence of a paradox of learning to be digital: As technological change becomes increasingly pervasive in the workplace, the adoption of a digital mindset is more critical than ever. However, anxiety around technology translates into individual and organizational defensive routines that contribute to learning resistance and prevent the being digital mindset from taking

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

hold. Clearly, we are only scratching at the surface of a very important topic that is evolving almost as quickly as the technologies that are forcing the conversation in the first place.

DIGITAL TRANSFORMATION IN CONTEXT

A few years ago, the term digital disruption was virtually nonexistent; in today's workplace, it is practically ubiquitous. Moreover, according to the strategy consulting firm McKinsey, when it comes to digitization, "You ain't seen nothing yet" (Bughin, 2017). Although the long-term impact of technological disruption on whole industries remains unclear, what we do know is that many industry incumbents are increasingly being attacked—successfully so—by so-called "digital entrants" (e.g., Bughin, 2017). Examples of technological disruption abound: Self-driving cars and trucks are transforming the transportation industry, artificial intelligence is upending manufacturing, and blockchain technology is revolutionizing the world of finance, to name just a few. Of course, disruption is not always digital, but digital technologies are—with increasing frequency—driving industry disruption. Take, for example, business model innovation. In a 2014 *Harvard Business Review* article (Christensen & Van Bever, 2014), innovation expert Clayton Christensen wrote about how digital platforms were disrupting the consulting and law industries to match freelance consultants with clients or identify potential customers. Without a digital infrastructure, an organization will undoubtedly be at a significant disadvantage when competing with new entrants whose businesses are premised on a digital foundation.

Digitization is the manifestation of a fundamental transformation of society known as the fourth industrial revolution (Bloem, Van Doorn, Duivestein, Excoffier, Maas, & Van Ommeren, 2014). It is fueled by generations sometimes called "digital natives" (including Generation Y, born between 1982 and 2000, and Generation Z, born starting in 2000), for which digital technologies are embedded in their daily practice (e.g., Persican, 2013) and deeply engrained in their culture. As great consumers of technology, these generations are essentially forcing companies to change their business models radically or develop completely new ones (Berman & Bell, 2016). Nowadays, consumer technology is generally far more sophisticated and user-friendly (i.e., using principles of "design thinking" [Kelly & Amburgey, 1991]) than enterprise technology, which is often a patchwork of legacy systems built over decades. Developed to serve the enterprise and not the individual employee, adoption of new technologies at work is often much less appealing. There is a significant gap between how a person interacts with technology in her personal life—for example, by tapping on an online banking app or quickly looking up the weather—and how she interacts with a mix of new and outdated technologies in the office.

Lured to the technology by its sleek design and user-focused experience, individuals from all generations are increasingly participating in all aspects of digital culture. Regardless of generation, people post photos of their children on social media sites and communicate via instant messaging. In fact, 67% of senior adults use the Internet and Smartphones daily (Anderson & Perrin, 2017). While virtually all individuals may use sophisticated social media platforms and interact with seamless digital technologies at home, adoption is likely to be more elusive when technology is not as ubiquitous and transparent, such as in the workplace (Westerman, Calméjane, Bonnet, Ferraris, & McAfee, 2011).

This transformation, led by technology innovators, is of crucial strategic importance to traditional companies because it forces them to scan the industry constantly for potential market disruption and learn to adapt in a fast and personalized way. As they race to develop digital strategies to maintain an industry position, company leaders appear to neglect what we argue is the single-most important limiting

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

or enabling factor—the individual employee. As Friedman (2017) noted, accelerations in technology "are causing an increase in the pace of change that is challenging the ability of human beings to adapt" (Loc. 426). Well-established change management models (often used by industry incumbents to drive major change) are no longer sufficient in a world where change is a never-ending phenomenon. In their most recent book, William Bridges and Susan Bridges (2017) acknowledged the limitations of their widely-acclaimed transition model in an era of "simultaneous changes" (Loc. 2137). Also gone are the days of John Kotter's (1996) eight-step process for driving successful change—because there is no longer an end game. Pietersen (2004) commented on the limitations of this approach well over a decade ago, writing that instead of focusing on one-time change, organizations must develop a "built-in ability to sense and rapidly adapt to changes in the environment…on a continuous basis" (p. 2).

In terms of digital disruption, change is not simply about getting hundreds or thousands of employees on board to execute a digital strategy (i.e., as a discrete event or project); rather, it is about nurturing the growth of a digital mindset in each and every employee and weaving it into the fabric of the organization. According to Friedman (2017), "the only way to release us from the society-wide anxiety around tech" (Loc. 506) is by focusing on the ability of our society to adapt. In other words, digital transformation is not about doing digital but about being digital. The implications of digital transformation in terms of learning—both at the individual and organizational levels—are nothing less than profound.

IMPEDIMENTS TO LEARNING IN THE DIGITAL WORKPLACE

Digital transformation is not easy; impediments abound. Many large organizations block access to digital media (Vodanovich, Sundarum, & Myers, 2010) such as Facebook, Reddit, and YouTube. Although these decisions appear to address legitimate security concerns, they are also often motivated by deeply embedded cultural norms (Vodanovich, et al., 2010) and perpetuated by a leadership team comprised of digital immigrants who are skeptical of the value that these tools bring. Consider the case of a company's rollout of a state-of-the-art enterprise platform that integrates traditional workplace applications such as email and file storage with newer team collaboration, social media, and organizational network analysis tools. That company's IT department blocked access to the less familiar applications, citing compliance and other security risks. Restricting digital media is likely to be ineffective and counterproductive in the longer term as it removes an important opportunity to innovate, collaborate, and learn (Vodanovich et al., 2010)—all of which are key to successful digital transformation. In other words, organizational leaders are restricting the very tools that are so needed to evolve a being digital mindset.

This defensive organizational pattern is challenging for digital natives and digital immigrants alike, albeit for different reasons. Digital natives struggle with this kind of dis-integration because being connected is not merely part of their daily lives; rather, they are hardwired for it. At home, millennials get information they need or solve problems by watching YouTube videos, searching the Internet or interacting with others on social media. Most are familiar with at least one coding language and many contribute to "open source" software development projects on the Internet. They engage collaboratively with their peers in interactive environments and consider the digital world to be "part of their personalities" (Vodanovich et al., 2010, p. 720). When the use of collaboration platforms is prohibited and personal learning tools are not available, the adoption of enterprise systems becomes difficult—even among the most tech-savvy employees.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

While digital immigrants also engage with social media at home, they often use it in a disjointed way, targeting applications for specific purposes (e.g., using LinkedIn for professional networking). Since they are generally less digitally literate than their millennial counterparts, they need to be brought along in a supportive and compassionate way. Organizational leaders must demonstrate how the new technology is going to improve an individual worker's life and answer the "why bother" question. Even more importantly, leadership must be willing to listen to and address the concerns of the digital immigrant population, as a way of establishing an empathic connection that will support trust building and pave the way for a mindset shift. However, leaders (many of whom are digital immigrants themselves) are also often overwhelmed by the changes and are therefore unable to provide the necessary support to their followers.

Another impediment to digital transformation in the workplace is the focus on how the new technology supports the execution of specific work tasks within the context of larger technology transformation projects and voluntary adoption by the individual employee. According to *MIT Sloan Business Review* (Kane, Palmer, Phillips, & Kiron, 2015):

Less digitally mature organizations tend to focus on individual technologies and have strategies that are decidedly operational in focus. Digital strategies in the most mature organizations are developed with an eye on transforming the business. (p. 38)

Since businesses organize their activities primarily on a project basis (e.g., Sydow, Lindkvist, & DeFillippi, 2004), technology initiatives are often designed as strategic change projects aligned with existing core business functions and focusing on operational improvement. This "business-centered" design approach reinforces an artificial separation between the technology and its user, and is likely to result in a missed opportunity for meaningful learning. It is also counterintuitive for employees who are accustomed to "human-centered" principles adhered to by the designers of consumer technology, and thus can lead to frustration and resistance.

Absorbing complex, transformative technology in the workplace requires much more than adoption and mastery of functional tasks; it often means a complete reengineering of organizational practices and procedures (e.g., Johnson & Rice, 1987). This advice—already 30 years old—remains elusive to this day. As Friedman (2017) said:

There is a mismatch between the change in the pace of change and our ability to develop the learning systems, training systems, management systems, social safety nets, and government regulations that would enable citizens to get the most out of these accelerations and cushion their worst impacts. (Loc. 416)

Once again, we are faced with the more fundamental question of what is preventing organizations from aligning their actions to match the desired outcomes.

TECHNOLOGY ADOPTION THEORY

To understand why traditional theories of technology adoption are of limited practical value in this new technological era, it is useful to review existing research. Well-known models, such as Rogers's (2003) "innovation decision process" (p. 41) and Davis's (1985) "technology adoption model," were developed

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to illustrate the technology adoption process and behaviors. Rogers (2003) proposed a five-stage "innovation decision process" in which individuals (a) collect necessary information about the innovation, (b) form a judgment of its value, (c) decide to accept or reject the innovation, (d) take first steps toward implementation, and (e) validate their initial views of the innovation. Rogers noted that an individual may reverse an earlier decision "if exposed to conflicting messages about it" (p. 41).

Several limitations are evident in Rogers's process when applied in the current environment. One is its linear approach to decision making, which implies that technology adoption is a relatively clean and universal (i.e., context-free) process (albeit with a feedback loop between phases three and five). While that might have worked 15 years ago, at the current pace of innovation, employees might experience multiple innovation decision processes at once. From there, one can postulate that an individual, feeling anxious and overwhelmed, would be generally more inclined to resist the adoption of new technologies (i.e., stop at Rogers's third phase), preferring to maintain the status quo. Another limitation of Rogers's theory is that it does not consider the vast discrepancy that has emerged between how people use technology at home and how they use it at work. Individuals often hold preconceived—but varying—notions of how technology should work for them and what connotes ease of use. Even those (e.g., digital natives) who embrace the use of technology at the early end of Rogers's curve may find workplace technology to be entirely different and therefore insufficient (Persico & Pozzi, 2014). This might cause them to stop adoption as early as Rogers's second stage, since they have already decided that their personal technology—with its seamless interfaces—works best. Put another way, task-based enterprise systems are complicated and often emphasize functionality over user interface (UI) or user experience (UX). Moreover, companies and their IT departments rarely take into consideration the digital habits of individual organizational members. Developing enterprise technology without considering the current state of consumer technology can cause even the most tech-savvy users to resist adoption. If the organization does not have a sound technology eco-system and a being digital mindset, proprietary systems will undoubtedly face resistance.

As an adaptation of Fishbein and Ajzen's theory of reasoned action, Davis's (1985) technology adoption model (TAM) was designed to assess and predict user acceptance of technology. Starting with external variables such as system design and training, the TAM proposed that an individual's adoption was the result of behavioral intention. This was, in turn, determined by two perceptions: (a) usefulness, or the extent to which an individual believes that using the system will improve his or her job performance; and (b) ease of use, or the extent to which an individual believes that using the system will be free of effort. While these perceptions provide meaningful insight into adoption, they only explain part of the story as it relates to digital transformation. The TAM, which was developed long before the age of digital disruption, neglects to consider the impact of seamless consumer-oriented technology on usefulness and ease-of-use perceptions. Consumer technology has shifted baseline assumptions and raised expectations far beyond the tools and technologies that most companies are offering their employees. More fundamentally, the TAM does not sufficiently consider the organizational assumptions—sometimes reinforced over many years—that underlie decisions regarding external variables and might enable or prevent usage.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ALTERNATIVE APPROACHES TO TECHNOLOGY ADOPTION

Theory of Action

Argyris and Schön's (1974) theory of action offers an alternative way of understanding resistance to learning in the digital workplace. It might come as a surprise that a theory, developed almost a half a century before the age of digital disruption, could be so relevant. The applicability is not around the adoption of a technology; rather, it is centered on the organizational defensive routines that prevent individuals and entire organizations from continuous learning, a key driver of being digital. Argyris and Schön (1974) identified espoused theories and theories-in-use as the two main components of their theory of action, a social constructivist view of how individuals interact on an ongoing basis to shape and evolve individual and organizational knowledge. At the individual level, espoused theories consist of explanations or justifications for a person's actions or patterns of activity, while theories-in-use are inferred from observed actions, which reflect their values, action strategies, and assumptions, and may or may not be in alignment with espoused theories. At the organizational level, members acting as agents of an entity interact with each other to negotiate new knowledge, which becomes part of the fabric of the organization. Here, espoused theories are concerned with strategies and other artifacts often created by organizational leaders and members, whereas theories-in-use are derived from the observed actions undertaken by individuals representing the organization.

Argyris and Schön (1996) created the theory-in-use model as a process that begins with a set of "governing variables" (Argyris, Putnam, & Smith, 1987, p. 84) or goals related to a problem to be solved (problem solving in this context is synonymous with learning). In this case problem definition is interactive because it affects both action and re-action (hyphenated to emphasize the interactivity). In other words, reflexivity impacts learning at the individual and organizational levels in both positive and negative ways. Individuals then consider a range of action strategies to produce consequences they believe will match their intentions. When the selected action produces a mismatch, the individual might test alternative strategies or question the governing variables. Single-loop learning occurs when an individual responds to a mismatch by trying out alternative action strategies until finding one that leads to a match. Individuals who question the underlying premise of the action (i.e., the governing variables) engage in double-loop learning, with new knowledge forming as the result of the mismatch (thus doubling the learning loop). Single- and double-loop learning are often nested; therefore, what is perceived as double-loop learning in one situation might be considered single-loop learning in another.

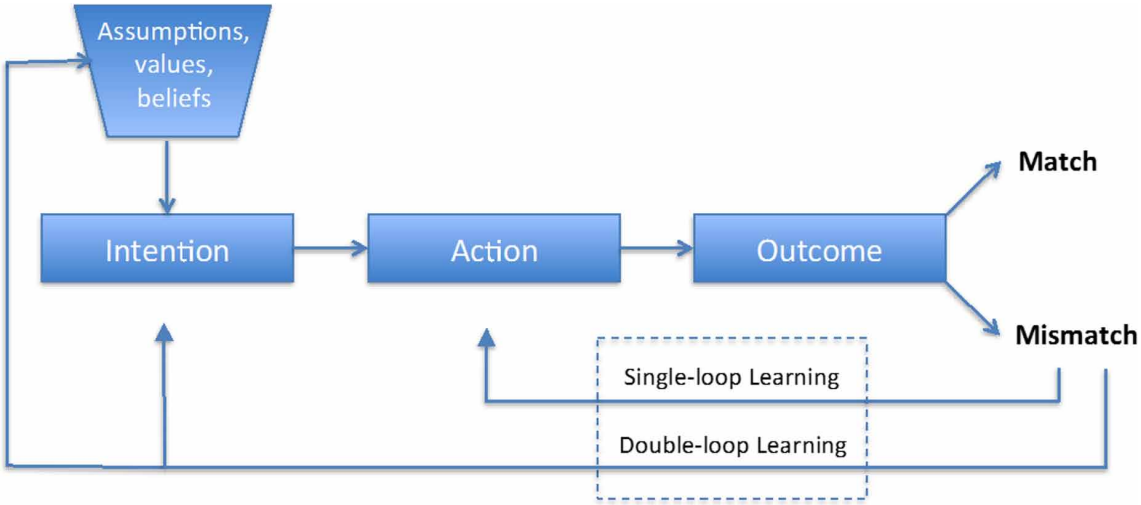
Figure 1. Argyris and Schön's theory-in-use model



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Marsick (unpublished) adapted Argyris and Schön's theory-in-use model as a process that begins with an individual's assumptions, values, and beliefs, which are the result of knowledge that has mainly been acquired unconsciously over many years (e.g., Mezirow, 1994). This tacit knowledge feeds into the governing variables, described by Marsick as intentions or goals related to a specific problem (in this case, the adoption of technology). Individuals then consider a range of action strategies to produce an outcome they believe will match their intentions. When the chosen action does not produce a match, the individual might test alternative strategies (i.e., engage in single-loop learning) or question the intention or the underlying assumptions, values, and beliefs (i.e., engage in double-loop learning).

Figure 2. Marsick's (unpublished) adaptation of the theory-in-use model (reprinted with permission by Victoria Marsick)



Marsick's adaptation of the theory-in-use model is particularly relevant to the discussion of technology adoption because of the distinction it makes between underlying assumptions and intentions. This approach, grounded in transformative learning theory (e.g., Mezirow, 1994), adds depth to the discussion. As will be highlighted in the case example later on, the creation of a being digital mindset is dependent on a double-loop learning approach in which intentions and assumptions, values, and beliefs are under constant scrutiny. These are necessarily different from the more superficial intentions or goals that one might have. The ensuing dialogue can help to surface organizational defensive routines that prevent adoption and mindset change.

Strategic Learning

A second alternative to traditional models of technology adoption that can help to explain the process of moving from doing digital to being digital was developed by Willie Pietersen, former CEO and professor of practice of management at Columbia Business School. Under the banner of "strategic learning," Pietersen (2004) laid out the case for a continuous learning approach that can help organizations to enjoy sustained success in a "world of unpredictable change" (p. 2). Strategic learning is grounded in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

experiential learning, an adult learning theory that emphasizes the role of experience in the construction of new knowledge and integrates "experience, perception, cognition and behavior" (Kolb, 1984, p. 21).

Pietersen defined strategic learning as "a practical leadership process for creating an adaptive enterprise by mobilizing a dynamic cycle of four steps: learn, focus, align, and execute" (p. 2). First, an outside-in situation analysis allows leaders to gain deep insights (i.e., to learn) about the business environment as the basis for making strategic choices. The second step is about strategic focus—creating a vision and making strategic choices based on the situation analysis. The next step is preparing for implementation. This is done through the alignment of all aspects of the organization's ecosystem—including measures and rewards, structure and process, people, and culture—with the strategy. The fourth step is executing through continuous experimentation and learning. Key is that those experiments fuel deeper insights, which then serve to update the situation analysis and adjust the strategic focus. In other words, the four-step cycle is dynamic and constantly evolving as learning happens.

Pietersen looked to nature and its "massive and ceaseless set of experiments" (p. 3) to develop his model, comparing the survival strategies of individual organisms to the business world: "As in nature, the rules of survival in the marketplace are essentially Darwinian. Never sit still. Continuously generate favorable variations—those that create competitive advantage—or run the risk of extinction" (p. 3). Unlike nature, however, he argued that people can think and learn, which allows them to adapt more effectively.

In addition to the four steps in the leadership process, Pietersen identified five "killer competencies" (p. 7) that individual leaders must purposefully develop in order to adapt: insight (the ability to interpret important signals in the environment), focus (prioritization on the right activities), alignment (the ability of the organization to rally around the priorities), execution (the ability to get things done quickly), and renewal (the ability to repeat the first four competencies on a continuous basis). While the first four competencies are output-oriented (i.e., designed to produce and implement business strategy), renewal is the "ultimate competency" (p. 8). Here, organizations live or die. As they go through cycles of action and reflection to develop and execute business strategy, organizational leaders must consciously integrate renewal in a deliberate and systematic way.

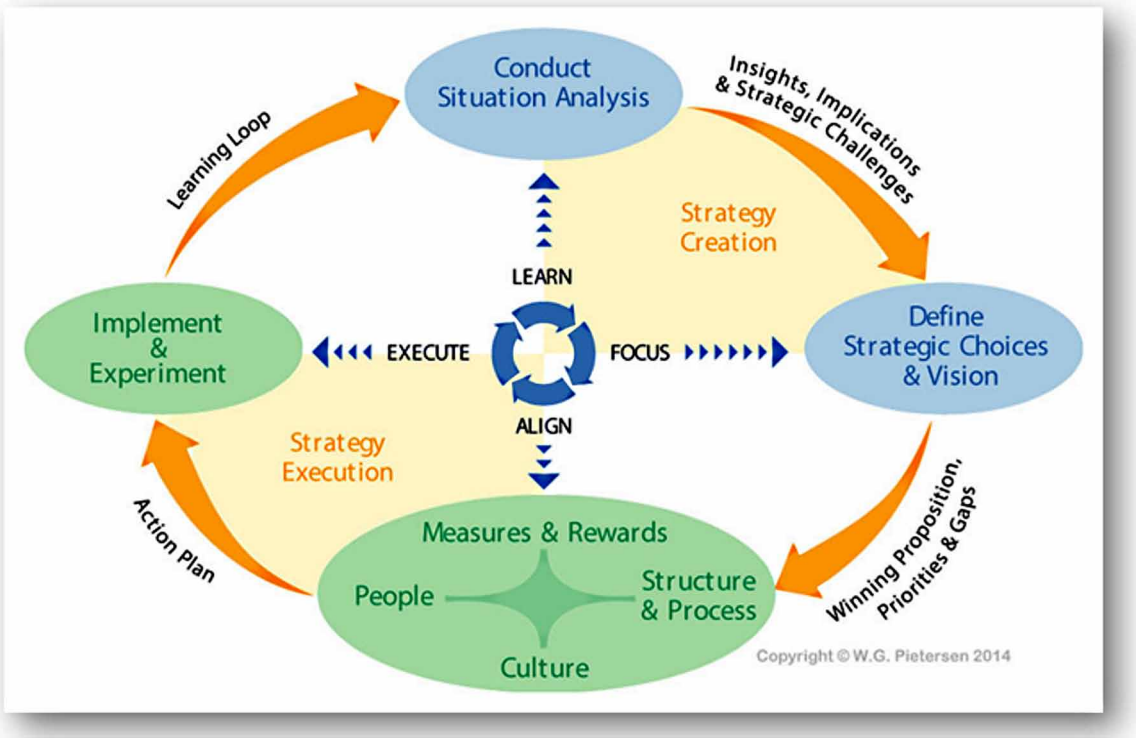
Strategic learning helps to elucidate the concept of being digital in several ways. Unlike the technology adoption frameworks described above, its holistic approach emphasizes the importance of learning as an integral part of organizational life, not as something one does when management orders a change. For instance, if an "outside-in" situation analysis leads to an understanding of digital disruption on the horizon and a strategic choice to transform the organization, the alignment of internal processes (e.g., measures, rewards, structure, people, culture, etc.) will enable the development of a digital mindset and make the adoption of new technology more palatable. In conjunction with Pietersen's killer competencies, leaders can use the strategic learning process to foster an environment of safety, which counteracts the insecurity and fear that prevent people from challenging their assumptions and intentions.

CASE STUDY

Companies fail to achieve digital transformation goals because they are unable to develop the capabilities that allow them to think and work differently (e.g., Chesterman, Castelle, & Shauger, 2016). As organizational leaders continue to develop technology to make process improvements and drive efficiency, they often neglect to foster the digital capabilities that employees need to reimagine the underlying processes completely. In other words, these companies inhibit their people (consciously or not) from challenging

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Pietersen's (2004) strategic learning model



existing assumptions, values, and beliefs around the value of technology. This, in turn, prevents them from learning how to drive real transformation. In the quest to remain relevant and competitive, leadership may make large investments in proprietary technology projects that perpetuate the status quo even as they genuinely try to find ways to innovate. Even organizations that were once widely acknowledged as innovative and disruptive can lose their competitive edge—and market share—if they do not promote learning as part of daily work and nurture a continuous mindset throughout the organization.

This is the case with Fulcrum University, a fictitious organization loosely based on the experience of one of the world's largest online universities. Widely acknowledged for being innovative and brimming with creative energy, Fulcrum was one of the first academic institutions to offer online degrees for working adults. A disruptor in its time, Fulcrum grew rapidly and thrived for over 30 years. However, in the early 2000s, several traditional universities began to challenge Fulcrum's supremacy by offering online degrees with slicker user interfaces, better learning design, and lower prices. By 2009, facing significant enrollment declines, Mark, the CEO of Fulcrum's parent company, presented a proposal to his board of directors to develop a state-of-the-art online learning management system (LMS), which he believed would help Fulcrum win back its market share and reaffirm its leadership position. Mark left the board meeting with a mandate to disrupt the market and develop "the best LMS ever." The goals were twofold: (a) create a high-quality, personalized learning experience for its several hundred thousand students based on the concepts of mass customization and adaptive learning, and (b) improve the institution's operational efficiency by streamlining faculty interaction with students, thus increasing retention. Mark also received approval to establish an educational consulting services division that would sell the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

new LMS to market entrants to generate additional revenues. With Fulcrum's reputation as the leading innovator in online adult learning, this strategic initiative would surely reinforce its leadership position and meet increasingly demanding market expectations.

In making his decision to move forward with the new LMS, Mark relied heavily on research sponsored by Joe, Fulcrum's President, to understand the challenges and opportunities in the industry. The results, which spanned more than two decades, showed how disorienting online learning was for many adults and stressed the need for a more intuitive learner support system. Over years, Fulcrum had developed a systematic and rigorous approach to providing student support through hands-on engagement with administration and faculty. But that came with a hefty price tag, and stakeholders were complaining about the lack of efficiency. The idea behind the new platform was to integrate student support into the learning experience and personalize it through the use of artificial intelligence (AI). This would improve learner engagement and reduce the need for live teacher-student interaction. Moreover, with so many new AI tools available in the marketplace, Fulcrum was extremely well positioned to link them to a new LMS and leapfrog the competition.

With responsibility for the design of the new platform, Dave, Fulcrum's CIO, hired designers from Disney and Google—technologists who he believed would know what "best ever" meant in terms of functionality and user interface. Dave came from a traditional IT background and had been with Fulcrum almost from the beginning. His long-term success was based primarily on his deep knowledge of the institution's internally developed legacy systems and his rock-solid relationship with Joe, his boss. The new LMS was not Dave's idea, but it was not his job to strategize. He was supposed to make it happen, although he was privately concerned about how his team members would manage such an ambitious project because they were all what Dave considered to be "old school" IT developers. That was why he had decided to bring in the very best designers from the outside. However, Dave made it clear to the designers from the beginning that, unlike high-tech companies, academic institutions needed customizable systems to meet unique faculty and course design requirements. After all, his clients were the teachers, not the students. He therefore strongly opposed the use of a "one size fits all" consumer-oriented cloud-based system, preferring an on-premise solution that would meet the needs of the university's faculty and administration.

As the development of the new platform progressed, Mark hired an entire marketing team from a technology company that had recently been sold. The idea was to begin socializing the capabilities of the new LMS with educational institutions that were expanding their online learning presence. Work on the new platform was slow, so the marketing team used screenshots and demos to generate interest in a product that they described as "coming soon." The team came back with positive feedback from the market, but sat idle for over a year waiting for the new LMS to be finished.

Diane, the Head of Marketing, wondered why the development process was so secretive. She had tried to get involved when she first arrived, but there was a lack of dialogue between the marketing and IT departments. That was not how digital companies worked—they were generally much more collaborative and cross-functionally oriented. As a new hire, Diane also noticed a discrepancy between the way the market perceived Fulcrum as "bleeding edge" (this is why she had been excited to join the company) and her own evolving view, which was that innovation at Fulcrum was more a myth than a reality. Perhaps it had been innovative at some point in the past. Diane's perception was validated when she finally got access to the actual platform. Despite its adaptive learning bells and whistles, one could hardly call it state-of-the-art because it was not cloud-based. Her experience told her that it would be extremely chal-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

lenging to sell an on-premise platform, no matter how good the system was. Indeed, it would be out of date by the time it was implemented! She wished that someone had asked for her opinion.

Over the next few years, Mark attempted to manage stakeholder expectations by generating excitement for the LMS and other innovative initiatives. Although the LMS was up and running, it was extremely complex and few institutions were willing to invest in an internally hosted platform, despite its sophistication. By 2015, it was clear that the new LMS had not met the market's expectations, and Fulcrum's one-billion-dollar investment in digital disruption had soured. Student enrollment at Fulcrum is currently a fraction of what it was when the project launched.

ANALYSIS OF FULCRUM

What follows is an analysis of Fulcrum's key decision makers using Marsick's adaptation of Argyris and Schön's theory of action and Pietersen's model of strategic learning (see Table 1 for a summary). In combination, these two theoretical perspectives offer valuable insights into cultural barriers to digital transformation, which can inhibit learning and adoption of new technology.

Assumptions, Values, and Beliefs

Marsick's adaptation of the theory-in-use model begins with the assumptions, values, and beliefs that underpin a course of action. While these assumptions drive individual decision making, they are often held by many individuals in an organization and, over time, become embedded as organizational knowledge. In the case of Fulcrum, assumptions around innovation, industry leadership, and technology contributed to organizational defensive routines that prevented any of the individuals from challenging them.

Mark, the CEO of Fulcrum's parent company, firmly believed that Fulcrum was the leading innovator in the online education industry. This view was not only perpetuated by individuals within the organization, but also by the external marketplace and even other universities. Similarly, Joe's assumptions were rooted in his unwavering belief that Fulcrum, with its decades of experience and success, was unique in its ability to understand the online education industry. He was certain that Fulcrum's research on adult online learning would provide accurate insights into future needs of the industry. The data—collected over several decades—convinced Joe that the new LMS, with its adaptive learning capability, could help any educational institution overcome obstacles to course completion. He also assumed that other universities with less experience would automatically look to Fulcrum, as the market leader, for expertise and would jump at the chance to use the new LMS.

Dave, the CIO, was not certain that the LMS was the right strategy, but trusted that Joe, Mark, and the Board knew what was best for the company. Since he did not believe he had the right in-house talent to execute, he hired designers and developers from well-known high-tech companies who he assumed would have the capabilities needed to design the "best LMS ever." However, Dave was constrained by his own experience in IT and mistakenly advised the team to develop an on-premise product—as had always been done at Fulcrum. He also believed that the primary function of IT in an academic institution was to provide on-site customer service for a full range of proprietary systems. In his opinion, technology should always be subservient to course design and did not need to be oriented toward the student.

Diane, the Head of Marketing, joined Fulcrum based on its history of innovation and overall leadership position in the industry. She was certain it would have a blockbuster product, and looked forward

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to be the first to market it to the university community. She brought in former colleagues based on the assumption that the software would be state-of-the-art, and that Fulcrum had done ample research to determine that the need for such a product existed beyond their own organization.

Intentions

The second step in Marsick's model suggests that individual intentions are manifestations of assumptions, and that intentions, or goals, are precursors to action which, in turn, lead to outcomes. Therefore, there is a strong relationship between intention and outcome. Mark's goals were to maintain the confidence of the board of directors, community, employees, and other key stakeholders. His responsibility was to convince them that despite declining enrollments, the LMS strategy, which was rooted in hard research, would reinforce their supremacy in the marketplace. Joe's short-term intentions were to stop the enrollment decline and maintain operations. In the long term, his goal was to build out an infrastructure that would increase the number of students who graduated and expand the overall student population.

Dave planned to lead the development of the "best LMS ever" with a world-class team of designers and developers. As Head of Marketing, Diane intended to enter the nascent LMS market with a new product that would be remarkably more advanced than the three major incumbents. She put together a rock-star marketing team who would be able to put the right product in front of the right people at the perfect time—when demand for online education was increasing and their current platforms were no longer meeting consumer demands. The more she researched other products in the same category, the more she realized that existing systems were designed with administrators in mind. Diane's goal was to put out a learner-centric system that would work intuitively for a less tech-savvy user.

Actions

Most of the actions taken by the leadership were the result of three basic assumptions about the institution: (a) it was truly innovative, (b) it had unique insight into the market through its decades-long research on adult online education, and (c) technology in academic institutions was fundamentally different. These beliefs underpinned the intention to produce an outcome that would disrupt the online education market and strengthen the organization's leadership position. Mark's and Joe's beliefs about innovation and research underpinned their convictions about the LMS and led them to deny that the initiative was struggling until it was too late. Dave's actions were driven by his loyalty to Joe and, although he understood some of the limitations of the IT department which led him to hire outsiders, his assumptions about how IT works in an academic institution created insurmountable constraints for the new designers. Diane's decision to join Fulcrum and bring a team with her was based on the assumption of innovation propagated by the external market, as was her willingness to show an unfinished product.

Outcomes

It should come as no surprise that the outcomes were overwhelmingly negative. Enrollments continued to decline, the development of the LMS became a serious financial drain on the organization, layoffs became necessary, and key stakeholders were very unhappy. In fact, the outcome was exactly the opposite of what was intended. While Dave was satisified with the look and feel of the new LMS, he was in denial about the commercial viability of an in-house system in the era of cloud-based computing. They

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

had built a beautiful LMS that nobody wanted to buy. Dave had to lay off his design and development team, and Diane, who was unable to sell the LMS, disbanded her team and left Fulcrum.

Single- and Double-Loop Learning

Mark, Joe, and Dave demonstrated single-loop learning. Their actions led to the very outcomes they were trying to avoid, but they never questioned the assumptions or intentions that underpinned them. While Diane did challenge her initial assumption of innovation, she did not alter her intention (to sell an LMS), nor did she surface her concerns. Not only were her actions the result of the organizational defensive routines, but they also served to perpetuate them.

Table 1. Application of theory-in-use model by individual

Actor	Assumptions, Values, Beliefs	Intention	Action	Outcome
CEO (Mark)	Fulcrum as market leader and innovator; accurate and sufficient research	Increase revenues and market share; keep board happy; reassure key stakeholders	Convince board to approve strategy; deflect performance concerns by generating enthusiasm about future	Board approval; high-quality product that does not meet client needs; declining enrollments and revenues; 1 billion-dollar loss
University President (Joe)	Accuracy of Fulcrum's data on student challenges and outcomes; supremacy of institution	Help more students complete degrees and increase enrollment; maintain the university's integrity and reinforce standing as academic institution	Provide research results to Mark; link data to LMS and adaptive learning platform	Unanticipated faculty and administration layoffs with significant impact to local community; declining enrollments
CIO (Dave)	Designers from high-tech companies would develop the best LMS ever; continued relevance of in-house custom systems; technology as support, not driver for innovation	Meet the needs of CEO and President	Hire team of best-in-class designers and developers to produce an LMS that matches Fulcrum's reputation as an innovator	Beautiful LMS but not commercially viable
Marketing Head (Diane)	Reputation in the marketplace was real; Fulcrum would build blockbuster product	To be part of an innovative institution; to sell the new LMS to institutions offering online courses or considering entering the market	Joined the university and brought a team with her; marketed the platform with screenshots and short demos; brought back word of interest in the "coming soon" product	Was unable to get any clients for the LMS

Strategic Learning

Pietersen's strategic learning framework offers additional insights into what went wrong at Fulcrum. According to Pietersen (2002, 2004), the key to embedding strategic learning in an organization successfully is to acknowledge that deep learning is a habit that encourages individuals to become cognizant of their learning through cycles of reflection and action. This did not occur at Fulcrum University. Beginning with a situation analysis that was flawed because of its internal focus, Fulcrum's leaders were blind to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

what was going on outside the institution. As the result of their assumptions of innovation and industry leadership, they relied solely on their own data (i.e., what they already knew) to make strategic choices and create a vision, neglecting to consider broader trends in higher education and advances in technology. In an example of doing digital (as opposed to being digital), it never occurred to Dave to build a system from the point of view of the end consumer (i.e., the student). His own experience left him unaware of how technology was evolving toward a design thinking approach, and while he was probably using consumer technology in his private life, the connection was not apparent to him. Nor did he invite the new team members to contribute their own experiences and insights, preferring to maintain the status quo and stay within his comfort zone (and what his assumptions told him was right).

Preparation for implementation was limited to the LMS itself, and did not address broader issues of alignment, which served to rally the organization around the strategic choice. In particular, there was a lack of interest in reshaping organizational culture, which resulted in ongoing mismatches between intention and outcome. Moreover, the secretive nature of the initiative led to a lack of experimentation and learning, and the strategic learning cycle was stopped before it could really get started.

Mark and Joe, Fulcrum's leaders, did not demonstrate the "killer competences"—the behaviors necessary to support a being digital mindset. Lacking insight into the broader environment, they chose to focus on the wrong activities. While Mark spent considerable time and energy rallying the university's external stakeholders around the LMS, he and Joe did little to engage their people and did not attempt to integrate the new and existing employees. Execution of the new LMS suffered and renewal was stopped in its tracks.

RECOMMENDATIONS

This article explored the adoption of new technology in the age of digital disruption through the lens of two distinct, yet complementary, adult learning theories. Outlined below are five recommendations grounded in theory and practice that organizational leaders can use as they seek to transform themselves and move from doing digital to being digital:

1. Adopt a holistic view of technology change. Organizational leaders must acknowledge that training on new technologies is not enough to drive adoption. They should start by "looking under the hood" and examining the assumptions that underpin intentions and actions. By challenging their own core beliefs and those of their employees, leaders can begin to articulate what might be preventing adoption and establish a foundation for a being digital culture.
2. Embed a culture of continuous learning. Once leaders have identified the fears and insecurities associated with digital transformation, they should use the process of double loop learning to address them—on an ongoing basis. Leaders should also be relentless about developing their own "killer competencies" to provide a supportive environment in which continuous learning can thrive.
3. Promote digital literacy by launching and sustaining a digital literacies program. Share bite-sized pieces of content with leadership and primary stakeholders each morning. This communication can be sent via email or by using a handheld platform that enables custom sharing of content so they can access this learning anywhere, any time. Video, articles, and other multimedia nuggets can share glimpses of digital culture. Some of the content should be broad-based, others should align with the business itself. For instance, one day a short video talk by a well-known digital thought

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

leader can be shared. The next day, share a screencast with a high-level demonstration of a new digital tool they might use at work.

4. Establish a clear link between consumer and enterprise technologies. Employees must learn how to connect their practices at home and the way they use consumer technology and tools to the way they work. Organizational and individual learning should be encouraged and purposefully enabled by collaborative, familiar practices and knowledge creation systems that promote inquiry, discovery, and exploration to build collective success and workplace potential. Within this empowering context, individuals can work cross-functionally, solve problems collaboratively, and develop initiatives collectively with the shared goal of accelerating the discovery, acquisition, and application of new knowledge.
5. Establish and execute a reverse mentoring program within the organization. Pair "digital natives" who are technology-savvy with established employees to share and assist with contextually appropriate tools. This relationship can be reciprocal—the mentee can learn about established practices, and the younger mentor can reflect on how the practice can be reimagined using newer digital tools and processes. That reflection can be shared, and in this way the tools are relevant to established objectives.

CONCLUSION

Technology is reaching into every corner of the business world. Digital entrants are constantly creating new playing fields and disrupting industry incumbents and forcing increasingly compressed business cycles. Characterized by a continuous learning mindset, being digital is key to an organization's success. Future research should build on what the ideas presented in this article to come up with a more robust definition of the term being digital and to understand more deeply the challenges associated with digital disruption. There is not a single organization in the world today that can afford not to make this topic a priority.

REFERENCES

Anderson, M., & Perrin, A. (2017). *Technology use among seniors*. Washington, DC: Pew Research Center for Internet & Technology.

Argyris, C., Putnam, R., & Smith, D. M. (1987). *Action science*. San Francisco, CA: Jossey-Bass.

Argyris, C., & Schön, D. (1974). *Theory in practice: Increasing professional effectiveness*. San Francisco, CA: Jossey-Bass.

Argyris, C., & Schön, D. (1996). *Organizational learning II: Theory, method, and practice*. Reading, MA: FT Press.

Berman, S. J., & Bell, R. (2016). *Digital transformation: Creating new business models where digital meets physical*. Somers, NY: IBM Institute for Business Value.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bloem, J., Van Doorn, M., Duivestein, S., Excoffier, D., Maas, R., & Van Ommeren, E. (2014). *The Fourth Industrial Revolution. VINT Research Report*.

Bridges, W., & Bridges, S. (2017). *Managing transitions: Making the most of change*. Cambridge, MA: Da Capo Press.

Bughin, J. (2017). Think digital is a big deal? You ain't seen nothing yet. *McKinsey*. Retrieved from http://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-strategy-and-corporate-finance-blog/think-digital-is-a-big-deal-you-aint-seen-nothing-yet

Chesterman, C. W. Jr, Castelle, K., & Shauger, J. J. (2016). Interpreting barriers to success in software development and deployment using systems theory. *International Journal of System of Systems Engineering*, *7*(1-3), 143–158.

Christensen, C. M., & Van Bever, D. (2014). The capitalist's dilemma. *Harvard Business Review*, *92*(6), 60. PMID:24956870

Corbett, A. C. (2007). Learning asymmetries and the discovery of entrepreneurial opportunities. *Journal of Business Venturing*, *22*(1), 97–118. doi:10.1016/j.jbusvent.2005.10.001

Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* [Doctoral dissertation]. Massachusetts Institute of Technology.

Friedman, T. (2016). *Thank you for being late*. New York, NY: Farrar, Straus and Giroux.

Johnson, B., & Rice, R. (1987). *Managing organizational innovation*. New York, NY: Columbia University Press.

Kane, G. C., Palmer, D., Phillips, A. N., & Kiron, D. (2015). Is your business ready for a digital future? *MIT Sloan Management Review*, *56*(4), 37.

Kelly, D., & Amburgey, T. L. (1991). Organizational inertia and momentum: A dynamic model of strategic change. *Academy of Management Journal*, *34*(3), 591–612. doi:10.2307/256407

Kolb, D. (1984). *Experiential learning as the science of learning and development*. Englewood Cliffs, NJ: Prentice Hall.

Kotter, J. P. (1996). *Leading change*. Brighton, MA: Harvard Business Press.

Mezirow, J. (1975). *Education for perspective transformation: Women's reentry programs in community colleges*. New York, NY: Center for Adult Education, Teachers College, Columbia University.

Mezirow, J. (1994). Understanding transformation theory. *Adult Education Quarterly*, *44*(4), 222–232. doi:10.1177/074171369404400403

Persico, D., Manca, S., & Pozzi, F. (2014). Adapting the Technology Acceptance Model to evaluate the innovative potential of e-learning systems. *Computers in Human Behavior*, *30*, 614–622. doi:10.1016/j.chb.2013.07.045

Pietersen, W. (2002). *Reinventing strategy: Using strategic learning to create and sustain breakthrough performance*. Hoboken, NJ: John Wiley & Sons.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pietersen, W. (2004). Strategic learning. A leadership process for creating and implementing breakthrough strategies. Retried from https://williepietersen.com/wp-content/uploads/pdf/Strategic_Learning.pdf

Rogers, E. M. (2003). *The diffusion of innovation* (5th ed.). New York, NY: Free Press.

Rogers, E. M., & Shoemaker, F. F. (1971). *Communication of innovations: A cross-cultural approach* (2nd ed.). New York, NY: Free Press.

Sydow, J., Lindkvist, L., & DeFillippi, R. (2004). Project-based organizations, embeddedness and repositories of knowledge: Editorial. *Organization Studies, 25*(9). Retrieved from http://sgpwe.izt.uam.mx/files/users/uami/dml/Sydow_Lindkvist_y_DeFillippi_2004_Project-Based_Organizations1.pdf

Vodanovich, S., Sundaram, D., & Myers, M. D. (2010). Research commentary—Digital natives and ubiquitous information systems. *Information Systems Research*, *21*(4), 711–723. doi:10.1287/isre.1100.0324

Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation*. Cambridge, MA: Harvard Business Press.

Westerman, G., Calméjane, C., Bonnet, D., Ferraris, P., & McAfee, A. (2011). *Digital transformation: A roadmap for billion-dollar organizations*. Cambridge, MA: MIT Center for Digital Business and Capgemini Consulting.

This research was previously published in the International Journal of Adult Vocational Education and Technology (IJAVET), 8(4); pages 13-28, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 3
Everything Must Change Because Nothing Changes:
A History of Organizational Change in the Italian Banking Sector

Filippo Ferrari
Bologna University, Italy

ABSTRACT

This reflective case history describes an intervention conducted by the author within an Italian bank. Involved in an organizational change at the bottom level, the author faced many difficulties both related to organizational dynamics (changes in work organization and in the skills of the operators) and to relational aspects (power dynamics and resistance to change of some employees). This reflective case history describes the followed organizational analysis and evaluation process and the implemented organizational change strategy. Finally, it presents the adopted reflective method of intervention and the obtained results.

INTRODUCTION

Background to the Organization and Change Setting

The Italian banking system has for many years been characterized by mergers, to meet the criteria of solvency and reliability required by European legislation. In Italy, however, many small businesses belonging to the so called 'cooperative credit' system (i.e. originally established by a small group of people on an equalitarian base) have in fact retained their own autonomy, taking root in their territory. For a couple of years, Italian legislation has forced cooperative banks to abandon this model of governance and be listed on a stock exchange (if adequately sized) or, alternatively, to merge.

The level of managerial and strategic skills expressed by these small credit institutions has always been criticized. For instance, the governance has often shown a lack of strategy, following *cronysm* log-

DOI: 10.4018/978-1-7998-7297-9.ch003

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ics in the provision of credit to companies. These logics often generated scandals and financial losses such that the Bank of Italy took over some institutions to the point of involving people who were close to prominent political figures of the Government. However, *cronysm* has also always affected the hiring and staffing process, eventually leading to a widespread skill shortage at the middle and bottom levels of the organization. Hence, in this continuously developing and changing sector, these specific criticisms at the human resources level could potentially lead to obstacles in achieving positive change outcomes. Given this scenario, proper preparation, training, and involvement of the human resource function in organizational change (OC) initiatives becomes a strategic purpose for all involved as the change agents.

The 'XYZ' Bank[1] was founded in 1908 by the initiative of sixty founders who each owned 1489 shares worth 20 *lire* (the Italian currency before the Euro). Just reading the Company Statute leads to a clear understanding of what the intentions were of its first shareholders. Article 2.1 states: "The Company's purpose is the collection of savings and the exercise of credit, both in respect of its Members and non-Members, and is inspired by the principles of mutuality; it also proposes to support and promote the development of all productive activities with particular regard to the smaller ones". For almost eighty years the bank's activities were concentrated in a mountain province of Northern Italy. Then, starting from the early 1990s, the 'XYZ' Bank committed itself to growing beyond its original geographical area: first in Milan and Sicily, then in Marche, and finally in Lazio. In a few years it became one of the leading Italian banking groups, and in 1994 was listed on the stock exchange. In 2016, on the Italian Government's impulse, it became a public company.

The banking group 'XYZ' has since then been made up of 4 different subsidiaries. The human resources division of the group consists of a central HRM service, at the head quarter, and a responsible HRM for each region. Operationally, all four subsidiaries consist of small branches in various parts of the four respective territories, whose human management policies are coordinated at the regional level. Each local branch has a branch manager and some operators. In this intervention, my direct interlocutor was the HRM coordinator for the Emilia-Romagna Region, where my affiliation (the University of Bologna) is based. Operationally, I also interfaced with the board of branch managers, which coordinates operations at the level of a single branch in the territory.

The Triggers and Drivers of the OC Initiative

In that period, 'XYZ' Bank aimed to achieve a new 'customer care model' in which the bank's operators would present a wide-ranging skills portfolio to face and address all customers' needs/demands. This implied there was a need for an extensive re-organization of personal skills, and development of a more flexible and life-long learning-oriented workforce, especially at the bottom levels of the organization. Therefore, creating readiness to change throughout the bank and employee adaptability became strategic issues for the human resource management function.

The Organizational Sponsors (Clients) and Stakeholders

The 'XYZ' Bank had never been involved in scandals. However, I had followed all the events of this bank: the decision to be listed on the stock exchange, the evaluation process by the Bank of Italy, the debate on all the major Italian newspapers. The opportunity for an OC consultancy collaboration with 'XYZ' Bank arose from a discussion of a Master thesis being carried out by a student of mine who was a young employee of the company. My student's manager (who belongs to the local branches coordina-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tors board) had been appointed as Project Manager of a staff development plan aimed at contributing to the change management process taking place. However, this manager from the beginning found some difficulties in involving people (especially middle management) in the project, and these difficulties were undermining the development of my student's thesis. It was an opportunity to make an appointment and meet the Project Manager.

THE ORGANIZATIONAL CHANGE INITIATIVE

My first meeting with the bank therefore takes place informally, during a meeting that had the aim of agreeing on the development of my student's degree thesis. So I did not have any role in the formulation of the change strategy, nor in the choice of the methodologies to be adopted. Soon, however, discussing the difficulties my student was encountering in collecting data, the project manager shares some of his perplexities and difficulties with me, and asks me for a private meeting, without the student. The process of change had already started, the bank's top management had approved the general strategy and funded the project, of which my interlocutor (who was not a top manager, but a local branch coordinator belonging to the regional board of coordinators) was the Project Manager. He had defined in partial autonomy the detailed operational plan that was to implement the strategy, but soon some problems with the local branch managers had arisen. At that point, I asked and got to see what had been done up to that point, trying to understand to what extent the company's strategic objectives were achievable with the planned strategy.

As argued in Chapter 1 of this book and in the author's contributed chapter in Section 2, engaging in 'critically reflective' as well as 'evidence-based' practice should become an essential feature of managing/facilitating OC programs. Senior (2002) suggests that management of an organizational change should be *strategic*, that it ought to be based on the ability to identify the type of change (rate of occurrence: continuous/discontinuous), how it comes about (planned/emergent), and the scale (level of impact: fine-tuning/corporate transformation). In fact, change processes are not all equal, and literature suggests that the type of change resistance depends on the type of change (By, 2005) and OC strategy. Hence, as Hamlin and Russ-Eft argue in Chapter 2 of this book, gaining a better understanding of an organization through sound organizational analysis prior to formulating a change strategy, and then critically evaluating the effectiveness of the change processes and change agency are of crucial importance.

Organizational Analysis and Evaluation

Many organizational change processes fail because the involved people are not adequately prepared for the specific type of change (Bovey & Hede, 2001). Following Senior's (2002) taxonomy, the 'XYZ' Bank case seemed discontinuous, planned, and with a wide impact on the corporate body. Thus, it appeared to me to be a somewhat simple case with favourable characteristics: an official project with a specific budget, well defined desired and formalized outcomes, and clear deadlines. At first glance, everything should have gone smoothly, or so I thought. But I was wrong.

The problem that I immediately identified was not at the level of middle line managers, but those in the HRM Department. To favour change, the HRM staff wanted to provide formal courses based on non-empirically validated methodologies- Neuro-Linguistic-Programming in particular-supposedly to 'convince employees that the change would be useful and effective'. A similar problem emerged during

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

various meetings with other consultants and trainers involved in the project, all of whom were practitioners without any OC related academic background: they too emphasized the usefulness of direct lecturer only methods to facilitate organizational change.

A considerable number of courses were therefore being delivered, but their effectiveness was scarcely being evaluated. This was because the courses had already been established by the HRM staff based on their personal beliefs, and I could not modify them. Despite and as a consequence of the HRM staff beliefs, middle managers considered the courses they attended to be a complete waste of time. This scenario was consistent with what has been available to read in the literature since the seminal study of Rynes et al. (2002) which revealed that research on effective HRM practices has not readily been adopted by HRM practitioners. More recent literature provides evidence of a significant research-practice gap between the beliefs of HRM professionals about human resources management practices, and the empirical evidence provided by the scientific literature (Carless et al, 2009; Sanders, et al 2008; Tenhiala et al., 2016).

In addition to this lack of an evidence-based methodological approach, my evaluation of the 'XYZ' Bank case unfortunately revealed other critical problematic issues, and mainly at the level of the informal relationships between various sections of the workforce.

The bank is organized on a regional basis, with at least one branch in each provincial capital. Each branch has a manager and 4 to 12 operators with different experience, skill levels, and often also with different areas of expertise. My student was working as an operator, thus at a very bottom level, where real relational problems arose. In fact, if on a formal level the objective of the OC initiative was to get the entire organizational bottom-level population to change, it soon became clear to me that a further problem was being generated by the fact that older employees were considered by the younger employees to be less competent, less up-to-date and less flexible in facing the new organizational situation. However, they often had some unique specialist skill and above all, their long tenure ensured them a high status in their branch. My problem was therefore activating and conducting an effective evidence-based OC intervention, but without causing conflict either with the beliefs and convictions of staff within the HRM Department, or by undermining the status of existing interpersonal relationships within the subsidiaries.

The OC Strategy Adopted and Implemented

The bank's management also had another problem due to the previously adopted OC strategy. In addition to investing in training activities to bring about change, and to raise the level of productivity and stimulate individual work motivation in the new business model, top management had begun to implement a performance appraisal system based on the goal setting technique (Locke & Latham, 2000) and on Management by Objectives (MbO) (Drucker, 1954). In doing so, the HRM staff followed the available empirical evidence. In fact, aiming to make the intervention more effective, the managers of local branches of 'XYZ' Bank had been stimulated to construct MbO plans strictly calibrated on the expected results (in terms of their subsidiary's output) and applied to each worker. However, within a few months, productivity had not taken off. Instead the rate of complaints from middle managers of the local branches had risen.

During a meeting with the Regional HR Manager, I was asked to intervene immediately. The HRM Department staff asked me particularly to design a new performance appraisal system urgently that would be better fitted for their desired strategic organizational change. Eventually, I tried a more reflective approach following Schein's *process consultation* view on Organization Development (OD) (Schein 1999). If I had supported my client I would have activated the *patient-doctor pattern*, and this would

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

have offered me immediate benefits. My perception, however, was that the management did not need an evaluation system, or rather that that was not the solution to the real problems that were causing the failures in implementing the OC strategy. Thus, following Schein's approach, I began an *open consultation process* through which I suggested they first take a diagnostic moment to understand better the attitude of the personnel involved in the change in progress.

The first approach was therefore 'traditional': I asked to meet in a confidential way some 'special witnesses'. It was very difficult for me to understand that the main problem in the 'new business model' was not the *elderly workers*, but the lower level of pay and the lower contractual protection of the *younger workers*. In this scenario, the 'new business model' would potentially penalize the younger staff. The 'model' required elderly workers with higher wage levels, more protection contractually and being very expert in specific areas but less prepared in general, to work together with younger staff with skills closer to those required by the 'model', but with lower levels of remuneration and trade union protection. Furthermore, I came to realize that the middle managers' goal was not to accomplish the change, but to *pretend* to accomplish it. In other words, the change project had to formally respect what top management had indicated, but without affecting the habits and skills of the involved people. Before my intervention, the front-office of each local branch was divided into several specific areas/positions in which the employees carried out tasks according with their specific skills. The 'new business model' required all front office employees to become fully-interchangeable. Therefore, the only possible strategy I could suggest was 'a promotion' of the older workers to move them from direct contact with the public/customers, leaving only the youngest (and most eclectic) workers at the front office. Formally, the 'new business model' was fully implemented with each branch re-organized to provide all-round advice to the customer. However, the reality was everything remaining as before: young employees provided the first level of care, and then passed the customer to the oldest colleague in the back office according to their higher level of competence. Of course, I had failed to implement a fully evidence-based intervention. However, I saved the relational system, and in addition I fostered the skills exploitation of the younger employees. It was a makeshift solution, but I avoided the collapse of the relational context. In the end, rather than training for change, it was a matter of moving people. As the ancient Italian saying asserts: 'everything must change, because nothing really changes ...'

Fortunately, there is a happy ending. To stop a succession of acquisitions that since 2010 had led the 'XYZ' Bank to lose € 1.1 billions, and also because in 2015 the stock market had collapsed by 90%, in December 2017 the extraordinary shareholders' meeting approved the robust capital increase of € 700 million, an amount six times higher than the bank's market value. In the first semester of 2017, the bank shares lost 12.78% marking the worst performance of the entire Milan list and closing at € 8.926. Today, 16th of February 2018, the announcement of the conditions of the € 700 million maxi capital increase has boosted the 'XYZ' Bank's share price at Piazza Affari (the Milan Stock Exchange). During the preceding six months, 'XYZ' Bank had renewed the employment contracts to more than four hundred people, especially the younger ones with fixed-term contracts, thus preserving the employment level. The HRM staff said to me that this outcome was considered by some in the bank to be due mainly to the better and growing performance of the youngest employees within the local branches all around Italy…

In a cultural context that is very traditional and relation-based as in Italy, the avoidance of conflict, the fact of considering 'untouchable' certain employees just because of the long time they had served in the company, and/or of their greater seniority perpetuates an organizational cultural model built on belonging rather than on merit.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

I was able to find the organizational mechanisms to lead the senior employees towards taking on a new job/position, but undoubtedly the potential of the branches remained partly unrealized due to the low productivity of the seniors involved. However, in the specific context of 'XYZ' Bank, this compromise was the only goal to be pursued, regardless of the Evidence Based Management that suggests that goal-setting is the most important factor providing the basis for excellent performance. In fact, as Rynes, Brown and Colbert (2002) claim, "this is one of the most robust findings in all of industrial/organizational psychology" (p.152) (see also Locke & Latham, 1990).

CONCLUDING REFLECTIONS

On reflection, maybe it was not correct of me to negatively emphasize so strongly the 'research-beliefs gap' in the field of HRM, as widely reported in the management literature. Regarding this research-beliefs gap, indeed a weakness in current approach to research is to identify evidence-based knowledge with empirical evidence. For instance, an evidence-based approach grounded only on empirical, quantitative literature would have suggested the implementation of a strongly goal-oriented management system applied to front-office operators. But this approach, in this specific context, resulted in negative outcomes. Because of the difficult in relationships between the local branch managers and their respective older operators I turned to boycotting such goal-based performance management systems.

The Italian bank sector is characterized by a shared perception of distributive justice based on an equality criterion rather than on meritocracy. People appraisal procedures that are outcome-based are not widespread at low hierarchical levels. Thus, evidence-based managerial procedures should pay attention to the specific context, considering both formal and 'informal' aspects. For instance, the 'XYZ' Bank case indicates that a more broadly based scientific approach should have been adopted that derived its evidence-based knowledge from other sources of information. This reflective case history indeed suggests that to make the most effective OC decisions, it is necessary to consider at least four different sources of information: empirical evidence derived from good qualitative as well as quantitative research, organizational evidence derived from good internal organizational analysis and evaluation, personal experience-based evidence, and finally stakeholders' experience-based evidence (Barends, Rousseau & Briner, 2014; Pfeffer & Sutton, 2006a; 2006b). Of course, considering these four sources of information at the same time makes the action of the change agent very complex, and above all requires a professional who has at the same time academic training (such as research methodology, literature analysis skills, participation in international networks) and a solid background of field experience as a consultant. However, professionals should be particularly cautious in paying attention to personal experience, especially as a source of evidence. Cognitive sciences warn that experience could become a trap, eliciting fallible shortcuts in decision-making processes. In other words, among these four potential sources of 'best evidence', past experiences could become a trap in change agent action. Thus, a more effective source of experiential information to inform and shape change management processes could be drawn from a change agent's personal characteristics including his or her *attitude of wisdom* (Ferrari, 2014). Wisdom is knowing without excessive certainty and without excessive caution. Understanding the role of wisdom (Bigelow, 1992) as a source of resilience is a Socratic kind of knowledge (the operator knows he doesn't know), a kind of knowledge which is free of presumption on the one hand and of excessive caution on the other. As an attitude, wisdom resides in individuals, and it has been conceptualized in at least two distinct (but not mutually exclusive) domains: a cognitive domain and a constellation of personal

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

attributes. The Max-Planck model (Baltes & Smith, 1990; Dittmann, Kohli & Baltes, 1990; for a review see Kramer, 2000) posits five specific criteria of wisdom: 1) rich factual knowledge about the matters of life; 2) procedural knowledge about ways of dealing with life problems; 3) life-span contextualism and, more relevant to the aims of this case history; 4) uncertainty in problem definition and finally; and 5) relativism regarding problem solving. Using a combination of these sources of 'best evidence' to inform the formulation and implementation of OC initiatives ensures a more appropriate and better context-situated decision-making process (Olivas-Luján, 2008). Perhaps, after all, a reflective change agent is 'simply' a *wise* professional who ensures a good integration between academic skills and field experience. At the end, this is my lesson learned, and the basis for future more reflective evidence-based organizational change projects.

REFERENCES

Armenakis, A., Bernerth, J. B., Pitts, J. P., & Walker, H. J. (2007). Organizational change recipients' beliefs scale: Development of an instrument. *The Journal of Applied Behavioral Science*, *43*(4), 481–505. doi:10.1177/0021886307303654

Barends, E., Rousseau, D. M., & Briner, R. B. (2014). *Evidence-based management. The basic principles*. Amsterdam: Center for Evidence-Based Management.

Bovey, W. H., & Hede, A. (2001). Resistance to organisational change: The role of defence mechanisms. *Journal of Managerial Psychology*, *16*(7), 534–548. doi:10.1108/EUM0000000006166

By, R. T. (2005). Organizational change management: A critical approach. *Journal of Change Management*, *5*(4), 369–380. doi:10.1080/14697010500359250

Carless, S. A., Rasiah, J., & Irmer, B. E. (2009). Discrepancy between human resource research and practice: Comparison of industrial/organizational psychologists and human resource practitioners' beliefs. *Australian Psychologist*, *44*(2), 105–111. doi:10.1080/00050060802630015

Drucker, P. C. (1954). *The practice of management*. New York, NY: Harper & Row.

Ferrari, F. (2014). Delegation, accountability and organizational reliability. coordination mechanisms and training models for contingency management. *Procedia: Social and Behavioral Sciences*, *150*, 937–943. doi:10.1016/j.sbspro.2014.09.105

Holt, D. T., Armenakis, A. A., Field, H. S., & Harris, S. G. (2007). Readiness for organizational change: The systematic development of a scale. *The Journal of Applied Behavioral Science*, *43*(2), 232–255. doi:10.1177/0021886306295295

Kramer, D. (2000). Wisdom as a classical source of human strength: Conceptualization and empirical inquiry. *Journal of Social and Clinical Psychology*, *19*(1), 1. doi:10.1521/jscp.2000.19.1.83

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice-Hall.

Olivas-Luján, M. (2008). Evidence-based management: A business necessity for Hispanics. *The Business Journal of Hispanic Research, 2*(2), 10-26. Retrieved from https://ssrn.com/abstract=2713116

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pfeffer, J., & Sutton, R. I. (2006a). Evidence-based management. *Harvard Business Review*, *84*(1), 62–74. Retrieved from https://hec.unil.ch/docs/files/56/1290/pfeffer_&_sutton_2006_evidence_based_management_hbr.pdf PMID:16447370

Pfeffer, J., & Sutton, R. I. (2006b). *Hard facts, dangerous half-truths and total nonsense: Profiting from evidence-based management*. Boston, MA: Harvard Business School Press.

Rynes, S. L., Brown, K. G., & Colbert, A. E. (2002). Seven common misconceptions about human resource practices: Research findings versus practitioner beliefs. *The Academy of Management Executive*, *16*, 92–103. doi:10.5465/AME.2002.8540341

Sanders, K., van Riemsdijk, M., & Groen, B. (2008). The gap between research and practice: A replication study on the HR professionals' beliefs about effective human resource practices. *International Journal of Human Resource Management*, *19*(10), 1976–1988. doi:10.1080/09585190802324304

Schein, E. (1999). *Process consultation revisited: Building the helping relationship*. Boston, MA: Addison-Wesley Publishing Company.

Senior, B. (2002). *Organisational change* (2nd ed.). London, UK: Prentice Hall.

Tenhiala, A., Giluk, T. L., Kepes, S., Simón, C., Oh, I.-S., & Kim, S. (2016). The research-practice gap in Human Resource Management: A cross-cultural study. *Human Resource Management*, *55*(2), 179–200. doi:10.1002/hrm.21656

ENDNOTE

[1] The name has been changed.

This research was previously published in Evidence-Based Initiatives for Organizational Change and Development; pages 601-608, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 4
Capability Demands of Digital Service Innovation

Jo Coldwell-Neilson
https://orcid.org/0000-0002-3602-8334
Deakin University, Australia

Trudi Cooper
Edith Cowan University, Australia

Nick Patterson
https://orcid.org/0000-0003-4565-3614
Deakin University, Australia

ABSTRACT

This chapter explores the demands that digital service innovation places on those stakeholders who use the digital service through three lenses: workers and workplace, digital literacy, and, finally, digital education. The chapter includes an overview of digital service innovation. The impact of digital services generally is explored from the perspective of the workforce and the future of work developing an argument for the need for ongoing upskilling in the digital space. The skills required in the age of digital disruption are explored, and a definition and general understanding of what digital literacy entails is presented. Finally, the opportunities for education in digital environments are explored through three vignettes which illustrate different opportunities for upskilling and retraining. The chapter highlights adaptations required in socio-political environments, education and training, and curricula to allow digital service innovations to achieve the expected benefits.

INTRODUCTION

Digital service innovation is emerging in diverse sectors in the economy, including, retail, education, tourism, hospitality, social services, and distribution. This chapter synthesises findings from three different research projects to address questions about how digital service innovation is changing work; what

DOI: 10.4018/978-1-7998-7297-9.ch004

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

types of change will be socially beneficial; what digital skills will be required by the future workforce; and how education and training can meet these needs. This chapter will explore four questions:

- how is digital service innovation changing work and workplaces?
- what are the potential socio-cultural benefits and pitfalls of digital service innovation?
- what are the implications of these changes for digital literacy? and
- how is education and training being developed to meet various digital literacy needs of the future?

RESEARCH METHODS

The research presented here builds on a recent research project on digital skill acquisition conducted by Coldwell-Neilson (2016) combined with digital discernment research by Cooper (2019) and with Patterson's extensive experience designing, building and teaching in online and MOOC environments. Three vignettes are presented which illustrate contrasting education and training skills that can be used to develop of various digital service skills.

Central to this chapter is the research conducted by the Coldwell-Neilson (2016) on future digital literacy requirements. A twenty-first century perspective of digital literacy was developed through an extensive literature review, which included a scan of existing digital literacy definitions and frameworks, as well as a review of industry expectations of the impact of digital service innovation on skills and capabilities. This was validated through a series of workshops with academics from higher education as well as through conference presentations. This led to an updated understanding of digital literacy as presented in the following sections.

Cooper conducted a research project to integrate digital discernment skills into an undergraduate degree, reported in vignette 3. Barnett and Coate's (2005) curriculum framework with Threshold Concepts (Meyer, Land & Bailie, 2010) was used to develop an initial curriculum for digital discernment for youth work and community work students. An action-learning methodology was used to fine-tune curriculum implementation changes through four iterations, as reported in (Cooper & Scriven, 2017). A cyclical inquiry process of dialogical questioning, planning, observation, information gathering, reflection and re-questioning, learning and re-planning was used as a reflexive research method to document and theorise process, and to improve delivery strategies. Digital discernment problems were identified and strategies to address each of these were developed and trialled.

BACKGROUND

Digital Service Innovation is driven by the need to deliver new solutions rapidly to a wide audience through digital technology. Digital Service Innovation is often assumed to be motivated by the pursuit of economic efficiency and the use of ICT to reduce workforce cost (Green, 2017) producing savings that are passed on to consumers as lower prices, or through increasing profit. Nylén and Holmström (2015) contend that better user experience is at least as important as price competition.

Digital Service Innovation brings about digital disruption. This has both positive and negative outcomes. Digital services, the electronic delivery of information and data over the internet, provides many benefits to employees, employers and consumers if it provides easier access to such services. Digital

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

technology has enabled flexible working, including working from home and, in some industries, flexible work hours so that work can be better balanced with other life commitments or constraints. This flexibility enables some people who were previously excluded from the labour market to participate, such as those with disabilities or people who live in remote locations or where there are few local employment opportunities (Green, 2017). Claims have been made that the automation of more tedious jobs allows workers to have greater autonomy and creativity in their working lives (Vom Brocke et al., 2018). New forms of work, such as 'e-lancing', crowdsourcing and social media influencing, have enabled individuals to directly access their markets digitally (Green, 2017).

Less positively, some digital service innovation has had negative outcomes for some groups in society. For example, digital service innovation has increased automation in clerical, retail and warehousing sectors, resulting in the loss of low skill, full-time, entry level jobs (Green, 2017). Remaining low-skill work has become casualised, and the precariat, the social class characterised by precarious employment, has emerged as a new class of workers (Standing, 2011). Services that are 'digital by default' at first point of contact (Green, 2017) where the user does not interact with another person, have not always delivered the positive user experience that Nylén and Holmström (2015) have suggested is necessary. This is especially problematic where the service is offered by an entity that the customer cannot avoid interactions with, for example, government services such as Centrelink. To avoid inequity, those using digital services need to have access to appropriate technology as well as the skills and capabilities to use them efficiently, effectively and safely (Compaine, 2001).

Technical and human barriers to digital service innovation have been researched by others, (for example, Green, 2017) and the effects of digital services innovation on employee experiences of work have also been explored (for example, Gregg, 2011). However, there is a consensus that more research is required into digital skills in the workplace (Gekara, Snell, Molla, Karanasios & Thomas, 2019). Concern is also widely expressed in the literature about the inadequacy of digital skills education and training (Gekara et al., 2019). Green (2017) contends that rapidly changing digital technologies have placed greater responsibility on individuals to maintain their skills to ensure employability. He contends that the shortening life cycle of digital skills makes this onerous because it necessitates ongoing learning and upskilling. Green found that businesses were not good at articulating the digital skills required and did not put resources into upskilling or training in digital literacy for employees (Green, 2017). This was affirmed by Gekara et al. (2019), who claim that late technology adopters expect employees to have digital skills and resist investing in upskilling their staff. However, they found that early adopters appreciated that continuous upskilling is necessary, and they were more likely to provide training (Gekara et al., 2019).

DIGITAL SERVICE INNOVATION AND THE FUTURE OF WORK

The impact of automation and digital technologies on the future of work is mediated by the socio-political systems in which technologies develop. Futurists and novelists have been making predictions about automation, the future of work, and social change, since the first industrial revolution, with varying degrees of success. Some futurists have assumed that the low-regulation free-market neo-liberal socio-political system that is dominant in many Western liberal democracies will be unchanged by the introduction of technologies. For example, Tyler et al. (2019) assert that space tourism will be a future job, without considering how mass space tourism might be affected by other policy considerations such as the climate crisis and the need to limit carbon emissions. Others have assumed that technological change will

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

have profound social and political impacts that may be dystopian. Science fiction writers (for example, Brunner, 1968) have explored potential social and political consequences of unregulated technology. Other futurists, such as Bill Gates, Elon Musk, and Stephen Hawkins have focused upon what regulation and policies are needed to prevent adverse socio-politico-cultural outcomes of technology and to ensure that technology meets human needs rather than being driven by economic needs. This section addresses digital service innovation and the future of work. The authors begin from the premises argued in the recent ACOLA report (Walsh et al., 2019), that:

- adoption of digital innovations will have social, political and cultural consequences;
- political choice can be made about implementation of technologies that affect the future of work; and
- these choices ought to be informed by social and ethical values rather than economic gain for the few.

If this occurs, regulation will modify how technologies are adopted and also how the socio-economic system operates, at least to some extent. The following example illustrates some important aspects of this position.

In 1930, Keynes, the economist, wrote about the future of work. He was writing just after the 1929 Wall Street stock market crash and at the beginning of the Great Depression. The Great Depression occurred during the second industrial revolution (Coldwell-Neilson & Cooper, 2019) when mass production had increased output and productivity. The economic recession caused mass unemployment in Europe and the USA, and positive feedback loops meant this was ended only by the Second World War. In 1930, Keynes had this to say about work in 2030:

…for the first time since his creation man will be faced with his real, his permanent problem-how to use his freedom from pressing economic cares, how to occupy the leisure, which science and compound interest will have won for him, to live wisely and agreeably and well…Yet there is no country and no people, I think, who can look forward to the age of leisure and of abundance without a dread. For we have been trained too long to strive and not to enjoy …For many ages to come, the old Adam will be so strong in us that everybody will need to do some work if he is to be contented. We shall do more things for ourselves than is usual with the rich to-day, only too glad to have small duties and tasks and routines. But beyond this, we shall endeavour to spread the bread thin on the butter-to make what work there is still to be done to be as widely shared as possible. Three-hour shifts or a fifteen-hour week may put off the problem for a great while. For three hours a day is quite enough to satisfy the old Adam in most of us! (Keynes, 1930).

Keynes contended that people have been encultured to need work, suggesting for the next hundred years from the time he wrote that this would continue to be the situation. By 2030, he predicted that the standards of living for ordinary people would have increased eightfold (this is probably an underestimate based upon Piketty & Goldhammer, 2015). After this time, he predicted an age of leisure, and a change of socio-cultural values away from a focus on making money and towards a focus on how to live well. Meanwhile, he suggested work should be shared to ensure that everyone had access to the sense of purpose that work provided. At the time of writing, eleven years remain before Keynes' 'age of leisure'.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The quotation illustrates that the social impacts of automation and digital technologies in part depend upon socio-politico-cultural decisions. The standard working week has reduced slightly from a 45-hour working week common in 1930s Britain, to 37.5 hours in contemporary Australia, and most other developed economies. A four-day week (30-hour worked but paid the same as 37.5 hours) was recently trialled by Perpetual Guardian in NZ. Against expectations the evaluation found that output did not decline and workers reported less stress and an improved work-life balance. A key to gaining these results was involving the workforce in the job redesign to enable a four-day week (Coulthard Barnes & Perpetual Guardian, 2018). A similar trial was run at Microsoft in Japan. Paul (2019) reported that Microsoft saw a 40% jump in productivity. There have been various trial projects of Universal Basic Income (UBI) schemes that guarantee people a weekly payment irrespective whether or not they work to address wage loss from automation (Piketty, 2015). UBI has been proposed as a policy response to structural unemployment caused by automation and digital technology (Weller, 2017) that would provide income to displaced workers. The preliminary evaluation of such a program implemented in Finland indicates that participants experienced less stress and better health, but their economic participation was no different from the control group (Charlton, 2019). If there is structural unemployment, the lack of improvement in economic participation might be expected. Apart from this, there is little evidence that changes to socio-cultural values needed for an age of leisure have occurred. There is no evidence that political and economic systems have adapted to ensure that those with little or no work have an adequate standard of living. Keynes's account was premised upon the assumption that the benefits of automation would be shared across the population, but in Australia there has been no increase in the real value of the Newstart allowance for 25 years for example (Lewis, 2019), so this has not occurred for those who are unemployed.

More recently, technology entrepreneurs Bill Gates and Elon Musk predicted that ultimately robots will replace humans in all work (as reported in Ghosh, 2018). Gates suggested this could be addressed by taxing robots, with the income generated used to fund more jobs for people working in education and social services, meeting currently unmet social and human needs. Musk supports payment of UBI to workers displaced by robots. They both predict that unless the socio-economic system adapts there will be greater wealth inequalities (Ghosh, 2018). A declining middle class in the USA (and growing inequalities) provides some evidence that this is already occurring (Pew Research Centre, 2016).

According to a recent OECD policy report (OECD, 2018), based only upon existing technologies, one in seven (14% of existing jobs) "are highly automatable and a further 32% could face substantial change" (p. 1). Manufacturing jobs, agricultural jobs and routine jobs with low skills are at most risk. Service sector jobs at risk include jobs in courier and postal services, land transport and food services (Nedelkoska & Quintini, 2018). The OECD report also identified that young workers were more at risk than middle-aged workers who have established careers, because automation will primarily affect entry level positions (OECD, 2018). According to Nedelkoska and Quintini (2018), older workers' jobs were affected, but less so than young workers.

The relationship between automation and age is U-shaped, but the peak in automatability among youth jobs is far more pronounced than the peak among senior workers. (Nedelkoska & Quintini, 2018, p. 8)

They conclude that under-employment is currently most likely to manifest as youth unemployment, and to a lesser extent unemployment of older workers, who effectively move into earlier retirement, albeit on a lower income. It should be noted, however, that recent policy in many OECD countries has

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

progressively raised the retirement age to save the cost of pension payments, so these effects pull in opposing directions. The OECD policy report also concluded that risks to employment from automation varied considerably between countries, depending upon their economic structures.

Many jobs will change rather than disappear. Technology will replace discrete tasks, and humans will augment technology (Business Council of Australia, 2017). Other jobs have changed substantially but use similar core skills. For example, in media and communications, the number of jobs in traditional print media journalism has declined, but social media analyst positions have emerged. Least at risk were professional jobs and social work/social care. However, even in aged care, digital service innovation is using technology to facilitate people to 'age in place' by remaining in their home rather than entering institutional care (Yang, Miao & Shen, 2015; Rantz, Skubic, Miller & Krampe, 2008). In this context, digital technologies change where and how services are delivered rather than displacing workers. This potentially contributes to increased social well-being, the goal suggested by Keynes and Gates. Yang et al. (2015) concluded that for digital service innovation in aging-in-place to succeed, implementation would have to consider many different factors including "technical, economic, organizational, societal and user readiness aspects" (p. 572). This is confirmed by the ACOLA report (Walsh et al., 2019).

The OECD policy report (2018) conceded that not all jobs that could be automated would be, and that other jobs would emerge. The report stated there was considerable uncertainty about the likely rate of change and whether jobs created would compensate for jobs lost. According to Price Waterhouse Cooper (PwC) (as reported by Ghosh, 2018) many jobs will be lost to automation within the next 10 years, but artificial intelligence will create more jobs than it will displace. The PwC report further suggests that healthcare and education will be growth sectors, as will professional scientific and technical, information and communications, and hospitality (Ghosh, 2018). However, it also predicts that more jobs will be lost than created in manufacturing, retail, transport, public service and construction. In the longer term the OECD policy report also concluded that there would be a diminishing number of job-types that in future could not be completed by robots (OECD, 2018). The ACOLA report (Walsh et al., 2019) suggested that priority for automation should be given to jobs that are "dirty, dull, or dangerous and difficult" (p. 31).

Workplace training will be essential to ensure that the workforce re-trains so that workplace skills align with employment vacancies (Nedelkoska & Quintini, 2018). However, this will require more targeted training than is currently occurring as Nedelkoska and Quintini (2018) found that workers whose jobs were most at risk from automation were least likely to receive training:

Workers in fully automatable jobs are more than three times less likely to have participated in on-the-job training, over a 12-months period, than workers in non-automatable jobs. (p. 9)

Policies that support adult learning will be essential for re-training and up-skilling workers whose jobs have been automated (Nedelkoska & Quintini, 2018).

IMPACT OF DIGITAL SERVICE INNOVATION ON SKILLS

In 2015, the OECD estimated that improving written communication, maths, problem solving and digital literacy could increase productivity by up to 7% in countries such Australia (OECD, 2015). More recently, the Foundation for Young Australians (FYA, 2017) have suggested that "traditional, linear

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

career trajectories are rapidly becoming an antiquated notion" (p. 3) and that most will experience a portfolio of careers in their working lives. FYA go on to suggest that by 2030 workers will spend more time: learning skills on the job; and on creative and critical thinking, with a need to use more maths and science skills. Workers will need highly developed communication and interpersonal skills and develop an entrepreneurial mindset. These predictions have significant implications for young people entering the workforce, but they also have ramifications for those already in the workforce. Reinforcing the OECD's 2015 expectations, skills currently in high demand are for digital literacy, critical thinking, creativity and presentation skills (FYA, 2017, p. 21).

In a post in the Adobe Blog, Gay (2019) suggests that digital literacy is "fast becoming an important job skill at all levels of an organization". Gay further suggests that 57% of executives are calling for workers to have 'soft' digital skills as well as the more common 'hard' skills, distinguishing here between the skills that make up digitally literacy and those that are specific to a profession. In his blog post, Gay makes the distinction that "digital literacy is not to be confused with a digital lifestyle, which refers to passive use of digital platforms". He brings our attention to work undertaken by the International Society for Technology in Education (https://www.iste.org/standards/for-students), who have identified seven attributes that contribute to digital literacy. These are:

1. Empowered learner
2. Digital citizen
3. Knowledge constructor
4. Innovative designer
5. Computational thinker
6. Creative communicator, and
7. Global collaborator.

These attributes align well with the skill set that the FYA (2017) have suggested will be essential skills for young people. However, as automation and digital service innovation in particular, continue to infiltrate into the workplace, what are the implications for our current workforce?

Meeting the changing demands of workplace skills requires action at a number of levels. Employers need to take at least some responsibility for upskilling their workforce, particularly for those who are most likely to be impacted negatively by automation. Employees need to be proactive in maintaining their skill set, particularly digital literacy, as these are the skills required to interact with automation. Education providers at all levels are not exempt. They have a responsibility to ensure that students and graduates have appropriate skills to be effective contributors to the workforce.

Digital literacy skills have become an essential skillset, alongside language and numeracy. But the question is often asked, and rarely answered, what is digital literacy? Employers expect it of their employees and those stepping into the workforce often think they are digitally literate. Unfortunately, there is a history of evidence to suggest that this is not the case if the evidence from studies of higher education students is to be believed (for example Kennedy, Judd, Dalgarno & Waycott, 2010; Nataraj, 2014; Martin & Roberts, 2015; Coldwell-Neilson, 2018). Without a universal understanding of what we mean by digital literacy it is difficult to understand how anyone can adequately prepare for a job of the future. We have presented one view of digital literacy above, from the International Society for Technology in Education. There are many other interpretations of what digital literacy entails, many relating to skills that need to be developed within an education context. The earliest definition was coined by

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Paul Gilster (1997) who described digital literacy as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (Gilster, 1997, p. 1). This understanding of digital literacy has evolved, but the information literacy focus has persisted for more than 20 years, particularly in higher education, despite digital technologies developing rapidly and becoming ubiquitous. Digital technologies have moved from being a 'closed shop' where large installations where kept behind closed doors that only the computer staff could access, to the majority having more computing power in their pockets in the guise of mobile phones. The activities of daily living are regularly facilitated through mobile digital devices but, as mentioned earlier, this does not imply that those using the devices are digitally literate.

Coldwell-Neilson (2018) has defined digital literacy as the ability to identify and use technology confidently, creatively and critically to effectively meet the demands and challenges of living, learning and working in a digital society. Being digitally literate is recognising that the evolution of technology and digital media is not static, that the associated skill set needs to be as flexible and expanding, as well as transferable across technologies and disciplinary boundaries, to meet the demands of this dynamic environment. Digital literacy is a mindset and an attitude, not just a skill set. This definition recognises that our digital literacy skills are evolving over time and that different sets of overlapping skills, capabilities and understanding are required in the various aspects of our lives. Ensuring our digital literacy skills continue to be relevant entails an exercise in lifelong learning.

Drawing on the work of JISC (2014), the European Commission (2006) and others, Coldwell-Neilson (2018) has developed a framework of digital literacy that underpins the definition stated above. Digital literacy incorporates seven elements that all contribute to the seven attributes of a digital literate as suggested by the International Society for Technology in Education:

1. ICT proficiency
2. Information and media literacy
3. Information and data management
4. Creation and innovation
5. Communication, collaboration and participation
6. Security and privacy, and
7. Digital identity and wellbeing

Each of these elements provide the foundation to: develop an understanding of how digital technologies work and build confidence in using them; develop the agility and flexibility to engage with, and manoeuvre a rapidly changing digital environment; actively develop skills to understand the modern media world to enable critical engagement with the environment; develop the skills to be able to recognize when information may not be reliable at best or fake at worst; develop the skills and capabilities to be a responsible digital global citizen; and develop the skills and capabilities to harness the power of digital technology for the betterment of yourself, your community and more broadly, the world we live in.

There has been, and continues to be, a significant increase in the number of roles that will require higher levels of digital skills beyond digital literacy. A useful four-band classification of the digital skills required in our workforce has emerged as part of the UK Digital Skills Taskforce (Select Committee on Digital Skills, 2015). This report indicates that in the context of the workforce approximately 7% of workers will not require any digital skills (the report refers to these workers as digital muggles). Digital citizens will make up 37% of the workforce. These workers will need to be able to use digital technol-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ogy purposefully and confidently to communicate, find information, purchase goods and services and interact with government services. Digital workers, making up 46% of the workforce, will need the ability to evaluate, configure and use complex digital systems. Elementary programming skills such as scripting will be required for these types of activities. Finally, digital makers will need skills sufficient to build the digital technologies that digital workers and citizens will be using. This group will make up 10% of the workforce. This classification suggests that the majority of the workforce of the future will required quite sophisticated digital skills, underpinned by a strong foundation of advanced digital literacy skills and capabilities.

DIGITAL SERVICE INNOVATION AND TRAINING

A recent Digital Pulse report (Deloitte Access Economics, 2019) indicates that the "highest policy priority for the digital economy is skills development" (p. 3). The report also suggests that increased investment is required to develop workers' foundational literacy, numeracy and digital skills supported by flexible learning programs that target mastery-based learning; and recognition of short courses as formal credentials. This finding is supported by McKinsey's report, which indicates that approximately 14% of the global workforce may need to change occupational categories due to digitization, automation and advances in artificial intelligence in the workplace (Illanes, Lund, Mourshed, Rutherford & Tyreman, 2019).

With the advent of new digital services, the requirements and needs for professionals to be digitally literate has increased and will continue to increase as the workplace evolves technologically. It is suggested that without the skills required to use digital tools, individuals will be left behind not only in their work lives but also possibly in their social lives (Chase & Laufenberg, 2011). Higher education is a key stakeholder in upskilling the workforce and its success or failure may be integral to, and a powerful indicator of, the knowledge-producing and talent-attracting capacity of the country (Hazelkorn, 2018). This section will focus on the training that will be required to meet the demands of the digital workforce. Who should be responsible for upskilling the workforce? What are effective ways of delivering training to and for individuals in the workforce? Two vignettes are presented which demonstrate the effective use of free online education; the first aims to upskill digital literacy skills and the second provides opportunities to gain micro-credentials that measure and certify skills developed within the workforce.

Technology is shaping the future of work, for example, through the proliferation of websites and mobile applications that change the ways people interact with services:

- providing digital access to large, global organisations such as Uber and Amazon;
- Australia Post's Keypass identity card for those who do not have a suitable way to identify themselves online;
- cloud storage solutions such as Dropbox and Google Drive; and
- activities associated with daily life such as making appointments, online banking applications or accessing government services.

These innovations have potential benefits for some businesses, and sometimes for service users and for society, however, not all technology has had beneficial social effects. Technology in everyday life, provides entertainment and opportunities to connect to others through social media such as Instagram

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and Facebook, and through dating applications. However, it has also enabled 24 hour a day access to gambling (Cherry, 2015), which may have adverse social consequences for some people.

In the work context, the digital era has seen a significant change in the way work is organised, for example, academic work in universities. Academics now routinely use digital devices such as computers, laptops, tablets and mobile phones, and also other digital technologies and software packages to support our research and teaching, for example:

- audio visual equipment is used in the classroom to support face-to-face teaching, including projectors and computers; presentation software such as Microsoft PowerPoint is used and lectures are recorded for students to access;
- delivery of learning resources to students is via a learning management system which also supports online discussions, provision of class lists, submission of assignments and notification of feedback and grades;
- Microsoft Outlook, Teams, Skype, Zoom and virtual meeting points are used for communication with colleagues across multiple locations;
- virtual private networks to access secure institutional intranet when working off-site;
- word processors to prepare electronic documents;
- project management tools such as Trello, Teams and Project to manage work activities and for student group work;
- Microsoft SharePoint and wikis to gain access to policies and procedures, curriculum documents, or to simply share documents with colleagues;
- other web applications for uploading student final grades, uploading exam scripts, managing tutorial and seminar groups;
- searching internal and external library databases to source information;
- online databases for research funding opportunities; and
- using reference management tools to curate all the information collected.

Capacity building to effectively use these technologies is often just-in-time, by trial and error, or relies on informal peer supported learning or the autodidactic capabilities of individuals, which often rely on digital resources. Strategies employed by staff vary according to circumstances. These approaches are sometimes formally supplemented by courses or by individual support, provided on an 'on-call' basis (helplines or mobile expert staff).

As suggested in the previous section, building flexible digital skills provides a starting point for training. Learning to use a specific tool or package may be adequate in the short term, but sometimes an in-depth transferable understanding can be useful in the longer term. In depth digital skill development can help people to transfer skills between technologies. In conjunction with Coldwell-Neilson's (2018) definition of digital literacy, awareness is required of the context in which digital skills are applied. Jones and Hafner (2012) suggest that although digital literacy relates to operating digital technology, it also relates to the ability to transfer affordances and constraints of the technology to different circumstances and contexts. However, training to use digital technologies is often dependent on the context and discipline or profession. Further, the skills associated with digital literacy may change as digital technologies advance (Coldwell-Neilson, 2017). Therefore, digital skills development needs to be addressed through lifelong learning. Coldwell-Neilson (2019) suggests that digital literacy is a mindset and attitude, not just a skill

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

set. Providing individuals with the ability to elastically adapt from one technology to another without a steep learning curve will help them to adapt to all the requirements in the workplace of the future.

Digital literacy and digital education could be developed progressively from primary school through to high school and into tertiary education. Hulten and Ramey (2018) indicate that education provides the foundational infrastructure of literacy, numeracy and general information which contributes towards the functioning of an advanced society as well as its economy. In Europe the European Commission identified digital competence as one of eight key competencies for lifelong learning (European Commission, 2006). More recently the Australian Government developed a national policy through the National Science and Innovation Agenda (Australian Government, 2015) which was implemented by ACARA (2015).

Although these initiatives are aimed at addressing the digital literacy capabilities of young people, the workplace of the present and future will require almost everyone to have digital literacy skills. One approach to improving digital literacy skills more broadly is for digital literacy education to be provided free or at an affordable price through tools such as Massive Open Online Courses (MOOCs), where the reach can be global through simple delivery mechanisms such as smart phones. One example is 'Becoming Career Smart', which is offered on the FutureLearn™ educational platform. It has reached over 36,000 people in over 40 countries. It is estimated that 5 billion people have a smart device and over half of these are smart phones, making options such as this kind of education much more feasible. Taylor and Silver (2019) found that a relative high percentage of adults in emerging economies report owning a smart phone; for example, in South Africa 60% of adults own a smart phone, in Brazil it is also 60%, in Mexico 52% and Nigeria 39%.

MOOCs are not the only solution. There are problems, for example, high attrition when learners join courses and do not complete. There are a number of factors which contribute to this including work and life commitments, or the fact that it is free results in learners not committing fully to completing the course (Koller, 2013). The low completion rates in MOOCs is termed the 'retention funnel' and can be concerning in traditional academic environments when the completion rate may be only 5% (Koller et al., 2013). If the content is not being utilised in a 'free' educational opportunity, is this wasteful? Further research by Bralić and Divjak (2016) shows that as a tool learners were fairly satisfied with this kind of approach, but they did have difficulties such as the language barrier, needing prior knowledge or the required workload in their life to complete it. The learners also appreciated the fact that MOOCs were self-paced and provided the opportunity to assess their knowledge on a regular basis (Bralić & Divjak, 2016). The following vignette illustrates an example of a collaboration between Deakin University and Australia Post that utilised a MOOC to deliver basic digital literacy education to the general public.

Vignette 1: Australia Post Massive Open Online Courses

Massive Open Online Courses have a variety of forms and purposes. Short, introductory courses are often used as 'tasters' to entice the student to go further and complete a formal qualification. Alternatively, they deliver a specific learning opportunity to fill a perceived need. Here we present one particular MOOC which was designed to benefit the general community by increasing awareness of digital business tools, provide an opportunity for the general public to gain the skills to enable access and use of the business tools with the aim of increasing access to and adoption of the digital services. This is a relatively new approach to educating a community about a service and providing them the means to build the skills to use it. However, it also presents an insight into the potential for failure when education is not the core business of, and the target audience is external to, the organisation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

During 2018, Deakin University and Australia Post (the Australian national postal service) entered into a commissioned project to develop two courses in the MOOC to boost the general public's digital literacy understanding and capabilities. This was driven by Australia Post's implementation of a suite of digital services that the general public could access. In order to take full advantage of these services, Australia Post realised that users would need some basic digital literacy competencies which were likely to be beyond the capabilities of many of their customers.

Information about the 'Digital Discovery' program was advertised on Australia Post's website and the courses were delivered via the FutureLearn™ platform. The courses are centred around the vision of 'building your confidence online' and covered topics such as web browsing, social media, shopping online, using digital tools and cyber safety. The two courses were delivered to the public for free and each ran for a period of 2 weeks.

Participants were guided through the learning, which consisted of short readings and videos which explained the concepts and provided instruction of how to implement them in commonly used digital devices such as mobile phones and tablets. The participants were able to post questions in a discussion board, providing a means of peer support. They also completed a short quiz at the end of each week to allow them to assess their progress and a final test at the end of the course which was designed to provide Australia Post with some indication of how successful the course was at achieving its aims. The delivery platform for the project centres around social learning (where peers communicate and help each other to learn, not purely through the lead educator), so feedback could be collected from the learners' postings in the online discussion boards; comments highlighted elements the learners were doing right which they were commended on, and identified what they were doing wrong, which then provided an opportunity for further learning.

Individuals and community groups were encouraged to participate in the program by mentoring the learners or providing supported environments for the learners by delivering the program in libraries, community centres or other environments where there is a need of improved digital skills and confidence. Guides to support mentors and community organisations were made available via the Digital Discovery page.

No formal evaluation of the courses has been undertaken to date, but evidence has been collated from the discussion boards at each stage of the course which indicate that throughout the courses the participants are learning about important elements of digital literacy including: the basics of digital literacy; using digital services for solving problems in their daily life; becoming braver when using the internet and associated technologies; and coming to the realisation they know more than they thought they did. In essence, building their confidence in the digital world.

Although this approach of free digital education to help increase the capabilities of business customers is well founded, Australia Post's initiative did not live beyond the first offering of each of the two courses. This was due to a number of factors. Australia Post had difficulty in proving a return on investment for the MOOC. As FutureLearn™ owned the student data, there was no information to justify how many of the participants were in the course out of curiosity compared to the number who were there to gain digital literacy skills. There was no indication of how many of the participants in the first course went on to complete the second one. Australia Post engaged with some public libraries to run the courses as a community offering, thus allowing them to gain some real insights in the value of the courses. However, the courses were designed for wholly online delivery and were not best suited to a blended style of delivery. Overall, Australia Post was unable to justify the cost of running an advertising campaign to increase the awareness of, and participation in, the courses by their customer base.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The training and education space with respect to digital service innovation and digital skills is a rapidly evolving and useful area as we will see through the second vignette which study illustrates how certification of skills developed in the workplace, through professional credentials, have benefits for the learner.

Vignette 2: Deakin Professional Practice Credentials

Training and education are changing, particularly at the postgraduate level. How we certify or measure someone's skills in the workforce is also changing, with greater recognition that learning does not only take place in the classroom but does so to a large extent in the workplace. For many employees, their professional learning has occurred on-the-job, with no formal recognition of their capabilities. This situation is not uncommon in the ICT industry for example.

Deakin University has developed an innovative method of credentialing an individual's skills and knowledge that have been gained through work and experience. Credentials provide an authenticated and validated method for an individual to gain formal recognition of their capabilities, enabling these to be warranted to employers. Credentials do not require any formal learning but provide the means for capabilities to be formally assessed and recognised.

Credentials are offered at a number of levels aligned with Australian Qualifications Framework (AQF) levels 7 (Bachelor's level), 8 (Gradate Certificate/Diploma level) and 9 (Master's level), and focus on what are generally termed professional (or soft) skills. The skills that can be credentialed currently include (see Deakin University, 2018):

- Employability skills such as communication, digital literacy and team work;
- Technical knowledge such digital marketing, data analytics and risk management; and
- Leadership such as adaptive mindsets and leading and developing people.

The credentials have been developed in consultation with industry experts and professional bodies to ensure they are recognised in the workforce. These are benchmarked against industry skill frameworks and AQF. The ICT related credentials for example have been developed in collaboration with ICT industry experts, the Australian Computer Society, and with reference to the Skill Framework for the Information Age (SFIA).

Having selected the relevant credential, the applicant is guided through the development of a portfolio addressing the credential's assessment criteria:

1. Selecting examples and evidence that "demonstrate the criteria and dimensions of autonomy, influence and complexity of the credential" (Deakin University, 2018);
2. Prepare a reflective testimony that brings together the examples and evidence into a narrative which addresses the credential's assessment criteria; and
3. Undertake a video testimony where the applicant has to answer a series of questions relating to the portfolio and the skill being assessed. The questions are designed to validate the evidence and authenticate the individual as the person claiming the experience.

The outcomes of each stage of the process are collated and sent to two assessors – one academic and one industry based - who determine if the evidence justifies the award of the credential. This approach is an Australian-first and allows individuals to measure their professional skills but also achieve a micro-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

credential that is recognised and can be used towards academic certification. The micro-credentials can be used towards recognition for prior learning towards a number of Master-level degrees offered by Deakin University for example, shortening the study period considerably.

Vignette 3: Digital Discernment for Youth Work and Community Work Students

Digital discernment skills are required in youth work and in many other social service professions. These skills enable youth work students to conduct good quality research during their university studies and are also valuable after students graduate. A role of youth work is to support young people's participation in democratic institutions. To do this, youth workers need to be able to recognise propaganda and disinformation disseminated through social media and to help young people to develop an awareness of how false information may be propagated. Information discernment skills are also necessary for youth workers so that they can support young people to recognise financial and romantic internet scams in daily life. Digital media have also become an integral part of young people's social world, and, in response, digital youth work has become blended with face to face youth services, (Cooper, Tierney, Brooker & Sutcliffe, forthcoming). This means that youth workers need various types of digital knowledge and skills to use platforms ethically, effectively and appropriately.

Based upon prior teaching experience staff identified five components of information literacy and discernment problems that needed to be addressed:

1. insufficient information retrieval/search strategies,
2. misapprehensions about the purposes of university education,
3. limited strategies to evaluate information critically,
4. uncritical trust in personal experience, and
5. attitudinal resistance of some students to examining materials challenged their existing beliefs (Cooper, 2019).

The first component required students to gain information retrieval skills. This was relatively easily taught in collaboration with the university subject librarian. The second component required students to accept that a purpose of university education is to enhance their capacity for critical thinking, problem-solving and self-directed life-long learning. This concept of education was made explicit but was resisted by some students (Cooper, 2019). The last three components required students to engage with different aspects of digital discernment and critical thinking skills. These skills were the most difficult to teach because they required students to develop judgement about the quality of information from internet sources and in everyday life, the relative validity of different forms of evidence, and how language and argument can be used fallaciously to mislead. The process of teaching information discernment was embedded in disciplinary knowledge and developed and reinforced across the whole degree. The author argues that digital discernment skills should be an embedded and integral part of academic education for all graduates irrespective of discipline (Cooper, 2019).

This third vignette illustrates the importance of digital literacy and digital discernment in a non-technical profession.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

SOLUTIONS AND RECOMMENDATIONS

It is clear that digital literacy is now a foundation skill in an environment of increasing digital service innovation. Education at all levels has a responsibility to ensure students are adequately prepared to engage with the digital environments and have the capability to develop their digital literacy skills to maintain relevance to future technology developments. However, not all responsibility lies with education. Employers have a responsibility to ensure they understand what digital literacy skills are required in their domain of influence and to support their employees to gain and extend their digital literacy skills aligned with these requirements. Opportunities for retraining will be an ongoing requirement as digital disruption continues to impact jobs of the future.

FUTURE RESEARCH DIRECTIONS

The three vignettes presented in this chapter demonstrate a few of the ways educational opportunities can be delivered to an audience. Further work is required to explore their relevance and reach and to ensure the opportunities meet the needs of the stakeholders. The dynamic nature of digital technology innovation and use suggests that developing an understanding of digital literacy and the associated skills and capabilities is a moving target that also requires ongoing exploration.

CONCLUSION

The introduction of digital service innovation is occurring in many fields. Digital literacy skills are becoming necessary in all professions and in everyday life. If Keynes, Musk, Gates and others are even partly correct, increased automation will have significant social impacts, including the possible replacements of full-time secure employment, for example in the public service, by less well-paid casual employment in the private sector (for example in the aged care sector). There is a strong likelihood that there will be a mismatch between some displaced workers' aspirations, their skills, and the jobs available. There is likely to be an increase in leisure-time (voluntary or involuntary) for many. How socio-political systems respond to this will have an impact on the types of work available, and whether displaced workers are able to fill the new roles. Appropriate social policy is needed to ensure that all workers, and in particular displaced workers, receive adequate support to retrain and that job creation occurs in locations that are accessible to displaced workers, or that support is provided for people to re-locate. A reduction in working hours may also need to be facilitated, to better distribute available work. Young people in particular will need extra support to gain employment, and older workers need policy that recognises that, for some, retraining for a new job may not be an option. Increased automation will ultimately change how people see the place of work in their lives, for example telecommuting and flexible work hours are becoming more common and boundaries between home and work are becoming less clear cut, as was the case prior to the first industrial revolution. Policy is also required to ensure wealth from automation is shared. Broader socio-culture values need to change to ensure that those who are displaced by automation and cannot retrain or cannot find work, have socially useful work or other ways to find purpose and gain respect (Walsh et al., 2019).

The increasing capability demands of digital service innovation will result in:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- The need for socio-political dialogue and decision-making about how to prioritise the roll-out and uptake of automation (for example, 'dirty, dangerous, dull and difficult' tasks); how to share the benefit of automation, and how to compensate those who have less work than they would like.
- Employers having a responsibility to provide opportunities for their workforce to upskill and retrain;
- Individuals having a responsibility to ensure their skills and capabilities are aligned with the current and future demands of the workplace;
- Changes to curricula in higher education across all disciplines; and
- Education institutions having an increase focus on providing appropriate learning opportunities to enable graduates to maintain and improve their hard and soft skills, through flexible, adaptable and innovative learning opportunities.

ACKNOWLEDGMENT

Support for this study has been provided by the Australian Government Department of Education and Training (Fellowship FS16-0269). The views in this study do not necessarily reflect the views of the Australian Government Department of Education and Training.

REFERENCES

ACARA. (2015). *National Assessment Program: ICT Literacy Years 6 & 10 Report 2014*. Australian Curriculum, Assessment, and Reporting Authority. Retrieved from http://www.nap.edu.au/verve/_resources/D15_8761__NAP-ICT_2014_Public_Report_Final.pdf

Australian Government. (2015). *Embracing the digital age. National Innovation and Science Agenda*. Retrieved from http://www.innovation.gov.au/page/embracing-digital-age

Barnes, C. & Perpetual Guardian. (2019). White paper - The four-day week: Guidelines for an outcome-based trial - Raising productivity and engagement. Auckland, New Zealand: 4 Day Week Global Ltd.

Barnett, R., & Coate, K. (2005). *Engaging the Curriculum in Higher Education*. Maidenhead: Open University Press and McGraw Hill Education.

Bralić, A., & Divjak, B. (2016). Use of MOOCs in Traditional Classroom: Blended Learning Approach. In *Proceedings of 9th EDEN Research Workshop*, Oldenburg. Retrieved from http://www.eurodl.org/index.php?p=special&sp=articles&inum=9&article=766

Brunner, J. (1969). *Stand on Zanzibar*. New York: Ballantine.

Business Council of Australia. (2017, October). *Future-proof: Protecting Australians through education and skills*. Melbourne, Victoria. Retrieved from http://hdl.voced.edu.au/10707/440976

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Charlton, E. (2019, February 12). The results of Finland's basic income experiment are in. Is it working? *World Economic Forum*. Retrieved from https://www.weforum.org/agenda/2019/02/the-results-finlands-universal-basic-income-experiment-are-in-is-it-working/

Chase, Z., & Laufenberg, D. (2011). Embracing the squishiness of digital literacy. *Journal of Adolescent & Adult Literacy*, *54*(7), 535–537. doi:10.1598/JAAL.54.7.7

Cherry, M. A. (2015). Beyond Misclassification: The Digital Transformation of Work. *Comparative Labor Law & Policy Journal*, (3): 577–602. Retrieved from https://heinonline.org/HOL/P?h=hein.journals/cllpj37&i=614

Coldwell-Neilson, J. (2016). Office for Learning and Teaching (OLT) National Teaching Fellowship: Unlocking the code to digital literacy, *Australian Learning and Teaching Fellows*. Retrieved from https://docs.education.gov.au/system/files/doc/other/fellows_2012-2016.pdf

Coldwell-Neilson, J. (2017). Digital Literacy - A Driver for Curriculum Transformation. In *Proceedings of the Higher Education Research and Development Society of Australasia Conference, HERDSA '17*, Sydney, Australia.

Coldwell-Neilson, J. (2018). Digital Literacy Expectations in Higher Education. In *Proceedings of Open Oceans: learning without borders. 35th International Conference of innovation, practice and Research in the use of Education Technologies in Tertiary Education.* Deakin University, Australia.

Coldwell-Neilson, J. (2019). What is Digital Literacy [video file]. Retrieved from https://video.deakin.edu.au/media/t/0_80y0wiqq

Coldwell-Neilson, J., & Cooper, T. (2019). Digital literacy meets industry 4.0. In J. Higgs, W. Letts, & G. Crisp (Eds.), Education for employability (Volume 2): learning for future possibilities. Boston, MA: Brill Sense. pp. 37-50.

Compaine, B. M. (Ed.). (2001). *The digital divide: Facing a crisis or creating a myth?* Cambridge, MA: MIT Press Sourcebooks. doi:10.7551/mitpress/2419.001.0001

Cooper, T. (2019). Calling out 'alternative facts': Curriculum to develop students' capacity to engage critically with contradictory sources. *Teaching in Higher Education*, *24*(3), 444–459. doi:10.1080/13562517.2019.1566220

Cooper, T., Tierney, H., Brooker, M. R., & Sutcliffe, J. (2020, in review, for publication). Theorisation, Models of Youth Work and Digital Technologies: Opportunities and Challenges. In Z. Zaremohzzabieh, S. Ahrari, S. E. Krauss, A. A. Samah, & S. Z. Omar (Eds.), The Handbook of Research on Youth Work in a Digital Society. Hershey, PA: IGI Global.

Cooper, T., & Scriven, R. (2017). Communities of inquiry in curriculum approach to online learning: Strengths and limitations in context. *Australasian Journal of Educational Technology*, *33*(4), 22–37. doi:10.14742/ajet.3026

Deakin University. (2018). Professional Practice credentials. Retrieved from http://www.deakin.edu.au/ppc

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Deloitte Access Economics. (2019). Australia's Digital Pulse: Developing the digital workforce to drive growth in the future. A report prepared for the Australian Computer Society. Retrieved from https://www.acs.org.au/content/dam/acs/acs-publications/Digital-Pulse-2019-FINAL-Web.pdf

European Commission. (2006). Recommendation of the European Parliament and the Council of 18 December 2006 on key competences for lifelong learning. *Official Journal of the European Union, L*, *394*(10). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32006H0962&from=EN

Foundation for Young Australians. (2017). The new work smarts: thriving in the new work order. *Foundation for Young Australians (FYA)*. Retrieved from https://www.fya.org.au/our-research/#report-downloads

Gay, A. (2019). How digital literacy affects the modern workforce. Adobe Blog. Retrieved from https://theblog.adobe.com/how-digital-literacy-affects-the-modern-workforce/

Gekara, V., Snell, D., Molla, A., Karanasios, S., & Thomas, A. (2019). Skilling the Australian workforce for the digital economy. *National Centre for Vocational Education Research (NCVER)* Adelaide, SA. Retrieved from https://eric.ed.gov/?id=ED594704

Ghosh, S. (2018, July 18). Artificial intelligence will create as many jobs as it destroys, according to PwC. *Tech Insider*. Retrieved from https://www.businessinsider.com.au/pwc-artificial-intelligence-wont-destroy-all-jobs-2018-7

Gilster, P. (1997). *Digital literacy*. New York, NY: Wiley Computer Pub.

Green, A. E. (2017). Implications of technological change and austerity for employability in urban labour markets. *Urban Studies, 54*(7), 1638. Sage.

Gregg, M. (2011). *Work's intimacy*. Cambridge, UK: Polity.

Hazelkorn, E. (2018). Reshaping the world order of higher education: The role and impact of rankings on national and global systems. *Policy Reviews in Higher Education*, *2*(1), 4–31. doi:10.1080/23322969.2018.1424562

Hulten, C. R., & Ramey, V. (2018). *Education, Skills, and Technical Change: Implications for Future U. S. GDP Growth*. University of Chicago Press. doi:10.7208/chicago/9780226567945.001.0001

Illanes, P., Lund, S., Mourshed, M., Rutherford, S., & Tyreman, M. (2018). Retraining and reskilling workers in the age of automation. McKinsey & Company. Retrieved from https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Future%20of%20Organizations/Retraining%20and%20reskilling%20workers%20in%20the%20age%20of%20automation/Retraining-and-reskilling-workers-in-the-age-of-automation.ashx

JISC. (2014). Developing digital literacies. Retrieved from https://www.jisc.ac.uk/guides/developing-digital-literacies

Jones, R. H., & Hafner, C. A. (2012). *Understanding digital literacies*. London, UK: Routledge. doi:10.4324/9780203095317

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kennedy, G., Judd, T., Dalgarno, B., & Waycott, J. (2010). Beyond ndatives and immigrants: Exploring types of net generation students. *Journal of Computer Assisted Learning*, *26*(5), 332–343. doi:10.1111/j.1365-2729.2010.00371.x

Keynes, J. M. (1930). *Economic possibilities for our grandchildren. Essays in persuasion* (pp. 358–373). New York: W. W. Norton & Co.

Koller, D., Ng, A., Do, C., & Chen, Z. (2013). Retention and Intention in Massive Open Online Courses: In Depth. Retrieved from https://er.educause.edu/articles/2013/6/retention-and-intention-in-massive-open-online-courses-in-depth

Lewis, C. (2019). Does anyone in Australia think Newstart is adequate? *Welfare*. Retrieved from https://www.crikey.com.au/2019/04/03/newstart-federal-budget/

Martin, A. M., & Roberts, K. R. (2015). Digital Native ≠ Digital Literacy. *Principal*, *94*(3), 18–21.

Meyer, J., Land, R., & Bailie, C. (2010). *Threshold Concepts and Transformational Learning*. Rotterdam, The Netherlands: Sense Publishers. doi:10.1163/9789460912078

Nataraj, S. (2014). The need for an introductory computer literacy course at the university level. [IJBMER]. *International Journal of Business Management and Economic Research*, *5*(4), 71–73.

Nedelkoska, L., & Quintini, G. (2018). Automation, skills use and training. *OECD Social, Employment and Migration Working Papers No. 202*. Paris, France: OECD Publishing.

Nylén, D., & Holmström, J. (2015). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. *Business Horizons*, *58*(1), 57–67. doi:10.1016/j.bushor.2014.09.001

OECD. (2015). *Students, Computers, and Learning: Making the Connection, PISA*. OECD Publishing; doi:10.1787/9789264239555-

OECD. (2018). Putting faces to the jobs at risk of automation. Policy brief on the future of work. Retrieved from https://www.oecd.org/employment/Automation-policy-brief-2018.pdf

Paul, K. (2019). Microsoft Japan tested a four-day work week and productivity jumped by 40%. *The Guardian*. Retrieved from https://www.theguardian.com/technology/2019/nov/04/microsoft-japan-four-day-work-week-productivity

Pew Research Centre. (2016, May 11). America's shrinking middle class: A closer look at changes within metropolitan areas. *Social & Demographic Trends*. Retrieved from https://www.pewsocialtrends.org/2016/05/11/americas-shrinking-middle-class-a-close-look-at-changes-within-metropolitan-areas/

Piketty, T. (2015). *The Economics of inequality*. Cambridge, MA: President and Fellows of Harvard College. doi:10.4159/9780674915565

Piketty, T., & Goldhammer, A. (2015). The Economics of Inequality. Cambridge, MA: Harvard University Press. doi:10.4159/9780674915565

Rantz, M. J., Scubic, M., Miller, S. J., & Krampe, J. (2008). *Using technology to enhance aging in place. Smart Homes and Health Telematics. ICOST 2008*. Berlin, Germany: Springer.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Select Committee on Digital Skills. (2015). *Make or Break: The UK's Digital Future*. London, UK: Authority of the House of Lords.

Standing, G. (2011). *The Precariat: The New Dangerous Class*. London, UK: Bloomsbury Academic.

Taylor, K., & Silver, L. (2019). Smartphone Ownership Is Growing Rapidly Around the World, but Not Always Equally. Retrieved from https://www.pewresearch.org/global/2019/02/05/smartphone-ownership-is-growing-rapidly-around-the-world-but-not-always-equally/

Tytler, R., Bridgstock, R., White, P., Mather, D., McCandless, T., & Grant-Iramu, M. (2019). Jobs of the future. Burwood, Victoria, Ford Motor Company of Australia & Deakin University.

Vom Brocke, J., Maaß, W., Buxmann, P., Maedche, A., Leimeister, J. M., & Pecht, G. (2018). Future work and enterprise systems. *Business & Information Systems Engineering*, *60*(4), 357–366. doi:10.100712599-018-0544-2

Walsh, T., Levy, N., Bell, G., Elliott, A., Maclaurin, J., Mareels, I., & Wood, F. (2019). The effective and ethical development of artificial intelligence: An opportunity to improve our wellbeing. Melbourne, Australia: Australian Council of Learned Academics (ACOLA).

Weller, C. (2017, February 14). Elon Musk doubles down on universal basic income: 'It's going to be necessary'. *Money & Markets*. Retrieved from https://www.businessinsider.com.au/elon-musk-universal-basic-income-2017-2?r=US&IR=T

Yang, Q., Miao, C., & Shen, Z. (2015). Digital services innovation for aging-in-place. In *Proceedings of 22nd IEEE International Conference on Industrial Engineering and Engineering Management* (IEEM). Singapore. DOI: 10.1109/IEEM.2015.7385711

This research was previously published in Leadership, Management, and Adoption Techniques for Digital Service Innovation; pages 45-64, copyright year 2020 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 2

Development and Design Methodologies

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 5
A Multi-Perspective Theoretical Analysis to Web Accessibility

Carlos Peixoto
INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal

Frederico Branco
INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal

José Martins
INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal

Ramiro Gonçalves
INESC TEC and University of Trás-os-Montes and Alto Douro, Portugal

ABSTRACT

Accessibility has become increasingly important in information technology, particularly due to legislation pressure to make affordable public services to all. Being end-users and software companies those who have direct contact with accessibility problems, other stakeholders are committed to defining methods and change mentalities in Web accessibility implementation. In addition to a conceptual definition, this chapter presents entities views with responsibilities in the area, taking into account their work done in the past and the prospects for future. The understanding of the interaction between all these perspectives will help to realize the way it will go, which carries with it great challenges and opportunities, widely explored in this work.

INTRODUCTION

Information and Communication Technologies (ICT) represent a good opportunity to reduce the exclusion of people with some sort of disability. As a result, the Web can be viewed as leverage for increasing communication possibilities and users' autonomy. On the other hand, Internet is making the world more connected and globalized. Organizations, in this context, are present not only in their own national territory but in the entire world.

DOI: 10.4018/978-1-7998-7297-9.ch005

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Continuous change in how users make use of Web applications is an irreversible fact, perceivable in the increasingly complexity associated with the available content and the existing needs for it to be dynamic and personalized. By merging this reality with the need to make the referred content more accessible to all, one can clearly understand that entities and organizations, such as development agencies, education institutions and governments, have a very important role in this process.

With the above in mind, from our point of view, a broader analysis to the Web accessibility topic is need in order to understand how the various entities and organizations perspective the topic. This is even critical when the scientific and professional communities, with common interests in Web accessibility, have difficulties in interacting, find consensus and sharing information and solutions.

The purpose of this study is to try to clarify the perspectives of the various relevant stakeholders associated with Web accessibility, and doing so by performing an extensive literature review. During the research project a set of perspectives was achieved and considered the most relevant to the topic:

1. End users;
2. Organizations;
3. Governmental entities;
4. Education institutions; and
5. Associative entities.

This paper was organized into six sections. Section 1 is the introduction and the second section provides the main theoretical concepts. Web accessibility according to the various aforementioned perspectives is characterized in Section 3. Section 4 contains a set of challenges and opportunities in the context of Web accessibility. Finally, the last section of the chapter presents the achieved conclusions, limitations and future work.

WEB ACCESSIBILITY: CONCEPTS AND PERSPECTIVES

Internet has been growing in size and complexity since its inception. Some arguments explain that this is because of its decentralized property, where anyone can contribute without there being a central authority to dictate what can and cannot be published (Lopes, Gomes & Sedge, 2010). With the integration of the Web in people's daily lives cannot be ignored potential accessibility barriers, as these barriers make this important resource inaccessible to a certain set of users (Van der Geest & Velleman, 2014).

WHO (2014) stated a disabled person covers impairment, limited activity or restricted participation. Still, according to data collected by the same organization there are over one billion people with type of disability, which amounts to 15% of the world population. At the European level, according to data collected by the European Union, there are more than 80 million citizens in the same context (EU-FRA, 2015).

The exclusion in the use of IT is not a single issue only of those people with disabilities. There is another group of users who have constant difficulties in interacting with the Web, the elderly (Arch, 2008). As society ages there is a serious probability of people suffering from some sort of disability, whether temporary or not (Díaz-Bossini & Moreno, 2014). This is even more relevant when considering that in 2050 the number of people with more than 60 years old is going to triple (United Nations, 2008).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Despite the various definitions associated with the term, accessibility is assumed as the ability of a person with disabilities have access to a particular service / product or perform a certain activity in the same way that a person without a disability would do. Accessibility is a topic that can be applied to various areas, and the area of ICT, an area in which this concept has been more debated and publicized (Gonçalves, Martins, Branco & Barroso, 2013).

In the technological context, the term accessibility means 'people with disabilities should perceive, understand, navigate and interact with the Web and that should contribute to the Web' (W3C, 2005). This concept evaluates how easily different sets of users, regardless of their constraints whether physical or on the surrounding environment, can access the content on a website (Mankoff, Fait, & Tran, 2005).

In the same context Iwata, Kobayashi, Tachibana, Shirogane, and Fukazawa (2013) says Web accessibility refers to the construction of a website, where all users can access to their information, regardless of their age and physical limitations, they can easily navigate in their site. In contrast, Aizpurua, Arrue, and Vigo (2015) report that a website can follow all the recommended standards in order to gain better understanding and yet this effort is not sufficient because developers can consider the site accessible and users hold a different perception about the accessibility the site. The same authors also claim that a Web site designed to be compatible with the appropriate standards can fail if users do not experience this accessibility.

Henry, Abou-Zahra, and Brewer (2014) studied the role of accessibility in the universal web and affirm the fundamental project of Web has the potential to be worked by all people, taking into account, their hardware, software, language, culture, location or physical and mental capacity. To achieve these goals there are different disciplines that focus on specific technical aspects, such as multi-modality, internationalization and accessibility for people with disabilities.

Today, Web accessibility, or lack of it, can be a serious obstacle to integration into society and not only with regard to individual interactions. Organizations are very powerful modern institutions that enjoy many of the legal rights of human beings, so it is only permissible for corporate web sites are accessible to everyone, even to those who are in the minority (Gonçalves, Martins, Pereira, Oliveira & Ferreira, 2013). In contrast, Web accessibility can also be very advantageous for companies because the number of users who visit the site will increase, which in the business aspect can result in an increase in sales effect for the organization (Noh Jeong, You, Moon, & Kang, 2015).

Martínez, De Andres, and García (2014) say Web accessibility is a technological innovation able to improve the relationship between an organization and all its stakeholders, not just those with disabilities. This happens because one of the key principles is to design websites and software flexible enough to meet different user needs, preferences and situations. The same perspective is approached by Sanchez-Gordón and Moreno (2014) when they stated that accessible technologies are technologies that users can adapt to suit their visual, auditory, cognitive deficiencies, dexterity and also their interaction preferences.

In addition, Web accessibility will also benefit people who use the Internet in special conditions, such as whom using text-only devices, which are in places where the network quality is relatively poor, or users connecting to the Internet through smart phones, tablets or Web-TV and using the same in a context where their eyes, ears or hands are interfered with by factors such as walking, driving or traveling in a quite difficult (Rau, Zhou, Sun, & Zhong, 2014). Web accessibility will improve the Internet user experience in all these conditions which will be beneficial not only for people but also for the Web service providers (Gonçalves, Martins, Pereira, Santos & Cota, 2013). These efforts have resulted in a number of different solutions, the most relevant being the regulations and recommendations that have

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

been published and which provided development tools, evaluation and appropriate Web content classification (Gonçalves, Martins, & Branco, 2014).

In the 1990s, there were already information regarding Web accessibility and were available in companies like IBM and organizations such as the Trace Research and Development Centre (Henry, 2002). However, the organization stood out most in this area was the World Wide Web Consortium (W3C), which is managed through the voluntary participation of members of the industry and universities and is basically oriented on two primary principles:

- "Web for all" and
- "Web on everything" (W3C, 2015).

In 1997, the W3C established the Web Accessibility Initiative to promote a corporate environment with Web content accessible to people with disabilities (WAI, 2005). Later, in May 1999 the WCAG 1.0 (Web Content Accessibility Guidelines 1.0) became the recommendation developed by WAI as a global standard for accessibility and design of Web content (W3C, 1999). This recommendation is a set of 14 guidelines, each containing clear key points about HTML form a total of 65 checklists, divided into three levels based on their importance and scope (Kuzma, 2009). However, implementation of this set of guidelines the W3C / WAI has received extensive comments since represented the first time that there was an international standard for Web accessibility, and this feedback reflected the need to update the recommendation (Brewer, 2004). Subsequently, in December 2008 the second version was created, the most current WCAG guidelines, WCAG 2.0 (Wentz et al., 2014).

The current version of the referred guidelines was defined according to several layers of conceptualization, including:

- Principles,
- General strategies,
- A set of techniques to promote web accessibility and
- Complex documentation set with all accessibility flaws and potential errors (W3C, 2008).

There are some studies in which the goal passes to deepen the process of migrating from one version to the other and even demonstrate the main differences between them (Bradbard & Peters, 2010; Li Yen Lu, & Lin, 2012).

In parallel, ISO (International Organization for Standardization) also introduced some regulations regarding Web accessibility, such as ISO TS-16071, ISO 9241-111 (ISO 2003, 2006), and the most relevant standard is the ISO 9241 -171 (ISO 2008) which was achieved through the development and evolution of the previous and aims not only the implementation of a set of rules that must be met, but also help the public and organizations create content accessible on its Web platforms (Gonçalves et al., 2015).

As these guidelines used by most countries, even so there are some who choose to create their own rules and methods. An example of these countries is the USA who created the "Section 508". In particular, this policy has served as an impetus for public libraries to facilitate the use of its websites and electronic resources. However, there are two issues at stake:

- One is the lack of perception and the other is the limited budget (Yi, 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

There are also studies for other countries that seek to demonstrate the laws and regulations regarding Web accessibility will follow the same (Leitner & Strauss, 2008; Sánchez-Gordón & Moreno, 2014).

A MULTI-PERSPECTIVE VISION OF WEB ACCESSIBILITY

In a field in constant evolution, the understanding between different stakeholders engaged on this subject can be tricky and complex. As a result, there is an increase difficulty for the inherent community in sharing knowledge and reaching agreements and understandings, which makes it even more difficult for people outside the community to realize what is at stake in terms of requirements, legislation and activities. With this in mind, an attempt to analyse the Web accessibility topic from the perspective of the various stakeholders was made. The chosen perspectives were drawn from Gonçalves, Martins, Pereira, Santos, et al. (2013), and are the following:

1. Governmental perspective;
2. Educational perspective;
3. Business Perspective;
4. Institutional perspective; and
5. End users' perspective.

Governmental Perspective

Government authorities have the capacity and the obligation to create laws and regulations, while taking the task of monitoring the implementation of laws and act accordingly on their practice. Therefore, the area of Web accessibility is no exception and has to be adequate rules that must be exercised by those in charge, and the government is the entity that has the duty to manage the whole process and above all to be an example in their sites web. Many countries have demonstrating evident interest in finding laws and policies that work in Web accessibility area. In America Section 508 was established as the standard mostly followed in other continents is the W3C WCAG 2.0 guidelines. However, there is still a lack of legislation or irregular adoption of the same, and there are communities that are trying to fill this gap, setting standards and promoting their implementation. In this perspective Andreasson and Snaprud (2014) discuss the efforts of a community called European Internet Inclusion Initiative (EIII) in order to support greater digital inclusion in the public sector.

Policy issues related to fragilities in the laws regarding the government's electronic services are a problem where discrimination exists in relation to the on line environment is huge and attitudes taken by the responsible authorities are not necessary (Jaeger, 2004). To achieve adequate levels of accessibility is necessary for the government to establish formal laws and appropriate guidelines to the local context and then adapt existing and force by law enforcement or other additional mechanisms monitoring these guidelines (Al-Khalifa, 2012).

In some research the concern of the authors is to understand whether government agencies are developing their web presence affordable to all the people and at the same time realize that they are being established standards that can be followed by other organizations or public, or private (White, Goette, & Young, 2015).USA is a country that has developed great efforts in this field, where several projects have

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

been developed in order to understand how they behave different states as concerns the accessibility of their government websites. (Lazar et al., 2010).

The provision of government services via mobile applications (m-government) has had a significant growth in recent years. In this context, it is also crucial that the applications are accessible to all people. Sierra, Carvalho, Ferreira, Vaz, and Freire (2015) present a case study with the evaluation of four government mobile applications in Brazil. The article discusses the methodological adaptations of WCAG 2.0 in the context of mobile and its limitations. The results showed many basic accessibility problems, which highlights the importance of promoting research accessibility in mobile applications.

Karkin and Janssen (2014) conducted a study which evaluate government websites in Turkey for the municipalities, not a common perspective of values as the content, privacy, usability and quality, but from a perspective of public values such as:

- Accessibility,
- Transparency,
- Openness,
- Dialogue and
- Balancing of interest.

The evaluation showed that websites perform better with regard to common values than the public values, justified by the fact that websites are built on providing functionality instead of holding public values.

Certain approaches to Web sites reviews have shown that there are other ways of perceiving their evolution. Hanson and Richards (2013) developed a study where the aim was to understand the changes of accessibility indicators over a period of 14 years in order to understand whether there was progress in this period. The conclusion is that the sites have a low level of compliance with WCAG 2.0 standards, although improvements are evident, at least in some success criteria, which can be a side effect of good coding practices and will improve the accessibility of Web sites.

Government websites are one of the main sources of information for people. Parmanto and Yu (2011) evaluated a set of US government websites and compared with the federal government sites and random e-commerce sites. The results showed that though the US government and the federal government provide the service more accessible, yet the barriers are huge and it is very difficult for a person with some kind of trouble navigating the 3 groups.

Nietzio, Olsen, Eibegger, and Snaprud (2010) a different concept presented with the aim of improving the development process of governmental sites. This project called eGovMon aims to bridge the gap between high levels of benchmarking and accessibility improvements that are implemented in isolation. This concept is based on several pillars:

- An on-line scanner that provides reviews,
- A community that serves to help managers of sites and finally,
- Regular and updated publication of benchmarking for managing the progress and improvements over time.

Some studies make a comprehensive analysis, the government websites in various groups of countries, such as the European Union (Goodwin, Susar, Nietzio, Snaprud, & Jensen, 2011). These studies

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

used various terms of comparison to developed countries and developing countries (Kuzma, 2010), continents (Kuzma, Yen, & Oestreicher, 2009) or even sets of comparison between countries a particular continent (Costa et al., 2013). Mostly these researches reveal that there are serious issues of accessibility in e-government sites, even those whose governments claim compliance with international accessibility standards.

Completed a bibliographic review you can see that there is a serious gap in the whole system when we talk on Web accessibility theme. It is easy to see that government institutions are not to assign the required value that the subject requires and the problem increases exponentially every day and every created Web site. It is extremely important that the responsible entities look to your web presence responsibly and judiciously with accessibility concerns. Only then, after resolving its internal problem can act careful way in other sectors.

Educational Perspective

Educational institutions, where universities and polytechnic institutes have a leading role, have a very important part in the continuous improvement of mission of the Web accessibility levels. These institutions are the ones with the knowledge and skills needed to develop, transmit and stimulate the best practices and techniques on the topic in question.

Van Rooij and Zirkle (2016) developed a work which describe the results of a collaborative case study that addresses one hand, the design and development of on-line educational experiences and other accessibility thereof. These issues are discussed simultaneously with the development of an on-line course and are taken a few lessons, particularly from the perspective of students in the same. Finally, the authors share their experience in order to sustainable collaborative processes are created for successful on-line initiatives.

There is a problem when two areas like Web accessibility and education intersect, is to realize what are the challenges and directions that have to take and above all who is working to implement the entire system. Linder, Fontaine-Rainen, and Behling (2015) also presented a study, performed in the United States, on the current institutional practices, structures, resources and policies that are necessary to ensure on-line accessibility for all students, with the key finding better articulate who is responsible for the process of on-line accessibility initiatives.

Education is a social process and consequently before moving any content learning to students is absolutely critical that teachers have accurate knowledge of what they convey. As the Web a recent area accessibility is necessary to train teachers on the content they are teaching, an example of such initiatives is presented by Santarosa, Comfort, and Neves (2015) promoting a course where the areas of accessibility and usability are part of the curriculum of training.

Despite laws and policies imposed it is still difficult to educational institutions recognize the rights for equal benefit of persons with disabilities on their Web sites. With this in mind it is urgent that these institutions adopt good accessibility practices in its on-line platforms, which has not been the case (Zap & Montgomerie, 2013). Failure by the university Web designers to use these guidelines reveals the unwillingness of institutions to follow in accordance with a universal Web.

In order to achieve organizational changes necessary to ensure that the accessibility challenges are effectively fulfilled, it requires a cultural change in educational institutions. Cooper (2013) reflected on the process of promoting this cultural change within an Open University and found that the importance of being clear about the roles and responsibilities in promoting accessibility for educators is huge. At

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the same time, educators must be provided with the necessary support to enable them to assume that responsibility.

In order to better understand the depth state of accessibility in education, a study was conducted by Ringlaben, Bray, and Packard (2014) where the sample were not public universities but to assess the websites of special education university departments, or institutions where their audience is none other than the disabled people. The results were catastrophic and showed that 97% of the pages have many problems of accessibility in which 39% of which are serious.

Distance education has grown significantly in recent decades and in parallel the need to meet the standards of accessibility of on-line courses increases. Several studies have focused their interest in this subject in order to determine if students with disabilities are satisfied with the respective institutions and the courses act in accordance with their capabilities in order to understand if these learning environments can be academically well- successful (Roberts, Crittenden, & Crittenden, 2011).

Wijayaratne and Singh (2010) explored the level of accessibility of Web sites of the Association of Asian Open Universities and realized that on-line learning tools are behind compared to Western countries. The purpose of this study is to highlight the importance of accessibility to educational institutions, which are to despise a wide range of users with large barriers in their platforms. Some countries have specified laws that legally oblige the institutions of higher education to have their Web sites accessible, as is the case of the US with the Americans with Disabilities Act (ADA). With this in mind are developed studies designed to assess the extent and effectiveness of the implementation of these accessibility policies in universities (Bradbard, Peters, & Caneva, 2010). The results show that while most universities apply these laws, they have serious deficiencies. In the case of ADA authors report that probably many schools are in breach and run the risk a judicial process by a disabled person.

In Portugal, the Web accessibility in educational institutions has also been the focus of many researchers. Gonçalves, Martins, Pereira, Santos et al. (2013) assessed the compliance of all high schools in the country with the WCAG 2.0 standard and found that there are serious problems that limit the availability of the mentioned sites and their content promoting serious implications in the educational context of students. Through these results the authors created a model that aims to improve the accessibility levels within the Portuguese spectrum.

Although all problems, research suggests some possible solutions. One can go through the potential generic pedagogical tools such as the theories of learning and learning projects can help teachers to develop materials and activities accessible. Seale and Cooper (2010) analysed these tools and argue that they can have potential, but its influence and too general and abstract. The authors also argue that the key is the teachers learn to use design tools because its potential is more concrete and influence the content of the design process is much higher.

Reviewed literature summary, we conclude that education and Web accessibility are two areas where it is critical that there is communion to achieve the objectives, not only related to educational institutions, as well as the future of all other sectors. It is essential that education to work as a sustainable basis for all Web accessibility implementation system and is through education that begins the process of learning an area that requires effective and robust training. That said, it is urgent that educational intuitions change their stance regarding this issue, with a profound change in their culture, their way of acting, in their curriculum programs and the platforms they manage.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Business Perspective

In this set of perspectives, we identified the companies as a major actor in the mission to improve Web accessibility levels. As business entities to express corporate social responsibility (CSR), Web accessibility is an integral part of this obligation in order to demonstrate the commitment to provide the same equal opportunities. In our view the business outlook should be divided into two distinct areas:

- The non-technological companies and
- Enterprises of information technology in which fits the perspective of programmers.

Even though, there is a highlight of the Internet in people's lives, most of the Web presence of organizations in the private sector does not yet meet the contemporary accessibility standards. Leitner, Strauss, and Stummer (2015) conducted a case study in order to find the motivations of organizations to implement or reject the accessibility standards. The authors realized that motivation varies according to several factors such as:

- The size and complexity of the business,
- The organizational sector,
- Corporate culture and
- The degree of complexity of web presence.

In the daily activity of a company there is a key element: employees. Providingh Web accessibility can be an important element in the CSR to demonstrate and employees can play a vital role in this process. Oh and Chen (2014) proposes a model which shall examine the intention of the employees to exert pressure, as concerns the accessibility is influenced by three psychological needs:

- The need for belonging,
- Control, and
- Meaningful existence.

In some sectors of activity, the importance of the Internet takes on a large scale. One of these sectors is the bank which has developed some research with the focus of this very Web accessibility. According to Martínez et al. (2014) three factors are associated with Web Accessibility adoption in banks:

- Operating factors,
- Size, and
- The organization's CSR strategy.

After a case study the authors conclude that both operating factors, such as database size, does not seem to influence the Web Accessibility adoption. On the other hand, the commitment to CSR, the results indicate significant influence on the adoption of accessibility.

As is evident, companies have a social citizenship behaviour that should take into account, with the leaders of organizations to fulfil this role. The world's largest companies to be a good example by setting standards to be followed by smaller companies. Gonçalves, Martins, Pereira, and Oliveira et al. (2013)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

evaluated the websites of the 250 largest companies in the Forbes list and found a considerable number of accessibility errors on all sites of the chosen group, demonstrating a level of compliance with the decidedly down guidelines.

Web accessibility in business is not just an ethical dimension issue or equal opportunities, but also an economic dimension as it excludes a group of consumers with economic potential. Rocha, Bessa, Gonçalves, Peres, and Magalhães (2012) focused on characterizing the economic value of people with disabilities so that companies realize what they are losing monetarily when their Web presences are inaccessible to a number of people. With specific data that used the authors demonstrated a very high amount of money that companies are losing.

Lorca, Andrees, and Martínez (2012) conducted a study on Web accessibility levels of a sample of 600 European companies. The researchers' findings are that both the size of the company and the culture of the country in which it operates have a considerable effect associated. A fact that proves this argument is that large British companies are likely to have the highest levels of Web accessibility and this comes from the fact that English law has high levels of individualism, low power distance and low uncertainty avoidance, and all these issues promote innovation (such as Web accessibility).

Organizations of information technologies, which include developers also have an important role to play in this process. While there are numerous regulations and standards for accessibility for the development of appropriate interfaces, it is still quite difficult to achieve, and more to maintain high levels of quality in the development process. This difficulty is due to several factors such as the lack of adequate development of methods, tools used and the professional's training of development (Miñón, Moreno Martínez, & Abascal, 2014).

In order to be included in accessibility is vital development process that developers acquire habits of developing accessible Web sites, more precisely in the techniques and methods used by them. In spite of the literature review show that Web accessibility is important in the work of these people, it happens that the actions are somewhat limited, either due to their own causes of the individual as their limited perception on the subject, his empathy, and especially the lack of related to the Web accessibility experience, whether due to external reasons, mainly relating to firms in which they operate, where the main reason is due to the fact that developers have lack of control / power in relation to positive or negative ramifications of Web accessibility (Putnam et al., 2012).

Web accessibility is increasingly desired by customers, where many development companies listed the same as one of the techniques offered in their services. As such, evaluation studies to the websites of these companies are carried out in order to see if these companies have accessibility as a service to incorporate in your on-line presence. These studies demonstrate that despite the homepage these websites contain the compliance icon with the guidelines, it has no impact on actual accessibility of the homepage and also does not reflect the current state of the entire site, as it may have been modified several times since the validation happened (Gilbertson & Machin, 2012).

Lopes, Van Isacker, and Sedge (2010) effected an investigation to try to understand the motivations, concerns and difficulties of web developers when the topic is Web accessibility. The answers showed that in half of the people surveyed the topic has effect on his work, recognizing some awareness of the guidelines and standards accessibility, but only a more theoretical format. Overall the majority expressed the need for greater knowledge about the functional limitations of the disabled as well as assistive devices. However, the largest proportion (85%) was attributed by those who indicated the need for advanced training in Web accessibility area.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Still in the same direction, a similar study to the previous with the difference being only specific to a group of programmers from a recognized software development company was analysed. The conclusions were that the design, testing and find appropriate technology, are the hardest aspects in producing an accessible application. Although programmers have access to information and training, testing and technological solutions are time-consuming to implement, and the lack of time is a limiting factor in the development of projects (Trewin, Cragun, Swart, Brezin, & Richards, 2010).

In light of the knowledge gained through the existing literature, it is clear that organizations, despite being aware that Web accessibility has assumed increasing importance globally, does not give it the proper value. Although all ethical and cultural values that arise, it should be noted that individuals with some kind of trouble have a high economic value and it is absolutely imperative that companies understand that they are losing that amount to devalue this set of people.

Institutional Perspective

Associations are organizations whose mission is achieving a common goal of all participants thereof. In the case of web accessibility, this setting is no exception, and associations related to the theme, which may or may not have been created under that system, must have the ability to not only sensitize the world to the subject and must also submit active participation in the discovery of information and knowledge.

One of the associations that have made more efforts in this area is the Web Accessibility in Mind (WebAIM), which has helped build a large community of programmers, specialized people in the Web, people with disabilities and others who share the goal of making the Web more accessible. The major contribution of this community based on sharing resources and information on-line ensuring the knowledge, technical skills, tools and leadership strategies that enable organizations to make their own content accessible to people with disabilities (WebAIM, 2015).

As already discussed in this chapter, the professionals who develop their work in Web accessibility of the area are very important parts in the process. Thus one of the associations that have had great impact is the International Association of Accessibility Professionals (IAAP), which is to end the association of individuals and organizations with a focus on accessibility or in the process of building their skills and strategies. The purpose of this association is to help accessibility professionals to develop and advance their careers in order to help organizations integrate accessibility into their products and infrastructure (IAAP, 2015).

By another hand, there are assistive technologies that are very important tools in providing help to people with particular needs. Thus was created the Assistive Technology Industry Association (ATIA) that represents the common interests of business, government, education and agencies. Their mission is to serve as the collective voice of the assistive technology industry to best products are delivered to people with disabilities (ATIA, 2015).

There are also associations not being created exclusively for the purpose of Web accessibility, begin to focus their attention on the subject. The US Public Policy Council of ACM (USACM) is an association that unites the US government, the computing community and the entire American public, which in recent years has been looking at Web accessibility as a major theme. Aims of the council are:

- To increase awareness,
- Develop tools, and
- Extend the accessibility standards minimizing the regulatory burden (USACM, 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Another country that has shown interest in the subject through their associations is Australia. The Web Australian Industry Association (AWIA) representing all the Web industry, both from an ethical point of view and professional, regularly organizes events related to Web accessibility where the topic is discussed thoroughly in order to find the best solutions, for both for the industry and for end users (AWIA, 2015).

According to what has already been reported, education and Web accessibility are two fields that to work properly necessarily have to cooperate among themselves. With this in mind, there are also associations for educational purposes that do not discard the Web accessibility. An example is the Association for the Advancement of Computing in Education (AACE) which has the mission to advance information technology in education and e- learning in its practical application. For this Web accessibility functions as a central pillar for the association in your research (AACE, 2015).

We verified the existence of a considerable number of associations approaching Web accessibility, some of them created exclusively for this purpose and others who realized the increasingly urgent necessity of the theme and the need to adapt. It is good to realize that within the associations the path already begun, however there is still much to go and it is essential that not only appear more entities concerned, as well as those that already exist, to make themselves heard more impactful to be successful in the goals that propose to achieve.

End Users Perspective

The last perspective to be analysed is the end users. We attribute great importance and emphasis to this group because obviously the whole scope of this work and Web accessibility in global revolves around these individuals, who may benefit if the objectives are achieved. As such it cannot exclude these people from intervening in the process of achieving better levels of accessibility, it is essential to acquire all the feedback and experience that they gather and use this valuable knowledge when developing new platforms.

Internet users are a highly heterogeneous entity, with different needs and requirements, where individuals with a disability may have many problems. With this in mind are created adaptive software systems to facilitate the interaction of people with all the information around them. The possibilities for exploring new methods and accessibility techniques to make adaptive Web for these users is a key point, since recent studies indicate that even when the guidelines are implemented, there is little evidence that people with disabilities gain better accessibility indexes (Raufi, Ferati, Zenuni, Ajdari, & Ismaili, 2015).

Research on inclusive design has contributed to a rich and wide range of publications and initiatives, forming an emerging knowledge base in this area. Understanding the needs and characteristics of the knowledge of the users, added a new dimension to the research task. For this purpose, there are works that focus on knowledge of inclusive design, involving the end users, in order to help the developers in their work. Research programs are used to illustrate the understanding of these needs and developed tools in order to evaluate its effectiveness (Dong, McGinley, Nickpour, & Cifter, 2015).

Factors such as the physical constraints, experience of using and accessibility barriers that websites have, are very important when observing users' behaviour on a particular Web site. This process of adaptation has been much investigated in recent times and the findings show that will as the interaction progresses the user gets higher completion rates of tasks, developing more techniques of exploitation, which makes them more qualified, independent and autonomous. These metrics can be considered learning indicators to be explored in order to intervene appropriately in the interface (Vigo & Harper, 2014).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Blind users are the most affected by this exclusion and is a challenge for them to seek information effectively on the Web. Xie, Babu, Jeong, Joo, and Fuller (2014) effected a case study with blind people in digital libraries in order to find possible solutions help in the interaction. The authors concluded that the keyboard focus location advertising, shortcut keys to exit out the current location of the cursor and descriptive summaries in relation to the overall site structure can be incorporated into digital libraries in order to improve the accessibility levels.

Ferati, Raufi, Kurti, and Vogel (2014) conducted a study which grouped people with different levels of visual impairment in different countries to compare their needs. The results showed that the cultural dimension of their country of origin and the context of use plays a crucial role in making the content accessible, and WCAG guidelines alone are often insufficient. Furthermore, it is necessary to evaluate the visual impairment level of the user before applying any technical adaptation.

Blind users interact with sites in different ways and it is necessary to analyse each case in particular to understand how they can eliminate these barriers. Pascual, Ribera, Granollers, and Coiduras (2014) performed an evaluation at two sites with similar content but different accessibility levels in three groups of users with different vision impairment. It was noted that all users showed better mood when interacting with the site accessible. An interesting fact is that the blind users when interact with the site inaccessible, complained much less than the low vision individuals and those without any difficulty. One possible explanation for this phenomenon is the daily interaction that blind users are always using the Web.

The evaluation of a website respect of its availability is an essential part of the whole process. Automatic ratings are the most common and which has higher utilization rate, however there are some barriers that are only detected with the participation of users. So it is important to study the behavior of these people in order to identify features and develop protocols that assessors and experts should consider in the performance of expert assessment (Capra, Ferreira, Silveira, & Ferreira, 2012).

Power, Freire, Petrie, and Swallow (2012) conducted an empirical study in collaboration with blind users and came to the conclusion that even though the developers correctly implement the current guidelines WCAG, there is little evidence that people with disabilities may have fewer problems. These results indicate that it is time to change the Web accessibility paradigm and define a much wider set of principles, in addition to the guidelines, which is based on users and knowledge that can be transmitted by them and used as valuable feedback by developers.

The question of accessibility on the Internet is not just for blind people, older users also have an important role in the information society. Yao, Qiu Huang, Du and Ma (2011) investigated the technological accessibility problems of this group and concluded that the reason for these difficulties is linked to:

- The lack of promotion by government entities enabling environments,
- Lack of involvement of the rest of the community,
- Lack of support the newest members of the family, and
- Little capacity autonomous learning of the elderly.

With older people as the focus of research Sayago and Blat (2009) effected an ethnographic study of daily interactions over a period of three years, concluded that the greatest barriers these people face are the difficulty in memorizing the steps, understanding the terms used on the Web and use of the computer by the mouse, despite the will to use it. Regardless of these limitations the inclusion and independence are two conditions desired by these users.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Audits and evaluations the Web is becoming ever more complicated and time consuming due to the increasing number of compliance criteria to be tested. As a consequence, Yesilada, Brajnik, and Harper (2011) tested 61 common barriers with different groups of users to try to reduce the compliance criteria and showed that 58% of them are common among users of mobile applications and users with disabilities. Another interesting aspect is that the most serious barriers are similar for users with low vision and users with motor disabilities.

Lopes, Van Isacker, et al. (2010) conducted a questionnaire to users who deal daily with accessibility problems either people with disabilities or elderly people, and realized that they all claim that increasingly Web and mobile applications are raising severe obstacles in their tasks. Even so, they continue to use your computer or smartphone on a daily basis, relying often with dependence on friends to help them. The group has explicitly stated that the main improvement that they desire is the better compatibility between assistive technologies and websites.

As result of this research, we can see how it is absolutely essential we include in this work the perspective and knowledge of end users can assign. End user are relevant throughout Web Accessibility process as their feedback is what makes work of programmers more focused to the needs of those will use. Thus all are benefited and are not wasted later features in practice does not serve as useful.

CHALLENGES AND OPPORTUNITIES

The demand for sophisticated Web interfaces, able to interact with everyone without any exceptions, using autonomous reactions, and meeting the needs of different users, has produced high expectations from ICT. Progressing towards understanding and modelling these computational tools is crucial in the behaviour of Human-Computer Interaction-systems in order to achieve social and economic benefits.

Laws and Regulations

Web accessibility depends on the combined efforts of several components, such as software development tools, developers and the content itself, and this interaction can sometimes be complicated. There are several organizations that recognize these difficulties and provide technical and functional indications directed to each of these elements, even though not always consensual and accepted transversally. In the case WCAG 2.0 it means that the automated validation and correction, preferred by programmers, cannot be considered as the only (or main) form to validate content and web platforms developed.

Based on previously explained, and after an analysis and reflection on the existing literature, we can see that there is a set of technical / functional regulations or indications homogeneously accepted by all and that programmers can easily follow. Such limitation brings a huge challenge to organizations and scientific community who wish to focus in this context, whereas its impact is immense, forcing the need to make a previous work of cross-examination before we even be able to think of technological developments or new solutions (Harper & Chen, 2012).

Current mass acceptance of mobile devices has also been creating a new set of issues to the already immensely complex problem of Web accessibility. This stems from the fact that most of the regulations and technical and operational indications are not directed at the development of content and platforms for mobile devices. Presented this fact, from our point of view it will be necessary to provide further clarification and regulations on how best to develop mobile applications accessible to all.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Web Accessibility in Education

After reviewing the existing literature Web accessibility in education it is possible to verify that there is a considerable gap in terms of know-how lack of progress in terms of different areas. This view is reinforced by arguments of several researchers (Seale, 2013), whereby an update to the teaching support systems and a thematic implementation of "Web accessibility" in study programmer focused and comprehensive manner.

Online learning has the ability to open the door of education to those who have the technology to participate. However, when it comes to inclusion rise up some barriers. These problems need to be solved quickly, but it is necessary to investigate the real needs of these students and their interaction with these platforms in order to achieve concrete objectives and to really improve your experience (Burgstahler, 2015).

Education is considered one of the main actions to improve integration of people with functional diversity in society, more accurately through the higher education institutions. Both the administrations of higher education institutions, as their teachers need to understand concepts in Web accessibility issues in order to carry out a more inclusive learning and quality. In fact, today's students will be professionals in the future, and when we invest now in their education about Web accessibility, we invested in an improvement of inclusion levels of long-term Web platforms.

Restrepo, Benavidez, and Gutiérrez (2012), present the idea to include lectures on the subject in educational institutions or even change the curriculum in the most appropriate courses, thematic instilling applying Web accessibility techniques, and thus teach students the techniques and methodologies appropriate to the creation of accessible Web content, may be the best option. Although there are some studies in this regard (Fuertes, González, & Martinez, 2012), is plenty of space for research in this area, as there are great challenges, both on the content being taught or about the most appropriate way of teaching.

Web Accessibility in Companies

We have seen, in recent years, some positive signs of how companies look at Web accessibility, however in light of the research we conducted, the adoption of Web accessibility by organizations (either when they are developing their own web content, either when they are developing Web content and platforms for others) is still very scarce (Gilbertson & Machin, 2012).

For many companies, websites are priority in the services they provide, then improve the accessibility levels of the same is urgent. Even so the challenges do not exhaust here and there are much deeper issues that need a comprehensive investigation. The challenges are immense, ranging from realizing that the reasons why organizations use this technology to analyse and try to change the perception that these are the social and economic value inherent in Web accessibility.

Nevertheless, for organizations are absolutely crucial to inform all the potential that Web accessibility can bring them in order to make themselves understood to companies that Web accessibility should not be an obligation, but a way to reach new audiences and reach more quality to those who are already loyal.

Collaborative Accessibility Web

Web content is under the control of the owners of Web sites and therefore are those who have the responsibility to make your content accessible. Given this basic assumption of accessibility, users should be able to demonstrate their discontent and even contribute with knowledge and help the owners of websites.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

So some windows of opportunities and challenges open, whereas are very few platforms where users can report problems of interaction and navigation, and those that implement this feature have very slow registration process and low success rate.

purpose to connect users and owners through platforms creating a social network so that these groups can share their experiences, report problems in real time and even serve as a platform to attract new users through the services affordably, it may be one way. However other directions may be taken into account, and the researchers are of utmost importance in this context, as it is necessary to realize a conceptual point of view of how it can integrate users and owners of websites so that they can collaborate.

Web Accessibility in Mobile Applications

The growing use of mobile devices has been overwhelming and today this type of systems has become one of the means most used by people to access services and information on-line. In this context it is extremely important that these resources are accessible to the entire community. Focused on this thought, it is possible to say that there is much work to be done in this area to achieve satisfactory levels of accessibility.

As argued by Leitner, Strauss, and Stummer (2015) the research possibilities in the framework of accessibility in mobile applications are varied. The challenges start right in designing accessible applications, where many problems still exist, as Although we already have some regulations of support do not yet exist any firm base to serve as a support to the developers of these platforms. On the other hand, the evaluation as to the accessibility of mobile applications already on the market is still an open challenge as a result of lack of regulation and technologies and support tools.

Researchers can also go through the studies with users with limitations, with the objective of analyse the problems arising from the use of mobile platforms in order to adjust and define recommendations for mobile accessibility based not only on assumptions, but on evidence empirical. This work has enormous relief, for it is through the results of this research that mobile application developers can direct their focus and work on developing truly accessible applications.

CONCLUSION

Web accessibility is an increasingly important topic both from a technological and from a more human perspective. This relevance is largely drawn from current Web users needs and the necessity to develop (Web) software and platforms that allow for a universal access and use.

Although most of the accessibility problems can be anticipated by users or programmers, there is another set of questions that can only be identified during the development stages. Nevertheless, it is increasingly accepted that the Web accessibility is also a critical topic for all organizations, including those who produce and provide Web content.

Social agencies with responsibility in education, associations or in government activities, should also help in triggering an accessible Web. This can be done from various perspectives: the development of regulations; the creation of a moral and social mindset towards the Web accessibility topic, and so many others. Besides these more direct actions, these entities can also help shape positive perceptions on stakeholders and web developers in order to increase the perception on the topic and the awareness on the necessity.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Despite the existing amount of scientific and technical work on the Web accessibility topic, perceivable through a literature analysis, it is still possible to identify a knowledge gap on the subject that should be analysed and aimed.

This chapter intends to document a multi-perspective vision on the Web accessibility topic and with this try to help creating a global perception on the subject and, in parallel, help both the scientific community and the organization to better understand the related issues and how to contribute to an overall improvement on websites accessibility levels, hence transforming this technology into an inclusive one.

REFERENCES

W3C. (1999). *Web Content Accessibility Guidelines 1.0*. Retrieved 25/11/2015, 2015, from http://www.w3.org/TR/WAI-WEBCONTENT/

W3C. (2005). *Introduction to Web Accessibility*. Retrieved 15/11/2015, 2015, from http://www.w3.org/WAI/intro/accessibility.php

W3C. (2008). *Web Content Accessibility Guidelines (WCAG) 2.0*. Retrieved 25/11/2015, 2015, from http://www.w3.org/TR/WCAG20/

W3C. (2015). *About W3C*. Retrieved 25/11/2015, 2015, from http://www.w3.org/Consortium/

AACE. (2015). *About AACE*. Retrieved 27/12/2015, 2015, from http://www.aace.org/about.htm

Aizpurua, A., Arrue, M., & Vigo, M. (2015). Prejudices, memories, expectations and confidence influence experienced accessibility on the Web. *Computers in Human Behavior, 51*, 152-160. doi:10.1016/j.chb.2015.04.035

Al-Khalifa, H. (2012). The accessibility of Saudi Arabia government Web sites: An exploratory study. *Universal Access in the Information Society*, *11*(2), 201–210. doi:10.100710209-010-0215-7

Andreasson, K., & Snaprud, M. (2014). *The European e-government web accessibility divide.* Paper presented at the Proceedings of the 8th International Conference on Theory and Practice of Electronic Governance.

Arch, A. (2008). *Web Accessibility for Older Users: A Literature Review*. Retrieved 15/11/2015, 2015, from http://www.w3.org/TR/2008/WD-wai-age-literature-20080514/

ATIA. (2015). *About ATIA - Information*. Retrieved 26/12/2015, 2015, from http://www.atia.org/

AWIA. (2015). *Web Accessibility*. Retrieved 26/12/2015, 2015, from https://www.webindustry.asn.au/news-and-events/events/web-accessibility

Bradbard, D., & Peters, C. (2010). Web Accessibility Theory and Practice: An Introduction for University Faculty. *Journal of Educators Online*, *7*(1), n1.

Bradbard, D., Peters, C., & Caneva, Y. (2010). Web accessibility policies at land-grant universities. *The Internet and Higher Education*, *13*(4), 258–266. doi:10.1016/j.iheduc.2010.05.007

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Brewer, J. (2004). *Web accessibility highlights and trends.* Paper presented at the 2004 international cross-disciplinary workshop on Web accessibility (W4A). 10.1145/990657.990667

Burgstahler, S. (2015). Opening Doors or Slamming Them Shut? Online Learning Practices and Students with Disabilities. *Social Inclusion, 3*(6).

Capra, E., Ferreira, S., Silveira, D., & Ferreira, A. (2012). Evaluation of Web Accessibility: An Approach Related to Functional Illiteracy. *Procedia Computer Science*, *14*, 36–46. doi:10.1016/j.procs.2012.10.005

Cooper, M. (2013). Making online learning accessible to disabled students: an institutional case study. *Approaches to Developing Accessible Learning Experiences: Conceptualising Best Practice*, 103.

Costa, D., Fernandes, N., Neves, S., Duarte, C., Hijón-Neira, R., & Carriço, L. (2013). *Web accessibility in Africa: a study of three African domains. In Human-Computer Interaction–INTERACT 2013* (pp. 331–338). Springer.

Díaz-Bossini, J., & Moreno, L. (2014). Accessibility to Mobile Interfaces for Older People. *Procedia Computer Science*, *27*(0), 57–66. doi:10.1016/j.procs.2014.02.008

Dong, H., McGinley, C., Nickpour, F., & Cifter, A. (2015). Designing for designers: Insights into the knowledge users of inclusive design. *Applied Ergonomics, 46,* 284-291. doi:10.1016/j.apergo.2013.03.003

EU-FRA. (2015). *People with disabilities*. Retrieved 28/11/2015, 2015, from http://fra.europa.eu/en/theme/people-disabilities

Ferati, M., Raufi, B., Kurti, A., & Vogel, B. (2014). *Accessibility requirements for blind and visually impaired in a regional context: An exploratory study.* Paper presented at the Usability and Accessibility Focused Requirements Engineering (UsARE), 2014 IEEE 2nd International Workshop on. 10.1109/UsARE.2014.6890995

Fuertes, J., González, Á., & Martínez, L. (2012). Including Accessibility in Higher Education Curricula for ICT. *Procedia Computer Science*, *14*, 382–390. doi:10.1016/j.procs.2012.10.044

Gilbertson, T., & Machin, C. (2012). *Guidelines, icons and marketable skills: an accessibility evaluation of 100 web development company homepages.* Paper presented at the international cross-disciplinary conference on web accessibility. 10.1145/2207016.2207024

Gonçalves, R., Martins, J., & Branco, F. (2014). A Review on the Portuguese Enterprises Web Accessibility Levels–A Website Accessibility High Level Improvement Proposal. *Procedia Computer Science*, *27*, 176–185. doi:10.1016/j.procs.2014.02.021

Gonçalves, R., Martins, J., Branco, F., & Barroso, J. (2013). *Web Accessibility–From the Evaluation and Analysis to the Implementation–The anoGov/PEPPOL Case. In Universal Access in Human-Computer Interaction. User and Context Diversity* (pp. 664–673). Springer.

Gonçalves, R., Martins, J., Branco, F., Pereira, J., Rocha, T., & Peixoto, C. (2015). *AccessWeb Barometer: A Web Accessibility Evaluation and Analysis Platform*. Paper presented at the INTERNET 2015 - The Seventh International Conference on Evolving Internet, St. Julians, Malta.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gonçalves, R., Martins, J., Pereira, J., Oliveira, M., & Ferreira, J. (2013). Enterprise Web Accessibility Levels Amongst the Forbes 250: Where Art Thou O Virtuous Leader? *Journal of Business Ethics*, *113*(2), 363–375. doi:10.100710551-012-1309-3

Gonçalves, R., Martins, J., Pereira, J., Santos, V., & Cota, M. (2013). Can I Access my School Website? Auditing Accessibility of the Portuguese Teaching Institutions Websites. *Journal of Universal Computer Science*, *19*(18), 2639–2655.

Goodwin, M., Susar, D., Nietzio, A., Snaprud, M., & Jensen, C. (2011). Global web accessibility analysis of national government portals and ministry web sites. *Journal of Information Technology & Politics*, *8*(1), 41–67. doi:10.1080/19331681.2010.508011

Hanson, V., & Richards, J. (2013). Progress on website accessibility?. *ACM Transactions on the Web*, *7*(1), 2. doi:10.1145/2435215.2435217

Harper, S., & Chen, A. (2012). Web accessibility guidelines. *World Wide Web (Bussum)*, *15*(1), 61–88. doi:10.100711280-011-0130-8

Henry, S. (2002). *Understanding web accessibility. In Constructing accessible web sites* (pp. 6–31). Springer. doi:10.1007/978-1-4302-1116-7_2

Henry, S., Abou-Zahra, S., & Brewer, J. (2014). *The role of accessibility in a universal web.* Paper presented at the 11th Web for All Conference. 10.1145/2596695.2596719

IAAP. (2015). About IAAP. Retrieved 26/12/2015, 2015, from http://www.accessibilityassociation.org/

ISO. (2003). *TS 16071: 2003: Ergonomics of human-system interaction–Guidance on accessibility for human-computer interfaces*. Geneva, Switzerland: International Standards Organisation.

ISO. (2006). *9241-110: 2006. Ergonomics of human system interaction-Part 110: Dialogue principles*. ISO.

ISO. (2008). *9241-171 (2008) Ergonomics of humansystem interaction--Part 171: Guidance on software accessibility*. ISO.

Iwata, H., Kobayashi, N., Tachibana, K., Shirogane, J., & Fukazawa, Y. (2013). Web accessibility support for visually impaired users using link content analysis. *SpringerPlus*, *2*(1), 116. doi:10.1186/2193-1801-2-116 PMID:23667799

Jaeger, P. (2004). The Social Impact of an Accessible E-Democracy Disability Rights Laws in the Development of the Federal E-Government. *Journal of Disability Policy Studies*, *15*(1), 19–26. doi:10.1177/10442073040150010401

Karkin, N., & Janssen, M. (2014). Evaluating websites from a public value perspective: A review of Turkish local government websites. *International Journal of Information Management*, *34*(3), 351–363. doi:10.1016/j.ijinfomgt.2013.11.004

Kuzma, J. (2009). Regulatory compliance and web accessibility of UK parliament sites. *Journal of Information Law & Technology*, *2*, 1–15.

Kuzma, J. (2010). *Global E-government web accessibility: a case study*. Academic Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kuzma, J., Yen, D., & Oestreicher, K. (2009). *Global e-government web accessibility: an empirical examination of EU, Asian and African sites*. Academic Press.

Lazar, J., Beavan, P., Brown, J., Coffey, D., Nolf, B., Poole, R., & Weber, K. (2010). *Investigating the accessibility of state government web sites in Maryland. In Designing Inclusive Interactions* (pp. 69–78). Springer.

Leitner, M., & Strauss, C. (2008). *Exploratory case study research on web accessibility*. Springer. doi:10.1007/978-3-540-70540-6_70

Leitner, M., Strauss, C., & Stummer, C. (2015). Web accessibility implementation in private sector organizations: Motivations and business impact. *Universal Access in the Information Society*, 1–12.

Li, S., Yen, D., Lu, W., & Lin, T. (2012). Migrating from WCAG 1.0 to WCAG 2.0–A comparative study based on Web Content Accessibility Guidelines in Taiwan. *Computers in Human Behavior*, *28*(1), 87–96. doi:10.1016/j.chb.2011.08.014

Linder, K., Fontaine-Rainen, D., & Behling, K. (2015). Whose job is it? Key challenges and future directions for online accessibility in US Institutions of Higher Education. *Open Learning: The Journal of Open, Distance and e-Learning*, 1-14.

Lopes, R., Gomes, D., & Carriço, L. (2010). *Web not for all: a large scale study of web accessibility.* Paper presented at the 2010 International Cross Disciplinary Conference on Web Accessibility (W4A). 10.1145/1805986.1806001

Lopes, R., Van Isacker, K., & Carriço, L. (2010). *Redefining assumptions: accessibility and its stakeholders. In Computers Helping People with Special Needs* (pp. 561–568). Springer. doi:10.1007/978-3-642-14097-6_90

Lorca, P., Andrées, J., & Martínez, A. (2012). Size and culture as determinants of the web policy of listed firms: The case of web accessibility in Western European countries. *Journal of the American Society for Information Science and Technology*, *63*(2), 392–405. doi:10.1002/asi.21650

Mankoff, J., Fait, H., & Tran, T. (2005). *Is your web page accessible?: a comparative study of methods for assessing web page accessibility for the blind.* Paper presented at the SIGCHI conference on Human factors in computing systems. 10.1145/1054972.1054979

Martínez, A., De Andrés, J., & García, J. (2014). Determinants of the Web accessibility of European banks. *Information Processing & Management*, *50*(1), 69–86. doi:10.1016/j.ipm.2013.08.001

Miñón, R., Moreno, L., Martínez, P., & Abascal, J. (2014). An approach to the integration of accessibility requirements into a user interface development method. *Science of Computer Programming*, *86*, 58–73. doi:10.1016/j.scico.2013.04.005

Nietzio, A., Olsen, M., Eibegger, M., & Snaprud, M. (2010). *Accessibility of eGovernment web sites: towards a collaborative retrofitting approach. In Computers Helping People with Special Needs* (pp. 468–475). Springer. doi:10.1007/978-3-642-14097-6_75

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Noh, K., Jeong, E., You, Y., Moon, S., & Kang, M. (2015). A study on the current status and strategies for improvement of web accessibility compliance of public institutions. *Journal of Open Innovation: Technology, Market, and Complexity*, *1*(1), 1–17. doi:10.118640852-015-0001-0

Oh, L., & Chen, J. (2014). Determinants of employees intention to exert pressure on firms to engage in web accessibility. *Behaviour & Information Technology*, *34*(2), 108–118. doi:10.1080/0144929X.2014.936040

ONU. (2008). *World Population Prospects: The 2008 Revision*. Retrieved 15/11/2015, 2015, from http://www.un.org/esa/population/publications/wpp2008/wpp2008_highlights.pdf

Pascual, A., Ribera, M., Granollers, T., & Coiduras, J. (2014). Impact of Accessibility Barriers on the Mood of Blind, Low-vision and Sighted Users. *Procedia Computer Science*, *27*(0), 431–440. doi:10.1016/j.procs.2014.02.047

Power, C., Freire, A., Petrie, H., & Swallow, D. (2012). *Guidelines are only half of the story: accessibility problems encountered by blind users on the web.* Paper presented at the SIGCHI conference on human factors in computing systems. 10.1145/2207676.2207736

Putnam, C., Wozniak, K., Zefeldt, M., Cheng, J., Caputo, M., & Duffield, C. (2012). *How do professionals who create computing technologies consider accessibility?* Paper presented at the 14th international ACM SIGACCESS conference on Computers and accessibility. 10.1145/2384916.2384932

Rau, P., Zhou, L., Sun, N., & Zhong, R. (2014). Evaluation of web accessibility in China: Changes from 2009 to 2013. *Universal Access in the Information Society*, 1–7.

Raufi, B., Ferati, M., Zenuni, X., Ajdari, J., & Ismaili, F. (2015). Methods and Techniques of Adaptive Web Accessibility for the Blind and Visually Impaired. *Procedia: Social and Behavioral Sciences*, *195*, 1999–2007. doi:10.1016/j.sbspro.2015.06.214

Restrepo, E., Benavidez, C., & Gutiérrez, H. (2012). The Challenge of Teaching to Create Accessible Learning Objects to Higher Education Lecturers. *Procedia Computer Science*, *14*, 371–381. doi:10.1016/j.procs.2012.10.043

Ringlaben, R., Bray, M., & Packard, A. (2014). Accessibility of American University Special Education Departments Web sites. *Universal Access in the Information Society*, *13*(2), 249–254. doi:10.100710209-013-0302-7

Roberts, J., Crittenden, L., & Crittenden, J. (2011). Students with disabilities and online learning: A cross-institutional study of perceived satisfaction with accessibility compliance and services. *The Internet and Higher Education*, *14*(4), 242–250. doi:10.1016/j.iheduc.2011.05.004

Rocha, T., Bessa, M., Gonçalves, R., Peres, E., & Magalhães, L. (2012). Web Accessibility and Digital Businesses: The Potential Economic Value of Portuguese People with Disability. *Procedia Computer Science*, *14*, 56–64. doi:10.1016/j.procs.2012.10.007

Sánchez-Gordón, M., & Moreno, L. (2014). Toward an integration of Web accessibility into testing processes. *Procedia Computer Science*, *27*, 281–291. doi:10.1016/j.procs.2014.02.031

Santarosa, L., Conforto, D., & Neves, B. (2015). Teacher Education and Accessibility on E-Learning System: Putting the W3C Guidelines into Practice. *Teaching Education*, *4*(01).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sayago, S., & Blat, J. (2009). *About the relevance of accessibility barriers in the everyday interactions of older people with the web.* Paper presented at the 2009 International Cross-Disciplinary Conference on Web Accessibililty (W4A). 10.1145/1535654.1535682

Seale, J. (2013). *E-learning and disability in higher education: accessibility research and practice*. Routledge.

Seale, J., & Cooper, M. (2010). E-learning and accessibility: An exploration of the potential role of generic pedagogical tools. *Computers & Education*, *54*(4), 1107–1116. doi:10.1016/j.compedu.2009.10.017

Serra, L., Carvalho, L., Ferreira, L., Vaz, J., & Freire, A. (2015). Accessibility Evaluation of E-Government Mobile Applications in Brazil. *Procedia Computer Science*, *67*, 348–357. doi:10.1016/j.procs.2015.09.279

Trewin, S., Cragun, B., Swart, C., Brezin, J., & Richards, J. (2010). *Accessibility challenges and tool features: an IBM Web developer perspective.* Paper presented at the 2010 international cross disciplinary conference on web accessibility (W4A). 10.1145/1805986.1806029

USACM. (2015). *Web Accessibility*. Retrieved 26/15/2015, 2015, from http://usacm.acm.org/accessibility/category.cfm?cat=23&accessibility

van der Geest, T., & Velleman, E. (2014). Easy-to-read Meets Accessible Web in the E-government Context. *Procedia Computer Science*, *27*, 327–333. doi:10.1016/j.procs.2014.02.036

van Rooij, S., & Zirkle, K. (2016). Balancing pedagogy, student readiness and accessibility: A case study in collaborative online course development. *The Internet and Higher Education*, *28*, 1–7. doi:10.1016/j.iheduc.2015.08.001

Vigo, M., & Harper, S. (2014). A snapshot of the first encounters of visually disabled users with the Web. *Computers in Human Behavior*, *34*, 203–212. doi:10.1016/j.chb.2014.01.045

WAI. (2005). *Web Accessibility Initiative (WAI).* Retrieved 25/11/2015, 2015, from http://www.w3.org/WAI/

WebAIM. (2015). *About WebAIM*. Retrieved 27/12/2015, 2015, from http://webaim.org/about/

Wentz, B., Lazar, J., Stein, M., Gbenro, O., Holandez, E., & Ramsey, A. (2014). Danger, danger! Evaluating the accessibility of Web-based emergency alert sign-ups in the northeastern United States. *Government Information Quarterly*, *31*(3), 488–497. doi:10.1016/j.giq.2014.02.010

White, J., Goette, T., & Young, D. (2015). Measuring the Accessibility of the US State Government Web Sites. *Communications of the IIMA*, *5*(1), 4.

WHO. (2014). *Disability and health*. Retrieved 15/11/2015, 2015, from http://www.who.int/mediacentre/factsheets/fs352/en/

Wijayaratne, A., & Singh, D. (2010). Is there space in cyberspace for distance learners with special needs in Asia? A review of the level of Web accessibility of institutional and library homepages of AAOU members. *The International Information & Library Review*, *42*(1), 40–49. doi:10.1080/10572317.2010.10762841

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Xie, I., Babu, R., Jeong, W., Joo, S., & Fuller, P. (2014). *Blind Users Searching Digital Libraries: Types of Help-seeking Situations at the Cognitive Level*. Academic Press.

Yao, D., Qiu, Y., Huang, H., Du, Z., & Ma, J. (2011). A survey of technology accessibility problems faced by older users in China. *Universal Access in the Information Society*, *10*(4), 373–390. doi:10.100710209-011-0222-3

Yesilada, Y., Brajnik, G., & Harper, S. (2011). Barriers common to mobile and disabled web users. *Interacting with Computers*, *23*(5), 525–542. doi:10.1016/j.intcom.2011.05.005

Yi, Y. (2015). Compliance of Section 508 in public library systems with the largest percentage of underserved populations. *Government Information Quarterly*, *32*(1), 75–81. doi:10.1016/j.giq.2014.11.005

Yu, D., & Parmanto, B. (2011). U.S. state government websites demonstrate better in terms of accessibility compared to federal government and commercial websites. *Government Information Quarterly*, *28*(4), 484–490. doi:10.1016/j.giq.2011.04.001

Zap, N., & Montgomerie, C. (2013). *The status of web accessibility of Canadian universities and colleges: A follow-up study 10 years later.* Paper presented at the World Conference on Educational Multimedia, Hypermedia and Telecommunications.

KEY TERMS AND DEFINITIONS

Challenges: A demanding or stimulating task.

Characterization: A characteristics and peculiarities description.

Disability: A disadvantage or deficiency, especially a physical or mental impairment that interferes with or prevents normal achievement in a particular task.

Guidelines: A rule or instruction that shows or tells how something should be done.

Multi-Perspective: Relative to more than one perspective.

Opportunities: A chance for advancement or progress.

Web Accessibility: Use of Web environments, products and services by anyone, regardless of their limitations.

This research was previously published in Research Paradigms and Contemporary Perspectives on Human-Technology Interaction; pages 117-139, copyright year 2017 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 6
Rethinking the Contribution of Organizational Change to the Teaching and Learning of Organizational Behaviour and Human Resource Management:
The Quest for Balance

John Mendy
University of Lincoln, UK

ABSTRACT

One of the great attributes of acting as a Human Resource Manager is being reasonable. One may not know what is best for a company but one should be able to identify, reasonably, when in-house fighting and resistance on the shop floor are disadvantageous. While agreeing with the law one must also be aware, again reasonably, that it may be in conflict with itself. One's job is to resolve difficulties to the benefit of all parties – once more reasonably – even when one's emotions are on the side of one of the parties. In short, there is a job to do, but there is a difficulty: doing so successfully depends on being reasonable as well as developing expertise. However, being reasonable is precisely what the scientific method does not support although being an expert could be a desirable attribute. It excludes anything that contributes to a bias, including the bias that trust, fairness and team spirit introduce (Huczynski & Buchanan, 2013). The result is well known: the scientific method tends to support commodification, objectification and reification and elicits resistance (Pitsakis & Kuin, 2012; Mahadevan, 2012) even on phenomenon-driven change (Schwarz & Stensaker, 2014). HRM officers do not seem to have done too badly however – albeit without the support of the scientific method (Ford, Ford, & D'Amelio, 2008). This does not mean that support would be wasted or impossible. The aim of the present chapter is to explore what it might look like. The result is a series of recommendations, based on a study showing how some

DOI: 10.4018/978-1-7998-7297-9.ch006

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

employees proved able to contribute as experts to their companies even after they had been threatened of being fired due to heavy economic weather. This finding serves as an important lesson, i.e. that there are ways other than the scientific method to turn personal motivations and objectives into resources. These ways include creating an HRM/OB platform for change that helps to link people. They make it possible to create structures that help individuals to achieve 'expert presence', i.e. expertise to deal with difficulties in the workplace in the here and now.

INTRODUCTION

HR Managers need to deal with a variety of practical problems as a result of the implementation of organisational change. Different ways have been adopted in the treatment of the topic in the academic literature and in education. In most studies the authors claim to apply the scientific method. Piderit (2000) for example identified staff attitudes, as positive and negative responses to organizational change, Lewin (1947) proposed the Force-Field Model and Kotter (2008; Kotter & Cohen, 2012) gave us an eight-stage guide. These examples present efforts to elaborate on the way Buchanan and Huczynski (2010) and Huczynski and Buchanan (2013) have looked at the subject. Other approaches include those of Burnes (2004) who advocated behavioural change and Schwarz and Stensaker (2014) who called for greater concentration on the change phenomenon rather than theory-driven change. Romanelli and Tushman (1994) focus on external influences on the way organizations function. Johnson et al. (2006) look closer at the role of culture in determining the successful or unsuccessful change outcomes. Agnew (2005) advocated changing the environment. Paton and McCalman (2008) and Rees and French (2013) focus on the cultural dynamics in the management of change. Additional material can be found in Kanter (2012) who called for organizations (and their managers) to become more competent. Buchanan and Badham (1999) and Pettigrew and McNulty (1995) focus on the important role people, power and politics play in the outcomes of the change management process.

A common characteristic from these literatures is that the debate is one-sided in terms of the addressees and the recipients, i.e., of those implementing change (i.e. organizations/employers/managers/change-agents on the Organizational Behaviour side) and those on the receiving side of the activities and actions (i.e. employees/staff on the HRM side). Usually only one point of view is explored (e.g., Ford et al.., 2008), who looked at the 'change-agent centric' viewpoint). Some researchers advocate for greater focus on change as a phenomenon and what practical forms of knowledge and understanding it could generate (Schwarz and Stensaker, 2014; Eisenhardt et al., 2007) whilst others propound theory generation or reframing (Burke, 2010; Suddaby, 2011; Hodgkinson, 2011). Golembiewski et al. (1976) examined the treatment of the subject from what has been referred to as 'technical' or, if one wills, scientific procedures that tend to objectify participants in the implementation and management of change. Kanter (2012) emphasises the centrality of employee learning, competency and skills acquisition. Other authors (Buchanan and Badham, 1999) focus on power and politicking as mediating variables between success and failure. Finally Piderit (2000) calls for 'ambivalence' in people's attitudes to organizational change.

Piderit (ibid) suggests that a different kind of treatment of organizational change is needed that goes beyond the rather simplified dichotomization of change agents and change recipients. This chapter takes a more complex view of organizational change to see what support is needed. An example would be the work of Kotter (2008) and Lewin (1947) who wish to treat managers as individuals. The type of support

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

developed in this chapter links technical/scientific and non-technical/non-scientific procedures. Adopting such an approach is expected to provide HRM professionals and OB specialists with an HRM platform that takes people's objectives and motivations into account to produce a different type of competence to what Kanter (2012) and Future Work Skills 2020 and their proponents advocated for as well as a different type of understanding as claimed by Schwarz and Stensaker (2014).

The chapter is firmly rooted in Human Resource Management and Organizational Behaviour education but a departure from Buchanan's and Huczynski's (2010; 2013) tradition. It explores the debates or 'old theories' in organizational change (see Hassard, 2013) and suggests that HRM and OB education and the literature could benefit by focusing on something missing; i.e. employees' motivations and objectives and what these could practically and theoretically contribute to the technical/scientific approach. It is also opined that doing so will help HR Managers become experts in their practical roles and that academic staff will develop greater expertise in research and teaching.

The above theoretical and educational debates frame the objectives of this chapter, which translate into research questions as follows:

1. Do employees play an active (or even expert) role in the implementation of organizational change practices?
2. What impact (if any) do organizational change practices have on the daily lives of employees?
3. What recommendations are there for researchers, student-learners and practitioners who investigate and want to develop their understanding and expertise of organizational change?

These questions form the basis for the investigative inquiry. In the next section the literature is explored that underpins the study reported in the next two sections. In the third section the research methodology, data collection and analytical processes are summarized, whilst the fourth section presents and analyzes the research/investigation's findings. The latter leads to the introduction of the concept of 'expert presence' and recommendations made on the basis of the experimental findings. The concept of 'expert presence' not only surfaces both the positives and negatives of organizational change as part of developing our understanding of the phenomenon but it also suggests what organizations, HR Managers and employees can do when personal objectives and motivations are taken into account. Concluding statements, including future research travel, are projected in the final section.

LITERATURE REVIEW

Technical Approaches to Organizational Change

This section explores and critiques technical approaches to organizational change with the view to see what has been missing in the debates and discussions. The most commonly cited examples of standard, technical/scientific models of organizational change are Lewin's (1947) Force-Field Model, Kotter's (2008; Kotter and Cohen, 2012) eight steps, Burnes's (2004) behavioural change or personal transitions that may be required to adapt to new procedures. All these authors and their followers were interested in looking at why change fails and what steps could be taken to resolve the difficulties. Some examples of major change failure over the years include Betamax, Pan Am, Swissair, Washington Mutual and Enron, to name but a few. Such academic and practical interests on the topic remain as current as they

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

were seventy years ago, at the time Lewin was making his proposals felt. The fact that these once-great organizations failed signalled that there was something fundamentally missing in the way they understood and managed their change practices. Below are three examples – the first two focus on technical/scientific approaches, examples of which are drawn from Lewin and Kotter and the final one looks at phenomenological resistance as an alternative (i.e. non-technical/non-scientific) approach given the limitations of the previous two. The differences between the approaches will be highlighted to see what support could be provided from the practical experimental findings to resolve part of the theoretical limitations.

Example One: Lewin

The first of three examples taken from Organizational Behaviour and HRM texts looks at Lewin's contribution as he is one of the key authorities on the topic area. In 1947 he came up with what he referred to as the 'Force-Field Model', one that can be used to analyze a society's or organization's readiness for change. The model is broken down into a three-stage procedure and discussed alongside what other academics and scholars have commented on the topic to see what is missing.

Lewin identified his first step as one where an organization needs to 'unfreeze' its members' behaviours and attitudes. He identified characteristics such as members having to unlearn or destabilize their old beliefs, attitudes, behaviours and an organization's culture needs to be rebalanced to new ways of doing things. He recognized that for an organization or society to bring about successful change there needs to be a rationale for change, providing organizational or societal members with information and employing people with the requisite skills to carry out the required tasks. He cited that this would entail a period of emotional disturbance and disequilibrium as members adapt to the requirements of new practices. To a certain extent, organizational or societal members could be experiencing shock to their system as leaders seek to communicate urgency and effect the new culture as part of the new practices.

Lewin claims in his second stage that the organization starts to transition or move onto the change phase as management try different procedures and implement the practices required. At the same time, management are also advised to take into account what is happening in their external organizational settings, note the approaches needed and evaluate chances of success. Whether they do might be another issue despite being targeted. Doing such groundwork is expected will facilitate organizations and their members to have the appropriate behaviours and ensure success. However, these actions need constant work and effort for the required behaviors to be embedded and for success to follow.

This is what Lewin refers to as the 'refreezing' stage when the change behaviors and attitudes are reinforced and stabilized. These become part of the institutional fabric. When this happens it could be claimed that the organization has a new way of doing things or a new order. This newness reflects the organization's culture, new practices, new values and norms. Cummings and Hues (1989) regard such transformation as pivotal to success.

Lewin and his followers emphasized the role the organization, the manager or society plays at the higher level. They deviated from the scientific procedure in focussing on interventions, but didn't specifically focus on individual contributions – such as motivations, objectives and preferences. What is needed is to explore what the role of individuals, i.e. their motivations and objectives could practically contribute in reversing the organizational change failure trend and rebalance the notions of resistance and cooperation in the theoretical debates.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Example Two: Kotter

In the second example, Kotter (2008) found an increase in the frequency and scale of change. Kotter proposed the eight-Step Model, which is designed to recognize the interlocking nature of the steps and the ways these are managed to deliver success. It is interesting to note that Kotter ruled out human emotion as part of his model although Richardson and Denton (1996) differ. This appears mainly attributable to the fact that both Kotter and Lewin used elements of the scientific approach. Their adaptations indicate that they were aware of some difficulties in doing so.

Step one of the procedure centres on management building a sense of urgency. Keeping the momentum, fostering collaboration and cooperation characterize this stage. It is assumed that data are available, that they are reliable and management can act on these to effect the changes. However, perennial organizational difficulties continue to wreak havoc on efforts. There are costs, dwindling material and non-material resources and the need to do more for and with less. In some management's quest to subvert what they term operational dysfunctionalities the anticipated change and the successes promised may come to naught. Although Romanelli and Tushman (1994) claim that external turbulence compels organizations to change, the scale and gravity of these on the internal organizational operations are not accounted for. Nor are people's reactions as part of the process. Alternative strategies such as research and development, performance management and leveraging these against competitors are recommended. However, the role that organizational members play in these dynamics are left out (Paton and McCalman, 2008; Hassard et al., 2013; Rees and French, 2013). Although the important role of culture is underlined, the grassroots' influence on outcomes is bizarrely left out by Johnson et al.. (2006). Studies seem to over-emphasize either the resistance or cooperation aspect in what scholars have acknowledged as inter-relational elements. Therefore a more holistic and more complex picture is required.

Realising the potential damages from resistance Kotter (2008) adds a second step. Building a coalition to implement the change is included. Kotter assumes that the group's formation will galvanize talent and create an appealing vision to employees and stakeholders (including customers or service users). Obstacles posed to change are overcome as management communicate the organization's new vision using a step procedure. Whilst Kotter proposes skills development, Kanter (2012) advocates that organizations (as entities) learn to become competent in change whilst Schwarz and Stensaker (2014) call for greater focus on the change phenomenon itself to see what it could offer. The extent to which individual employees at the lower level play a role in the new developments is downplayed at best or not commented on. Paradoxically, those who fear the changes should be empowered to carry the vision through as part of the next step. Significant omissions in this include the roles of culture, power and members' reactions (not to forget negative resistance), the very obstacles Kotter was poised to overcome by using elements of the scientific approach. Perhaps, the lack of tangible and measurable data in this area and the approach adopted could have accounted for his omission. Buchanan and Badham (1999) and Pettigrew and McNulty (1995) uphold the centrality of people, power and politics. Others still see the arguments as one-sided (Ford et al.., 2008) and therefore not representative of the complexities involved.

In relation to the chapter's topic it is important to highlight and recognize the contribution of different individuals. The four organizations studied show the need to talk about people, their motivations and objectives. Although the latter were constrained by conditions such as their employment, an economic downturn and the anxieties of future dismissal, they contributed to reshaping their organization's culture and its fortunes. The motivations and objectives of people need to be included in Kotter's, Lewin's and their followers' scientific and resistance-centric approach.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Other Approaches to Organizational Change

Example Three: Resistance

In the third example, Piderit (2000) reminds us in her seminal work of the role attitudes play to organizational change as a departure from the scientific approach and its teachings (also see Bouckenooghe, 2010; Procter and Randall, 2015). She highlights the complexity of the topic area and a shift from reifying people and what they could contribute. However, she also bemoans the over-emphasis scholars have placed on the role of resistance. Dent and Goldberg (1999) are an additional case in point. Researchers and practitioners who treat resistance as negative have reinforced the tradition started by Lewin (1947) although we have been reminded of its limitations. We are also aware of the potential limitations of an over-emphasis on theoretical postulations (Hodgkinson, 2011; Hassard, 2013). Finding alternatives means looking at different ways of reconceptualising resistance and whether this could be beneficial. When resistance is not perceived negatively, it offers possibilities. For example, Schultz et al. (2002), Nemeth et al. (2001) and Knowles and Linn (2004b, 2004c) have reminded us of the way resistance can be used as a resource to create awareness as part of the necessary support needed for change.

Scholars who treat resistance negatively view employees as barriers to change. People are reported as uncooperative and therefore need to be managed (see Watson, 1982; Bovey and Hede, 2001). However, other studies have revealed a different source for the difficulties. Management are perceived as the source of employees' resistance by treating employees initially as resistors to the change plans (see Merron, 1993). It is assumed that those with less power will try to oppose those with official power (i.e. management or 'change agent-centric' individuals (see Ford et al., 2008). Whether this happens in most cases as reported is yet to be concluded. Research into why people resist organizational change has also revealed that this could be explained by people's ethical beliefs rather than their own individual interests (see Milgram's 1965 experiments). Contrary to Lewin and his followers' claims, studies have recently demonstrated that resistance can draw management's attention to practical things that employees (as implementers of change), want to see addressed (Dutton et al., 1997). Whether the resultant actions benefit the organization and develops our understanding of the phenomenon is another thing (Schwarz and Stensaker, 2014). However, the assumption is that when not addressed, this creates further difficulties for HR Managers and OB specialists and others who seek to understand and address the complexities. A different type of support is therefore needed for HRM and OB specialists.

In their studies Brower and Abolafia (1995) and Spreitzer and Quinn (1996) emphasized the role that employees' inaction and management's leadership behaviors could play in creating resistance. This is contrary to Lewin and his followers' notion that people's uncooperative actions are conceptualised as resistance. Even when employees act against management's change initiatives these are perceived as impatience and emotional frustrations (see Coch and French, 1948 for earlier renditions). Piderit (2000) combined three approaches: the cognitive, the emotional and the intentional to study people's attitudes and report what she perceives as a more dynamic (and therefore complex) view. The cognitive element refers to people's beliefs or what they think about the change. The emotional pays attention to how people react to/feel about the change and the intentional centres on people's judgements and what they wish/wished to achieve. Given that people may show more than one attitude, Piderit proposed 'ambivalent attitudes'. By so doing, she combined positive and negative attitudes and signals a shift in the topic. However, she did not indicate the type of support needed or even whether these could count as resources.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Earlier studies tended to separate the approaches to attitudes and treated resistance to change negatively (see Eagly and Chaiken, 1998; Morrison and Phelps, 1999).

Ford et al. (2008) claim that resistance should be perceived by scholars and practitioners as something of value and that it creates a new conversation. However, others who are more sympathetic to the technical/scientific approach see it as a challenge (Kanter, 2002; Barrett et al., 1995). When new conversations arise they take the forms of complaints and criticisms (Carruth et al., 1985) or communicative behaviour (Skinner, 1991). It is assumed these help in highlighting the issues faced by members. To ensure commitment and success, members' freedoms should be ensured as they become part of their organization's decision-making processes. When there is a clash between members' personal values and those of their organization, engagement with the change processes is perceived to be expressed (Dirks et al., 1996). Elsewhere these are seen as conflicts that organizations ought to avert through appropriate communication and relationship-building mechanisms (Kotter and Schlesinger, 1979). Even when the initiatives are resisted by employees, it is averred that resistance assumes a value that could prove useful in developing the necessary resources.

Contrary to Piderit's (2000) and Dent and Goldberg's (1999) proposal to relegate resistance into the scrapheap, the author proposes that HRM and OB should value resistance and note its theoretical and practical contribution in highlighting people's objectives and motivations and the type of support needed in organizational change. Although Lewin and Kotter faced resistance in their treatment of change, they addressed it as something negative that needed to be resolved by using elements of a scientific, mechanistic or technical procedure. Developing something different means looking at three things: the contributions of management (as change implementers), the negative portrayal of employees as resistors to change and the contributions, the objectives and motivations of both employees and management as change agents and recipients. Doing so, shifts the emphasis from the dichotomised presentation of both groups of participants as either 'implementers' or 'recipients' and highlights additional issues that HR Managers and scholars need to (re-) focus their attention on. It is anticipated doing so will add to the much needed resources in managing change more effectively. Managers and employees would now be viewed as active participants to the organizational change and change management process (different from the one-sided recipient-presentation by Bartuneck et al. (2006) earlier)). The first two have been overly examined in the literature (see Lewin, 1947; Kotter, 2008; Piderit, 2000, and Ford et al., 2008 amongst others), the latter notion of 'active participants' has not benefited from such attention. What people contribute to organizational change, including their motivation to resist, need to be included in the scientific approach already developed by Lewin, Kotter, Dent and Goldberg and their followers.

The author reports below on his own investigation on constraints faced by employees and the ways they reacted to the difficulties caused by the scientific approach, elements of which managers used to try to resolve constraints to working practices. The author proposes to use findings from four case studies to explore what the third element can contribute to creating the necessary support (see the fourth section for the findings' contribution to the organizational change) for managers, student-learners and academic staff. This adds to the emerging literature on change recipients' development of capabilities as part of the support needed (see Lopez-Cabrales et al., 2006, for example). Whilst Meyer and Stensaker (2006) and Stensaker and Meyer (2011) looked at the attitudes, experiences and reactions of employees to multiple organizational changes, the current chapter examines the motivations and objectives of employees as they collectively contribute to liberate themselves from the constraints and bring about successful organizational change. Building on from the earlier work of Meyer and Stensaker (ibid), the chapter identifies both the positive as well as the negative reactions of employees and combined these with em-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ployees' motivations and objectives in a concept referred to as 'expert presence'. It appears important in bringing about collective organizational change in a way that is different from previous studies that have examined the subject in dichotomized terms of change agents/implementers (i.e. management) and change recipients/resistors (i.e. employees) by using either technical/scientific procedures, by perceiving resistant employees as a problem or, in other words, a drain on necessary resources or by focusing solely on theory generation (Burke, 2010; Suddaby, 2011; Hassard, 2013) or practical relevance (Eisenhardt et al., 2007; Schwarz and Stensaker, 2014). When this happens what drives people to contribute (i.e. their capability to be a resource) becomes lost. The findings and the concept of 'expert presence' are intended to help HR Managers become experts in identifying when conflicts and resistance are becoming destructive and what needs to be done to reverse the damage. It is also anticipated that academic staff become experts in the evolving research and teaching issues of organizational change. The methodology that informs the current chapter is examined next.

METHODOLOGY

The author conducted interviews with employees and managers whose organizations were experiencing difficulties and undergoing change in the UK. Managers were tasked with implementing the necessary changes and therefore fitted the predominant theoretical description of 'change agents' (see Ford et al., 2008). Two data collection points were carried out, the first in 2004/2005 and the second in 2011 to address part of the shortcomings of data sufficiency in this area as well as check the impact of the change phenomenon (see Schwarz and Stensaker, 2014) on potential theoretical generation (Burke, 2010; Suddaby, 2011). In the first set, that is prior to the banking crisis of 2008, the author asked participants what changes were introduced, by whom, what was the nature of the changes, how they were introduced (e.g. by 'change agents') and reacted upon (e.g. by 'change recipients'). Four organizations that had to respond to market pressures, satisfy customer demands and government legislative changes to the delivery of services such as care and housing agreed to provide materials for the case studies. Participants were distinguished as managers and employees to provide clarity in their roles, to identify what they contributed to the new requirements, and to see whether they fitted descriptions from the literature (Lewin, 1947; Kotter and Cohen, 2012) or whether additions are required in line with Burke (2010), Hodgkinson (2011), and Hassard (2013). Sixty-eight interviews were conducted in the first round, seventeen in the second. The second set of interviews asked what each organization did subsequently, what the nature of the working relationships were between the two groups, what the objectives were and how these influenced the changes. In 2004/2005, seventeen interviewees were conducted on average per organization with the following breakdown: Bakkavor-Lauren's Patisserie - ten employees and seven managers, Longhurst Housing - ten employees and seven managers, Eden Housing - ten employees and seven managers and Lagat -ten employees and seven managers. Participants and their companies relinquished anonymity. Each participant was given the opportunity to elucidate on their objectives to see whether these added anything. Some did others chose not to via their statements. The responses/statements were treated as ways people saw the changes, the constraints imposed and what they articulated as their objectives. These had the benefit of providing rich data, insightful knowledge on each of the four organizations' working practices, how people responded to the demands and enhancing the emergence of potentially new ways of understanding and managing change (see also Tavana, 1998). Generalising the findings to other cases could be problematic as contextual variables may apply.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

With the assistance of two other researchers the author wrote down all the themes from both datasets, checked these with the two assisting researchers, agreed what themes were dominant based on their recurrence and named each of the categories in stages as reported hereafter. The categories fitted and were then reported in six stages. These were narrated and their narrative followed a story-like format. Each stage of the narrative showed the development of how participants responded to constraints as a result of the technical approach and the reification used. The technique via which the themes were derived has been referred to in the literature as recursive abstraction following the hermeneutics tradition (Alvesson and Skoldberg, 2000). The findings demonstrate the differences in the ways employees and managers reacted to their reification and to people's motivations and objectives in shaping change.

Empirical Data From Four Organizational Cases

The specific organizational-type difficulties and changes in the four companies were as follows. In 2004/2005 Longhurst was coming under intense pressure from government to improve its housing stock and facilities, to provide more affordable homes and to comply with UK housing legislation. They introduced more one-to-one staff supervisions as well as encouraged team and mobile-working. By 2011 supervisors were conducting appraisals and using measurements to closely monitor performance.

During the first interview round, Lagat's services of providing guidance and counselling to young adults were increasing. This was at a time when the human resources to deliver such services were thinly stretched out. Employees were having to work long hours thereby increasing their workload. The organization set up additional skills training to cope with the new demands and identified areas for further development. In 2011 staff were additionally stretched as workforce numbers had gone down owing to a merger and redundancies for acquired Connexions staff. The parent company, Lagat faced additional pressures such as government's funding cuts, lack of business opportunities and covering a wider geographic area. They responded by asking staff to embrace digital working and closer scrutiny.

In 2004/2005 Eden Supported Housing was run as a family-business. Management and staff worked cordially and patients with learning and physical disabilities were supported. They were responding to providing affordable care to those within as well as off their premises. The level of care quality was also scrutinized closely. On the author's return in 2011, the organization had been bought by a business firm whose priority was to streamline operations and maximize profits from existing and new business ventures. Managers were tasked by the parent company to be more business-like in their service-delivery and monitoring. This included having to monitor patient numbers and welfare according the Care and Quality Commission guidelines.

When the author initially visited Laurens-Patisserie in 2004/2005 it was family-owned. The company made and sold cakes to local supermarkets and families for over two decades. Increasingly, the company had to work hard at integrating different ethnicities and nationalities including Iraqis, Afghans, Africans and other people from Eastern Europe and South Asia. There was also an increasing demand from local supermarkets to slash costs. By 2011 supermarkets wanted nutrition labelling on all products. The organization responded by training additional staff for Health and Safety, increased health inspections, introduced an additional shift of workers and monitored production and quality. The organization has also been bought by Bakkavor, an Icelandic-based company, whose emphasis shifted to profit maximisation, an increase in managers and employees' responsibilities and contributions. All were expected to cut down on waste and create shareholder value.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Whereas Lewin (1947) introduced three stages and Kotter (2008) proposed eight the author identifies six stages (from the experiential data or, if one wills, from the phenomenon as proposed by Schwarz and Stensaker, 2014). Developments from each of the practical settings highlight employees' 'expert presence' as part of a demonstration of what happens when people's objectives and motivations are taken into account. When combined the stages tell a story of the complexity of ways that employees and managers adopted their 'expert presence'. The latter's characteristics are argued to be a necessary addition to the technical or scientific approach propounded by Lewin and Kotter and helped in reframing the theoretical debates in the area (Hodgkinson, 2011; Suddaby, 2011). The technical methods adopted were found to reify what people did as the phenomenon evolved in each of the six stages. The notion of 'expert presence', generated from people's contributions, describes a variety of employees' subjective experiences and objectives to the technical/scientific procedures managers thought would alleviate the constraints of change. The concept is different from the traditional observational and representational form of research in which people's feelings and subjective perceptions are represented as objective/reified entities (similar to the technical/scientific approach). 'Expert presence' makes it possible to feature people's objectives in a six-stage process (see next section) and provides an outlet for current and future HR Managers and student-learners to identify when conflicts and resistance become destructive thereby triggering practical action.

Stage 1

This stage saw managers in each of the four organizations recognizing the need to address the constraints. They started to introduce new customs, new ways of working and demanded that employees adhered to the requirements. Managers realized from early on that they ought to begin to ask employees to be disciplined and to meet the challenges if they were to continue in jobs in the longer term. Managers also started asking their staff to work in teams in order to carry out what employees saw as an increase in their workload as tasks became more diversified and monitored compared to prior to the organizational changes. A breakdown of what each job role did, in which of the four participating organizations and at what point in the data collection stage (2004/2005 or 2011) is reported to show contextual differences, the techniques used and levels of or lack of support as follows.

In 2011 a senior manager at Lagat said: 'management put up an away day to break barriers between teams; we also arrange weekly then monthly meetings for people to see what others are doing...' Another manager in the same company added 'I also develop programs as government funding and opportunities arise, working in partnership with organization s to maximise opportunities (with our collaborators such as Lincoln College, Action for Employment (A4e), Jobcentre Plus etc).' The Business Advisor said '… we used to work independently whereas everybody has talents we can pool together in a team.' A Senior Training Officer mentioned 'we…have Lagat Days and we talk about the company training plan... All new staff are encouraged to do the key skills they require.'

At Eden the HR Manager remarked 'we are working with people with more complex needs, we are growing geographically with an ambitious growth plan while managing the cost plan, so doing more with less resources, introducing new projects in certain strategic places; each of those projects is multi-tasked, for example the Health Care Manager and Team Managers are managing staff and delivering frontline support…a lot of managers are having to work round the clock, regional managers have to pick up one-to-one (i.e., supervision) with staff, changes will ensure we are leaner and more efficient…'

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

An employee at Lagat remarked 'there's a lot of cross working, a lot of cross function work that goes on in departments around disciplinary issues...'

The Head of Construction at Longhurst said 'there is a policy for every manager to meet staff once every month; it's a download session really, they talk about jobs on site, with end users, how they are working, if it doesn't work we think of alternatives, to get the best solution…' The Quality and Information Manager at Longhurst noted 'in the next three-five years…there will be more conflating of work… We try to be more effective. Previously…the last two companies (Friendship Care and Spire Homes) had 2 IT systems…there will be better returns on investments…' An employee said 'until recently we have been financially stable but there's increasing recognition we have to compete, to be cost effective and to be able to grow. Government grant aid has been cut, so the only way to grow is to be leaner and meaner so that we can borrow more and build more...'

The Systems Manager at Bakkavor noted the following changes in working practices: 'The change was driven by becoming leaner, to measure ourselves, train personnel and a need to drive down labour costs to make maximum profits… The previous management team has been scrapped. In a similar vein, the way we quantify all the processes have changed. For example information and manufacturing processes have changed, technical staff [Technical Assistants] have been increased, factory operatives have decreased, but there has been more management staff, more quality assistants, more health and safety staff…'

Stage 2

Managers started to inject more disciplinary measures into their organizations having realized that previous efforts to use the scientific approach had failed. Employees did two things simultaneously: they showed signs of being disciplined by reporting and leaving work on time, carrying out their responsibilities whilst finding additional ways not to be cowed by the technical measures. They did so by occasionally reporting late for work or sometimes failing to do so and providing countless reasons for their tardiness. Managers began to despair at the ways employees were talking to each other and bringing in unofficial methods to get their work done. HRM and Health and Safety procedures and policies were being side-lined as employees interpreted the rules managers had put in place to suit their own work and personal circumstances. They started to find more intelligent ways to work round the proposed organizational changes.

In 2004/2005 employees at Eden talked about 'making work arrangements less strict' or if one wills, less scientific/technical and 'erasing job boundaries'. Staff at Longhurst noted that jobs were given 'verbally to a team in the ICT Department…This is informal as opposed to laid-down (HRM) policies and procedures… Staff devised their own ways of conducting daily operations.' In a similar vein, Lagat (formerly Prospects) staff at their Lincoln office talked about adopting 'working practices which were at odds with their London counterparts.'

Stage 3

Managers started to identify what they termed 'new strategies' to engage their employees more as they realized the resistance generated from their earlier draconian, scientific measures was damaging progress. Employees saw these measures as 'hard'. Managers identified values such as organizational effectiveness, value for organizational gain, sustainability, organizational survival and so on which they thought employees could easily assimilate into. However, employees felt they have been treated in a disrespectful and objectified way. They started to develop their own communication methods as a way not to talk to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

their managers thereby creating a two-tier communication system. To make matters worse, managers insisted that employees should report their actions (or inactions) to their Line Managers/Supervisors. Failure to do so was judged by management as acts of sabotage and that employees were not wanting to cooperate. Employees began to explore additional ways of institutionalising structures that work in the organization's favour and interests. Managers tried to reinstate 'hard' procedures, measures and structures.

Some employees talked about 'undergoing a lot of pressure and job stress' simply because they were having to be compelled by managers to 'meet the daily targets' and to bow to shareholder demands of boosting profitability because 'shareholders have the power' in Laurens.

Stage 4

Employees increasingly engaged other employees to fight against the 'harsh' management strategies. They began to take up additional roles whilst managers emphasized that employees needed to stick with their official responsibilities. This they thought would facilitate monitoring and supervision of staff outputs. When employees sought to be more entrepreneurial, managers introduced what they saw as further bottlenecks in the work of Dispatch, Health and Safety, Cleaning and Production staff. When the latter failed to comply managers became despondent and increased the monitoring mechanisms. Employees began to feel that they have discovered a new sense of personal dignity outside of the technical procedures. Managers introduced quality checks and increased the number of and heightened the role and responsibilities of quality teams and customer services. Managers thought their implementation will boost the cooperation between the parties. The counter-effect was achieved in Eden as employees viewed such a move with cynicism and full of technical elements.

In the 2011, the Quality Manager at Longhurst remarked 'We have residents' scrutiny panels who look at our customer service. Residents are engaged and quite involved in retendering contracts and that has been good' (i.e. in improving our services). Another said 'we have always had housing officers who engage with the local community…the expectation to engage with people…'

At Laurens and Eden employees started to seek for a second point of view different from what was going on in Longhurst who engaged with their local communities for such second viewpoints. One employee remarked 'people would say: 'we used to do this and that together' as employees) whilst it was becoming practice for 'junior support staff at Eden to confide to trainers' for a second opinion different from managers' technical ways.

Stage 5

Employees initiated the development of sub-cultural groups which they thought would provide the necessary support for other employees affected by managers' strategies and desires. Employees began to identify tasks which they were collectively good at and started to work more closely with others in other departments to make their effect and employment power on management more pronounced. They increasingly would not report their actions to managers but to each other. They began to stimulate each other to be more productive and effective in dealing with management's 'harsh' strategies. Managers started to backtrack on some of their actions and emphasized their personal power as a cushion against the backlash.

In 2004/2005 an employee at Laurens said 'managers and the proprietor of the business have a lot of power here. The proprietor owns the land.' Employees observed that managers' responses in resolv-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ing the change implementation issues were not sustainable and they started to question management's competence in managing the change process in the longer term. Lagat employees doubted whether their managers' could see the sustainability of providing educational and counselling services to younger adults in the future whilst Eden employees viewed with cynicism managers' sudden drive to increase value for money in every service.

In 2011, an employee at Bakkavor said 'I want to have responsibility... I manage my function and I get on with it… I would like to…develop towards a broader role…and then have a more strategic role… in another Bakkavor site…' Others mentioned 'learning to appreciate the work demands on each other's role through support for each other…'

An employee at Eden remarked 'it's about developing a positive attitude, enhance team working across departments and develop…'a very 'can do' approach. There's a lot of cross working, a lot of cross function work that goes on…Cross departmental working is appropriate…'

Along similar lines, another employee at Eden remarked 'more is expected; managers are less visible, because they have more work to do…as an employee I used to go to people and say 'can I help with something'…'

Stage 6

By stage 6, employees were increasingly behaving as if they were influencing their organizational change. They were putting what they thought were the appropriate strategies to respond to the constraints and successfully. They were cognisant of their value and in what they could do. They started to encourage others to be more supportive and to be competent. One employee made the following comment 'we at Laurens are self-supportive' whilst another said 'I think more communication is required at Laurens because of the high turnover rates' whilst another said 'management at Lagat need to be talking to staff informally.' This stage witnessed employees' growing confidence in their abilities to make their motivations and objectives felt when managers were trying to fight off their resistance by using technical procedures. Paradoxically, managers realized that employees were becoming more competent in their roles as change implementers and said that 'jobs are allocated based on responsibilities at Eden'.

The story of these six stages has shown that when managers were implementing wide-scale organizational changes as 'change agents', employees were increasingly showing signs that were akin to positive and active participants. Their actions suggested a reversal of roles as they took the role of 'change agents' as they displayed behaviour that suggested they had the welfare of their organizations to heart. They demonstrated that they could be innovative even when they came across management barriers and power that incited resistance. Such developments are composed of people who come together in a collective effort to defy the constraints that included treating staff as objects of change. This type of development is what has been referred to as people having 'expert presence'. Its contribution to the literature, its practical benefits and how it was developed from the six stages are discussed in the next section.

DISCUSSIONS

'Expert presence' highlights six steps that help in including individual objectives, something that is not mentioned in the type of cooperation that Lewin's three or Kotter's eight steps, the resistance literature from Dent and Goldberg (1999) or the competency and cross-cultural frameworks that Kanter (2012)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and the Future Work Skills 2020 intended to achieve. Employees showed that they can channel what they wanted done in a stage-by-stage process that provided the practical support needed for organizational members. The author therefore challenges the interpretation of (societal and organizational) change as initiated by people in leading roles, e.g. managers (including Chief Executive Officers), democratically-elected or self-imposed individuals and so on. This view is particularly inherent in some of the well-known proponents and scholars of social change (Lewin, Kotter) and also in that of people who may avail themselves the opportunity to use the results of applying the technical/scientific method. In the author's view, it is advantageous and even responsible to stimulate those implementing social and organizational change to not only contribute to the formulation of the objectives but equally importantly to the identification and appropriate use of the resources needed for the specific type of change. This is fundamental especially in paradigmatic-type change similar to the ones described in the four case studies here. The data from the cases show that employees of organizations that had to change as they faced situations that posed serious threats to their existence contributed in terms of identifying the necessary resources to avoid their organization's demise. This type of contribution is referred to as having 'expert presence'. It will be beneficial for future HR Managers and the HRM and OB student-learners to be able to recognize characteristics of such expertise and to develop similar attributes so as to help their future organizations manage change successfully and responsibly.

In addition to the literature the story that emerged from the responses seems to balance the notions of resistance (see Piderit, 2000; Dent and Goldberg, 1999) as well as cooperation by showing a variety of other ways managers have identified what was needed and how they reacted to the changes. Lessons for scholars, student-learners and practitioners are derived from reflections and discussions on the findings and include the following. Employees cannot simply be viewed as passive recipients as shown with the traditional technical/scientific approach whereby resistance to change is identified, reified and dealt with through standard HR and OB procedures. The emerging story shows the springing up of new organizational heroes and heroines who are different from those advocated by Lewin, Kotter, Buchanan and Huczynski. Teaching change management in the traditional sense in HRM and Organizational Behaviour has been shown in the four cases to have woefully failed in motivating and inspiring their employees at the grassroots. The latter had to innovate and create working practices that not only helped in making the organizational changes to stick but to enhance their organizations' continuous survival (Argyris and Schon, 1996). The findings show that HR Managers and student-learners need to become aware of the complexities involved in identifying objectives when they instantiate organizational change processes and procedures. The findings from the four cases also show that employees, students as well as managers need to be aware of the potential pitfalls and develop capacities to manage these.

The six stages demonstrate that individual motivations do matter in successful organizational change. When managers isolated themselves as part of their fightback to resistance (see stages three and four), this tactic seemed to have worsened resistance. Employees showed they were additionally strengthened as they identified the need to build sub-culture groups and strategize to 'save' their organizations from elements of the scientific approach used by the managers as originally designed by Lewin (1947). If employees had resisted (see stage five) and not shown expertise (see stage six) this could have led to organizational failure. The case has therefore been argued, using the data and the literature for people's motivations to be part of change management procedures (technical, non-technical, resistance and 'expert presence'). The chapter has successfully made the argument for rebalancing the notions of resistance and cooperation in the teaching of Organizational Change within HRM and OB.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

An additional lesson for student-learners is that resistance has to be researched and taught by academic staff not as something negative that HR Managers need to deal with/manage in line with traditional management literature but as part of the resources that people contribute to organizational change. This marks a significant departure from its earlier treatment (see Lewin, 1947; Coch and French, 1948; Armenakis et al.., 1993; Kotter, 2008). In other words, employees' exhibition of a range of reactions and motivations should provide the platform for HR Managers to learn about the nature of the constraints, its sources (e.g. clients, patients, suppliers) and how to deal with these in a responsible way (i.e. in a way that serves the collective good). Employees were responding to pressures externally (Romanelli and Tushman, 1994) as they simultaneously were changing their behaviours based on the internal change phenomenon (see Schwarz and Stensaker, 2014). Therefore the teaching and researching of organizational change should not be dichotomized by academic staff as presented by Ford et al.. (2008) or treated as 'ambivalent' (Piderit, 2000). This answers the first research question on whether employees do play a role in change.

The results from the six stages have shown that when HR Managers are faced with the responsibility of balancing their personal and official power with staff, they tended to fall back to the traditional, technical approach to deal with staff (French and Raven, 1959; Agnew, 2005). The lesson for student-learners here is that HR Managers need to be aware of when their power can be used irresponsibly at their organization's detriment and to avoid destructive conflicts and resistance from the shop-floor. HR Managers should listen to people as they drive change with staff. Employees have shown they can upskill themselves, take on additional workloads and adapt to internal and external pressures. This has answered the second research issue on the impact of organizational change on the daily lives of employees. The notion of 'expert presence' responds to the third research question on investigating other approaches to organizational change other than the predominant technical approaches in the tradition of Lewin (1947) and Kotter (2012). This type of organization is different from the upskilling, the organizational competence claimed by Kanter (2012) and the cross-cultural competence propounded by the Future Work Skills 2020. What the four cases demonstrate is that teaching, researching and learning about change should recognize a more bottom-up approach to organizational change, referred to fittingly as 'expert presence'. When all parties develop expertise in this area, it limits the practical destruction that would have been caused had elements of the scientific approach continued to be used. The notion is informed by the change phenomenon as advocated for by Schwarz and Stensaker (2014) and still satisfies the quest for rethinking and reframing emerging notions in the area (Burke, 2010; Suddaby, 2011; Hodgkinson, 2011; Hassard, 2013).

From 'expert presence' employees showed that resistance could be treated by HR Managers as a positive development contrary to earlier claims by Dent and Goldberg (1999) or Coch and French (1948). It shows employees are prepared to work round impositions and control from their managers (Felstead et al.., 2003) by becoming more active in identifying groups, structures and practices that bring about successful change. Managers should learn ways of using buffer positions created by staff to increase the value of their contributions as 'change agents' and 'change resistors'. 'Expert presence' made it possible to surface (via the six stages) and refer to the idea that staff may contribute individually and collectively by trying to become 'expert' at what they do and to do so by being present (i.e. being there (at the time and place of the change). The latter may be contrasted with the position of an external researcher who acquires knowledge or, if one wills expertise, without being there and hence is unable to include personal objectives and experiences in the knowledge and expertise acquired. It is envisaged that 'expert presence' enables managers and researchers to deal with the inadequacies of the scientific/technical procedures by capturing the increasingly complex nature of organisational change. 'Expert Presence' has made it

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

possible to allow for the identification of complex and, sometimes, difficult behaviors as well as how better to respond to the difficulties and complexities. HR Managers should learn that an increase in command and control structures using the scientific approach might serve to create unintended consequences of staff resilience and destructive conflict and resistance to organizational change. It behoves of management to deal with change issues more sensitively and responsibly and to develop managerial expertise in stimulating 'expert presence' contrary to earlier claims by Dent and Goldberg (1999) and Golembiewski et al. (1973). Such 'expert presence' is achieved when managers are supported to understand the limitations and potential pitfalls of using the outcomes of the technical/scientific method. The findings demonstrate that both managers and employees need to work together to formulate objectives and collectively identify the organisational resources needed to bring about effective change.

However, the question needs to be asked 'what happens when all employees develop 'expert presence'?' What the findings demonstrate is that some employees have identified the appropriate resources that helped in building their 'expert presence' which they then used to facilitate their organization's successful change. Some might argue that this initial expert group could be used to develop or enhance the expertise of all employees so that organizational change failure becomes a thing of the past. This could then cut down drastically on an organization's costs of having to hire change management experts/consultants, having to deal with resistant employees, resolving conflicts with trade union representatives and so on. Others might argue that paradigm shifting types of change as the ones captured in the four organizations need to celebrate the complexities and varieties of interactions involved. These include the cooperation, the resistance, the conflicts and the varieties of activities and behaviours such that current and future HR Managers and student-learners can deepen their understanding and knowledge of the shifting contours of the change phenomenon and be equipped to do something practical about it. Total 'expert presence' might stifle such kaleidoscopic presentation and the need to reframe and rethink the debates over time. Whatever the case, some 'expert presence' may help towards resolving some, if not all, of the resistance, the conflicts and unintended consequences that these might bring had the notion and its benefits not been surfaced and explained.

RECOMMENDATIONS

This section provides recommendations for HR Managers, academics and student-learners based on the findings and the lessons from the previous section as follows. It is recommended that current and future HR Managers take a more complex and comprehensive view and understanding of what employees do when challenged to adopt new ways of working rather than be restricted by and to the adoption of the scientific approach. As observed from the findings, doing so will wreak more havoc and destruction to change efforts and expertise. Based on the principal research outcome of 'expert presence', HR Managers, OB specialists and student-learners ought to recognize early signs of resistance and conflict and to guard against their negative consequences among shop-floor and others. Taking greater responsibility of management's actions is a starting point towards such change in managerial attitude and behaviour. This can be done by current and future HR Managers developing the capability to identify various stages of staff resilience as well as being able to act responsibly and at an early stage. When they do, they can utilize these apparently negative elements as knowledge from the grassroots to effectively deal with negativity within change environments. Additionally, it is recommended that HR Managers develop

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the capacity to identify those objectives that motivate staff to be resistant and what inspires them to be creative as a bottom up approach to enhance individual and collective expertise to change.

It is recommended that HRM and OB students recognize from the data that organizational change is instantiated by multiple members, not just solely by 'change agents' or 'change recipients' as portrayed in the extant literature. It is recommended that students view top management not distinctively as 'change centric' people who are out to 'save' their organizations but as participants in a process of developing expertise for everyone. The findings show that sometimes their actions might be as counter-productive as the change resistors they had initially intended to deal with. It is recommended that students are aware when destructive elements need to be treated more responsibly as upcoming HR Managers.

Academic staff could use the case study approach as one way to bring out the richness of change management issues in a complex and holistic manner in contrast to the rather simplified renditions of the topic from the technical/scientific or non-technical approach. Doing so will help to rebalance the debates and discussions on organizational change by portraying the and to show expertise in the process of teaching and researching its elements. The initial findings have shown that employees took charge as 'change agents' and made the required changes in working practices happen successfully. Referred to as 'expert presence' it is recommended that participants recognize each member and their objectives and motivations as a resource that could be pooled together for organizational benefit. When this happens, academics will be seen to be allowing for the identification and theorizing of a more complex and varied set of people's attitudes, motivations and objectives especially in environments that are controlled, constraining and difficult to manage. It is recommended that HR Managers see their role as one that enhances a more liberating environment where everyone is willing and capable to contribute to. It is also argued to be mindful of some of the potential pitfalls of trying to make all employees have 'expert presence'.

We (academics, non-academics, society) should recognize the limits of using the technical/scientific approach to organizational change and be prepared to explore less mechanistic procedures that enhance innovation and creativity from the bottom up. Resistance or elements therein could then be used to develop the capacity and expertise to change for the better. 'Expert presence' made it possible for people's points of view to be made to count in ways that they thought are more liberating than the scientific approach that sought to objectify what they did.

CONCLUSION AND FUTURE RESEARCH STUDY

In conclusion, the chapter has looked at two different approaches – the technical/scientific and the non-technical/non-scientific approach to organizational change. It is opined that both approaches have informed and been informed by HRM and OB education and literature over the past seventy years, especially since Lewin (1947) proposed his Force Field Model. It has also been shown that HR Managers make use of the predominantly technical approach when they implement and manage organizational change although with limited success as this has been shown from the literature and the findings to constrain what people want to do. When the procedures reported in Example One are noted to result in the reification of people's motivations, employees are blamed for being 'anxious', uncooperative and resistant (see Dent and Goldberg, 1999). These characteristics are perceived as negative 'barriers' or 'resistors' to change and Kotter (2008) proposed that Managers adopt the eight steps to deal with the problems caused. When employees still fail to cooperate tougher measures from the scientific approach are recommended as shown in Example Two.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Over the past seventy years, HRM and OB education and its literature have paid much attention on two principal actors dichotomized as 'change recipient'- employees who derail change efforts and 'change-centric' managers who are perceived as having the requisite competence to deliver successful outcomes (Golembiewski, 1976). The past decades have also witnessed the polarization of the debates between theory generation and phenomenon-informed change (Kotter and Schlesinger, 1979; Piderit, 2000; Eisenhardt et al., 2007; Burke, 2010; Schwarz and Stensaker, 2014). When the procedures of the scientific approach fail, others have proposed additional measures such as dealing with organizational politicking and using managerial power (French and Raven, 1959; Agnew, 2005). It is assumed these would quell employees' resistance and enhance what people contribute (Buchanan and Badham, 1999). Research results still show that organizational change fails as resistance or identity-affiliated resistance continues (Mahadevan, 2012) thereby shifting the contours of the phenomenological experience and how it is managed (Stensaker and Meyer, 2011). This has ushered in Example Three. To resolve the problem of resistance that HRM and OB education and literature might have benefited from Schwarz and Stensaker's (2014) call for 'straightening' the tightness of the proverbial theoretical 'jacket'. However, this does not guarantee that the anticipated organizational success will follow or that all employees will have 'expert presence'. In other words, it is not a guarantee that managers will convert resistant employees into overnight cooperating individuals with 'competence' to deliver successful change (Kanter, 2012). Or even that managers are aware of the destructive nature of their resistance-fuelling technical procedures. The imbalance between cooperation and resistance and sometimes lack of theoretical development has continued in HRM and OB for longer than is necessary.

What the six stages from the findings have shown is that HRM and OB education and its literature need to embrace something new, something that balances the notions of cooperation and resistance, serving both as a lesson and a set of practical recommendations. This is 'expert presence'. In terms of its operationalization, it would firstly be beneficial for academics and practitioners to recognize and incorporate in their teaching and practice that employees also have objectives just as organizations and their managers have objectives. Managers need to recognize and work with employees' objectives if they want to effect successful change. Using their power and influence alone (French and Raven, 1959) and falling back onto technical/scientific procedures have been shown not to provide the answers to bring about the required outcomes. Managers, future HR Managers and student-learners can use the six stage-story as one way that will help them to see how employees who found themselves in difficult organizational situations that had been brought about by the need for their organizations to change have channelled their objectives (including their motivation to resist) to provide support to each other in difficult change situations. Employees have demonstrated that they could re-develop their contributions contrary to parts of the technical and resistance approaches. These motivations and objectives have been played out by using the six stages and the arrangement produced 'expert presence'. The notion highlights what individuals and collectives can do as they resist imposition and mitigate against the negative impacts on their physical, emotional and mental wellbeing/wellness at work. The literature is vocal on employees' attitudes and reactions to change but silent on what motivates people to develop objectives perceived as resistant behaviours. The empirical data demonstrate employees took up active roles, adapted their objectives and made change work. This is a grassroots perspective different from the higher up/managerial, organization or societal-wide perspective.

The benefits of 'expert presence' are that it makes it possible to talk about and theorize instances where and when people are able to identify certain inappropriate interactions, constraints to their psychological and emotional development and to fight against/resist the predominant extant literature's

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

notions of employee frustration (Coch and French, 1948) or their 'discontent' (Graham, 1995: 220) or their anxiety (Argyris and Schon, 1978) or their 'un-readiness' (Armenakis et al.., 1993). It is recommended that managers use employees' objectives to support each other and to effect positive change. The operationalization of the concept via the story has also helped to answer the second as well as the third research question on 'the impact of change on employees' lives' by showing that even though there was a negative environment employees transitioned the negativity into something positive, proactive and supportive.

Academics should recognize that through research employees' actions and behaviours, HRM systems and the workplace can be combined and their combination via a series of steps/stages can produce a platform. Such a combination gave rise to 'expert presence'. This has demonstrated the potential of using experimental material from the findings to forge a more complex understanding of the issues raised and the objectives of people within various organizational change environments compared to the limited possibilities provided by the technical and resistance approaches. The findings show that the models proposed by Lewin and Kotter and the propositions made by Schwarz and Stensaker (2014) and their followers need further revisions and applications in order to provide the necessary expertise for successful and liberating change. The first step in doing so has been proposed through the recognition and contribution of 'expert presence' which serves to highlight the ways employees adapt their motivations and objectives to bring about a practical supportive structure and environment that could enhance successful change. A further study could look at how 'expert presence' might be resisted in other similar SMEs, what the nature of that resistance might look like, the nature and characteristics of developing total 'expert presence', any potential resistance to this and ways how these emerging characteristics and issues could be used to inform HR Managers and employees of other possibilities of change implementation and management. From such further research additional recommendations can be made to HR Managers, academics and students on alternative approaches of implementing and managing change…

REFERENCES

Agnew, J. A. (2005). *Hegemony: The new shape of global power*. Philadelphia: Temple University Press.

Alvesson, M., & Skoldberg, K. (2000). *Reflexive Methodology: New Vistas for Qualitative Research*. London: Sage.

Argyris, C., & Schon, D. (1978). *Theory in practice*. San Francisco: Jossey Bass.

Argyris, C., & Schon, D. (1996). *Organizational Learning II: Theory, Method and Practice*. Addison-Wesley.

Armenakis, A. A., Harris, A., & Mossholder, K. W. (1993). Creating readiness for organizational change. *Human Relations*, *46*(6), 681–703. doi:10.1177/001872679304600601

Barrett, F., Thomas, G., & Hocevar, S. (1995). The central role of discourse in large-scale change: A social construction perspective. *The Journal of Applied Behavioral Science*, *31*(3), 352–372. doi:10.1177/0021886395313007

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bartunek, J. M., Rousseau, D. M., Rudolph, J. W., & DePalma, J. A. (2006). On the receiving end: Sense-making, emotion and assessments of an organizational change initiated by others. *The Journal of Applied Behavioral Science*, *42*(2), 182–206. doi:10.1177/0021886305285455

Bouckenooghe, D. (2010). Positioning Change Recipients Attitudes toward Change in the Organizational Change Literature. *The Journal of Applied Behavioral Science*, *46*(4), 500–531. doi:10.1177/0021886310367944

Bovey, W. H., & Hede, A. (2001). Resistance to organizational change: The role of cognitive and affective processes. *Leadership and Organization Development Journal*, *22*(8), 372–381. doi:10.1108/01437730110410099

Brower, R. S., & Abolafia, M. Y. (1995). The structural embeddedness of resistance among public managers. *Group & Organization Management*, *20*(2), 149–166. doi:10.1177/1059601195202005

Buchanan, D., & Badham, R. (1999). Politics and Organizational Change: The Lived Experience. *Human Relations*, *52*(5), 609–629. doi:10.1177/001872679905200503

Buchanan, D. A., & Huczynski, A. A. (2010). *Organizational Behaviour*. Pearson Education.

Burke, W. W. (2010). Organization Change: Theory and Practice (3rd ed.). Sage.

Burnes, B. (2004). *Managing Change: A Strategic Approach to Organisational Dynamics*. Pearson Education.

Carruth, D., Middlebrook, B., & Rachel, F. (1985). Overcoming resistance to change. *S.A.M. Advanced Management Journal*, *50*(3), 23–27.

Coch, L., & French, J. R. P. Jr. (1948). Overcoming resistance to change. *Human Relations*, *1*(4), 512–532. doi:10.1177/001872674800100408

Cummings, T.G., & Hues, E.F. (1989). *Organizational Development and Change*. West Pub Co.

Dent, E. B., & Goldberg, S. G. (1999). Challenging 'resistance to change'. *The Journal of Applied Behavioral Science*, *35*(1), 25–41. doi:10.1177/0021886399351003

Dirks, K. T., Cummings, L. L., & Pierce, J. L. (1996). Psychological ownership in organizations: Conditions under which individuals promote and resist change. *Research in Organizational Change and Development*, *9*, 1–23.

Dutton, J. E., Ashford, S. J., Wierba, E. E., ONeill, R., & Hayes, E. (1997). Reading the wind: How middle managers assess the context for issue selling to top managers. *Strategic Management Journal*, *15*(5), 407–425. doi:10.1002/(SICI)1097-0266(199705)18:5<407::AID-SMJ881>3.0.CO;2-J

Eagley, A. H., & Chaiken, S. (1998). Attitude, Structure and Function. In D. T. Gilbert, S. T. Fish, & G. Lindsey (Eds.), *Handbook of Social Psychology*. New York: McGowan-Hill.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, *50*(1), 25–32. doi:10.5465/AMJ.2007.24160888

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Felstead, A., Jewson, N., & Walters, S. (2003). Managerial Control of Employees Working at Home. *British Journal of Industrial Relations*, *41*(2), 241–264. doi:10.1111/1467-8543.00271

Ford, J. D., Ford, L. W., & D'Amelio, A. (2008). Resistance to change: The rest of the story. *Academy of Management Journal*, *3*(2), 362–377.

French, J. R. P., & Raven, B. (1959). Bases of social power. In D. Cartwright & A. Zander (Eds.), *Studies in social power* (pp. 159–167). Ann Arbor, MI: University of Michigan Press.

Future Work Skills 2020 Report. (n.d.). Palo Alto, CA: Institute for the Future for the University of Phoenix Research Institute.

Golembiewski, R. T., Billingsley, K., & Yeager, S. (1976). Measuring change and persistence in human affairs: Types of change generated by OD designs. *The Journal of Applied Behavioral Science*, *12*(2), 133–157. doi:10.1177/002188637601200201

Hassard, J., Cox, J. W., & Rowlinson, M. (2013). Where are the old theories of organization? Prospects for retrospection in organization theory. *Academy of Management Review*, *38*(2), 309–313. doi:10.5465/amr.2012.0100

Hodgkinson, G. P., & Starkey, K. (2011). Not simply returning to the same answer over and over again: Reframing relevance. *British Journal of Management*, *22*(3), 355–369. doi:10.1111/j.1467-8551.2011.00757.x

Huczynski, A. A., & Buchanan, D. A. (2013). *Organizational Behaviour*. Pearson.

Johnson, D. W., Johnson, R. T., & Smith, K. (2006). *Cooperative Learning: Improving University Instruction by Basing Practice on Validated Theory*. University of Minnesota.

Kanter, R. M. (2002). *Teaching old companies new tricks: The challenge of managing new streams within the mainstream*. Boston: Harvard Business School Press.

Kanter, R. M. (2012). Ten Reasons People Resist Change. *Harvard Business Review*.

Knowles, E. S., & Linn, J. A. (2004a). The importance of resistance to persuasion. In E. S. Knowles & J. A. Linn (Eds.), *Resistance and Persuasion*. Lawrence Erlbaum Associates.

Knowles, E. S., & Linn, J. A. (2004b). The promise and future of resistance and persuasion. In E. S. Knowles & J. A. Linn (Eds.), *Resistance and Persuasion*. Lawrence Erlbaum Associates.

Kotter, J. P. (2008). *A Sense of Urgency*, Harvard. *Harvard Business Review*.

Kotter, J. P., & Cohen, D. (2012). The Heart of Change: Real Life Stories of How People Change their Organisations. *Harvard Business Review*.

Kotter, J. P., & Schlesinger, L. (1979). Choosing strategies for change. *Harvard Business Review*, *57*(2), 106–114. PMID:10240501

Lewin, K. (1947). Frontiers of Group Dynamics: Concept, method and reality in social science, social equilibria and social change. *Human Relations*, *1*(1), 5–41. doi:10.1177/001872674700100103

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lopez-Cabrales, A., Valle, R., & Herrero, I. (2006). The corruption of managerial techniques. *Human Relations*, *55*, 537–564.

Mahadevan, J. (2012). Utilising identity-based resistance for diversity change: A narrative approach. *Journal of Organizational Change Management*, *25*(6), 819–834. doi:10.1108/09534811211280582

Merron, K. (1993). Let's bury the term 'resistance'. *Organization Development Journal*, *11*(4), 77–86.

Meyer, C. B., & Stensaker, I. G. (2006). Developing capacity for change. *Journal of Change Management*, *6*(2), 217–231. doi:10.1080/14697010600693731

Milgram, S. (1965). Some conditions of obedience and disobedience to authority. *Human Relations*, *18*(1), 57–76. doi:10.1177/001872676501800105

Morrison, E. W., & Phelps, C. C. (1999). Taking charge at work: Extra-role efforts to initiate workplace change. *Academy of Management Journal*, *42*(4), 403–419. doi:10.2307/257011

Nemeth, C.J., Connell, J.B., Rogers, J.D., & Brown, K.S. (2001). Improving decision-making by means of dissent. *Journal of Applied Social Psychology*, *31*, 48–58.

Paton, R. A., & McCalman, J. (2008). *Change Management: A Guide to Effective Implementation*. London: Sage Publications.

Pettigrew, A., & McNulty, T. (1995). Power and Influence in and around the Boardroom. *Human Relations*, *48*(8), 845–873. doi:10.1177/001872679504800802

Piderit, S. K. (2000). Rethinking resistance and recognising ambivalence: A multidimensional view of attitudes toward an organizational change. *Academy of Management Review*, *25*(4), 783–794.

Pitsakis, K., & Thijs Kuin, B. (2012). Resisting Change: Organizational decoupling through an identity construction perspective. *Journal of Organizational Change Management*, *25*(6), 835–852. doi:10.1108/09534811211280591

Procter, S., & Randall, J. (2015). Understanding employee attitudes to change in longitudinal perspective: A study in UK public services 1996 – 2007. *Qualitative Research in Organizations and Management*, *10*(1), 38–60. doi:10.1108/QROM-01-2013-1127

Rees, D., & French, R. (2013). *Leading, managing and developing people*. London: CIPD.

Ricahrdson, P., & Denton, D.K. (1996). Communicating change. *Human Resource Management*, *35*(2), 203–216.

Romanelli, E., & Tushman, M. L. (1994). Organizational Transformation as Punctuated Equilibrium: An Empirical Test. Academy of Management Journal, 37(5), 1141.

Schultz-Hardt, S., Jochims, M., & Frey, D. (2002). Productive conflict in group decision-making: Genuine and contrived dissent as strategies to counteract biased information seeking. *Organizational Behavior and Human Performance*, *88*(2), 563–586. doi:10.1016/S0749-5978(02)00001-8

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Schwarz, G., & Stensaker, I. (2014). Time to take off the Theoretical Straightjacket and (Re-) Introduce Phenomenon-Driven Research. *The Journal of Applied Behavioral Science*, *50*(4), 478–501. doi:10.1177/0021886314549919

Skinner, B. F. (1991). *Verbal Behaviour*. New York: Copley.

Spreitzer, G. M., & Quinn, R. E. (1996). Empowering middle managers to be transformational leaders. *The Journal of Applied Behavioral Science*, *32*(3), 237–261. doi:10.1177/0021886396323001

Stensaker, I. G., & Meyer, C. B. (2011). Change experience and employee reactions: Developing capabilities for change. *Personnel Review*, *41*(1), 106–124. doi:10.1108/00483481211189974

Suddaby, R., Hardy, C., & Ouy, N. H. (2011). Where are the new theories of organization? Introduction. *Academy of Management Review*, *36*(2), 236–246. doi:10.5465/AMR.2011.59330875

Tavana, M. (Ed.). (1998). Handbook of Research on Organizational Transformations through Big Data. IGI Global.

Watson, T. J. (1982). Group Ideologies and Organizational Change. *Journal of Management Studies*, *19*(3), 259–275. doi:10.1111/j.1467-6486.1982.tb00108.x

This research was previously published in Teaching Human Resources and Organizational Behavior at the College Level; pages 103-132, copyright year 2018 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 7
Challenges to Business Models in the Digital Transformation Context

Pedro Fernandes da Anunciação
Instituto Politécnico de Setúbal, Portugal

Francisco Madeira Esteves
Instituto Politécnico de Setúbal, Portugal

ABSTRACT

The digital transformation of the economy and society itself is pushing the economic organizations to processes. Multiple digital technologies like data analytics, enterprise mobility, social networks, cloud computing, robotics, block chain, and internet of things (IOT) are pushing radical changes in the ways of working (WoW). People with strong technological skills are demanding changes to organizations towards two-way business interaction in order to meet the needs and expectations. But consumers who are technology users expect new information and knowledge products and services based on technological potential. It remains to the organizations to define strategies for this transformation, seeking to adapt their organizational and information systems to this new paradigm of digital transformation.

INTRODUCTION

The economic and social environment is permanently challenged by technological innovation. The resources, structures and dynamics established in the economy and society are increasingly dependent on technological capabilities. This dependence also expresses greater vulnerability of people and organizations regarding the technological context of society and of the economy itself. As we move towards greater integration of the digital dimension into the lives of consumers and organizations, the collective responsibility of the various actors that ensure the availability and operation of infrastructure increases. It is this collective responsibility of the various stakeholders that depends on the quality of the transac-

DOI: 10.4018/978-1-7998-7297-9.ch007

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tions carried out, the satisfaction of the products and services marketed, as well as the general social relations carried out through the technologies.

In this context, issues, like privacy or security, are permanently present in the activities of economic organizations, in the lives of technology users and in the new technological dimension of ethics, a concept rooted in ancient philosophy, reflects on the new human condition in the context of the digital economy and society (Anunciação, Esteves & Santos, 2014) (Anunciação, 2012) (Anunciação, 2008) (Anunciação & Santos, 2007). The lightening of the set of values and principles that, in the past, guided human practices, now, need adaptation, or perhaps not.

We live in a spiral difficult to control and even manage. Society and the digital economy constitute movements of society that have no return. The adhesion of consumers and citizens to information and communication technologies put pressure on economic and social organizations to adopt new working paradigms closely aligned with technological factors. ICT challenges business and organizations to adopt new models fully attuned to the technological potential, in any economic sector. If digital transformation in any large organization is tough - breaking down silos, overcoming legal barriers, fixed mindsets and internal conventions - negotiating technological change on the scale of the federal government is nightmarishly difficult (Gray & Parce, 2017).

Management requires responses in timings that are too short to adapt organizations and their operations to the market, modifying structures and adapting crystallized cultures. The setting is a permanent investment and managers are required net profits in the process of digital transformation of economic activities. And since many companies are not, and do not have, specialists in all technological areas, they will have to frame their activities in partnerships with specialists, focusing on their core business in order to frame their competitiveness.

The context associated with the process of economic and social transformation can be better evidenced through the analysis of the evolution of the digital economy in Portugal is presented in Tables 1-4 (IDC2015).

Table 1. Evolution of internet users

Online Population	2011	2012	2013	2014	2015
Evolution of users (millions)	6,1	6,7	6,7	7,0	7,4

Table 2. Evolution of the number of online buyers

Shopping Population Online	2011	2012	2013	2014	2015
Evolution of online purchases (millions)	1,9	2,3	2,5	2,7	3,1

There are several technologies that mark this digital era. Cloud computing, social networks, IoT (Internet of Things) and artificial intelligence, among others, are examples of new paradigms that are emerging and consolidating in the economy and society. Some of them have been breaking traditional paradigms associated with concepts fully assumed in the field of business sciences, such as cloud

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Activities on the internet

Activities on the Internet	Email	Search	Social Networks	Read News	Chat	Listen to Music
Personal computers	83%	67%	59%	55%	31%	30%
Tablet, smartphones	56%	39%	49%	35%	30%	19%

Table 4. Business presence on the internet

Activities on the Internet	All Companies	Public Administration	Banking and Insurance	Distribution and Retail	Industry	Services
Companies with own website	29%	89%	100%	28%	30%	29%
With page in business directory	7%	11%	30%	8%	8%	4%
With page in social networks	20%	39%	80%	19%	18%	24%
Selling on own website	10%	0%	70%	19%	3%	13%
Online sales in third-party site	3%	0%	30%	5%	6%	5%
Company with mobile APP	8%	11%	90%	6%	2%	9%

computing or data centers. The concept of Information System, traditionally framed and administered in the internal context of economic organizations, is now outsourced, providing remote access to users wherever they are. This feature is one of the biggest advantages of cloud computing, access to information anytime, anywhere. Take the health area as an example, and analyze the advantages of access to medical imaging and the possibility of clinics and hospitals accessing the patient's data, with just one computer or tablet and internet access.

This possibility is a new reality for management, in general, and for information systems managers, in particular. And, in this sense, it is important that management understands the various dimensions associated with the digital transformation as an impact on the organization and business. And in this sense, it is important to analyze the surrounding environment and understand, among other aspects, why traditional companies are failing at digital and how they can succeed; how to overcome strategic, operational, technical and market related causes of failure; how to benchmark, envision, roadmap and build a successful digital strategy, and why preparing for the future, near and far, ensures their readiness for the next decade's technology revolutions.

At the ubiquity (Anunciação & Zorrinho, 2006) must match the security of data / information and the respective treatments, and associated services and the scalability of the systems should match the suitability of providers. The management is, thus, responsible for a secure outsourcing of the information system, safeguarding core and core aspects such as service levels, operations and information backup or technical support, among other aspects.

With regard to social networks, their importance is not only due to the great ease of communication they provide, by allowing multiple connections between a significant diversity of people / users, but especially the exceptional source of data that originates and makes available. In social networks, people / consumers exchange opinions, evaluate products, dictate trends, judge behaviors and, above all, define

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

themselves as citizens and as consumers. Networks are currently the main communication channel, constituting excellent commercial channels of enormous competitive potential.

IoT (internet of things) is a new reality. Based on a network of billions of digitally connected devices, from homes to household appliances, from cars to clothing, global data collection and transmission are possible. In this domain, information and information systems governance is challenged by enhancing the digital world of economic organizations with the possibility of connecting a multiplicity of devices and objects that communicate and act according to certain parameters or instructions, given not only by people, but the machines themselves. This extension of information systems to the diverse needs of people, not only professional or social but also functional support to their life (appliances, housing, transport, etc.), challenges and will continue to challenge architecture or organizational urbanism (Anunciação & Zorrinho, 2006) (Anunciação, 2016) (Anunciação, 2015) of the economy and society itself. Not only will be required, new technological, treatment and storage, connectivity or interoperability capacities, but, above all, new instruments and models will be required to facilitate the management of a new context where the limits are difficult to identify.

While there were updates on familiar themes from prior years, such as the Internet of Things (IoT) and cloud computing, the major shift this year has been a central focus on Artificial Intelligence (AI) across industries, and a need for an even more aggressive approach to digital transformation in order to compete (Tiersky, 2017). The Artificial Intelligence has perhaps associated the most radical change, in that it provides a new relationship between the human person and the technologies, devaluing several dimensions that realize the human being.

Eventually, we are faced with a new challenge for the human being if he comes to rethinking himself, his role in the economy and his framework in society itself. Since the industrial revolution that seeks to overcome human limitations and increase their capacities. With artificial intelligence, he walks to the possibility of overcoming not only physical limitations but his own intellectual capacities. Some social researchers are currently questioning whether, in the future, people will be driven by machines or even if some "digital people" on social networks are real.

In the economic context, artificial intelligence, in addition to enabling smarter choices, provides the possibility of predictive analytics development, linking work environments, personal life, leisure, health, etc., conditioning options and choices. If the virtue of the advantage of having an instrument that can increase our capacity for action is clear, it is also evident the perspective of a greater conditioning, and control of what we are and what we do which, in economic terms, can have significant repercussions.

As we consolidate these changes, many of the foundations (principles, values, models, instruments, etc.) that have so far oriented the functioning and development of economic organizations, and even of the theory itself, have been questioned in society and in economic management. The traditional principles of business science are difficult to fit into the new reality. It is important to understand the new requirements associated with the functioning of economic institutions in a framework that tends to be completely technological and to be able to define a matrix for the desired development in view of the organizational and economic sustainability.

Most business leaders agree that digital transformation - a wave of business innovation fueled by technology - is disrupting their business or soon will be, but fewer than half have enacted a digital strategy, according to a new report by Harvard Business Review Analytic Services (Olavsrud, 2017). But, according Westerman (2018), technology doesn't provide value to a business. It never has (except for technology in products). Instead, technology's value comes from doing business differently because technology makes it possible. E-commerce is not about the internet — it's about selling differently. Analytics is not about

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

databases and machine language algorithms — it's about understanding customers better, or optimizing maintenance processes, or helping doctors diagnose cancer more accurately. IoT is not about RFID tags — it's about radically synchronizing operations or changing business models (Westerman, 2018).

If it is true that technologies continue and will continue to dictate the meaning of economic and social development, managers need to understand how this development tends to take place. If, in the past, the adoption of technologies was carried out essentially from a one-to-one or individual perspective, where the main objective was productivity and efficiency gains or the improvement of the functioning of the operational structures, the development now fits into a two ways perspective, relational or collaborative, whose benefit depends on the degree of depth of relations, service and value to the parties involved.

Although the centrality lies in technological innovation, its focus is associated with the relationship between technology service providers and customers / citizens / users in general. Citizens/users, while tending to be more and more active in the technologies, will seek players who provide services capable of meeting their permanent information needs. It is not only a question of satisfying a specific commercial need, but of a whole set of complementary or associated needs. Thus, emerges, as a competitive paradigm, the "360º" vision of the client/citizen.

It is in this context that organizations must evolve and transform themselves. They should identify the critical dimensions for this evolution, from structure to technology integration, from partners to customers. Ismail (2014) characterizes the organizations in this context as Exponential Organizations, considering that these have to be better, faster and cheaper than the competitors. The economy and competition do not, in this field, leave a great alternative. Organizations are, in general, pressured to increasingly provide technology-based services. It is precisely in the capacity to complement the tangible dimension of services with the digital dimension and, above all, in the evolutionary capacity to complement supply and demand for digital products and services that will face the greatest challenge of digital transformation.

This is a movement that has no return and that fits a new scenario for the economic sustainability of organizations. Make digital transformation core to your business strategy (Albanese & Manning, 2016). Adaptation to it is a management imperative, depending on the managers' ability to give their organizations a strategic look at digital transformation.

WHAT IS DIGITAL TRANSFORMATION?

The change in the needs of the business has not happened overnight. Business needs have been gradually evolving throughout the internet and mobile computing eras where technology became more accessible, vendor offering matured products and services and the rest of the business became more tech savvy. The disruptive technologies and trends, such as social, mobile and cloud, did not create the gap; they have widened it to the point where it cannot be ignored (Shrivastava, 2017) (Cox, 2014).

In this sense, we can consider digital transformation as the set of disruptive changes that institutions must make in business, organizations, structures and forms of operation and development of the respective activities based on the digital paradigm. It is not just a substitution of people or activities for technologies, but a new economic view of the institutions and their activity through ICT and, above all, the generation of new value for customers or citizens / users in relation to the products marketed or services provided.

The digital transformation market size is estimated to grow from USD 148.04 billion in 2015 to USD 392.15 billion by 2021, at a Compound Annual Growth Rate (CAGR) of 18.7% (Newswire, 2016) (Wire, 2016). Companies are seeking ways to increase revenue and reduce expenses, as the global market

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

competition continues to shrink profit margins. Organizations of all sizes are focusing more on analyzing sales and market saturation in specific territories and identifying gaps. However, the lack of awareness regarding the benefits of digitalization is a restraining factor for the digital transformation market. (Wire, 2016). In the Portuguese case, for example, according to the Marktest Telecommunications Barometer study, smartphone usage and the penetration rate have registered an upward trend over the last few years, rising from 40.4% in 2013 to 71.6% in July 2017 (Marktest, 2017). It is, therefore, natural for customers to expect benefits in terms of mobility, access to information and services when they need them, whatever the channel (smartphone, for example). These challenge is not only to provide instruments, means and services that meet customers' needs and expectations, but also the possibility of collecting data on them and on the operations carried out, in order to allow a better understanding of them big data, analytics, for example). These tools enable the opportunity to develop deeper knowledge about customers, seeking to improve their experience, regardless of the device used in access to information.

There are several relevant and central domains presented in the scope of digital transformation by various authors. Tiersky (2017), for example, mentions that this shift breaks into five interrelated insights: customer expectations continue to rise, speed is more important than ever, customer insight continues to be essential, artificial intelligence is front and center and digital transformation means business transformation. On the other hand, Evans (2017) considers that digital transformation is a broad subject that requires competency across strategy and vision, people and culture, process and governance, and technology and capabilities. Strategy is before technology (Schwertner, 2017) (Westerman, 2017). In the area of the strategy and vision pillar, this author refers to the existence of some of the key elements that include digital transformation strategy, digital transformation focus and investments. The digital strategy must be understood as a process from strategy to execution. It's important for the digital strategy to set the stake in the ground in terms of target business outcomes. Digital focus is important to establish a customer-centric perspective that drives transformation journeys and continuously adjusts based on changing customer demands. And Investment specifically allocated to digital transformation as a critical factor to fund the large-scale transformational change that's essential across business models, business processes, products and services.

With regard to the second pillar, people & culture, some of the key elements include leadership, culture and digital skills. Leadership as a digital transformation necessity, to enforce behaviors, and to keep programs chartered and aligned with the external perspective front of mind. Culture because digital transformation initiatives require re-inventing and re-designing traditional business models, processes and ways of working, it necessitates an innovative and collaborative culture to enable tolerance and receptivity to risk, to embrace and empower change, and to encourage innovation and experimentation. And digital skills because digital transformation initiatives require new technologies, capabilities and approaches, so it takes strong digital skills embedded in all strategic areas across the organization to do the heavy lifting with a completely new set of tools and techniques.

Concerning the third pillar, process & governance, some of the key elements include innovation management, change management and governance. Digital innovation leading practices in corporate innovation, and they are important to identify and accelerate digital transformation initiatives from idea to execution and to provide a mechanism for continuous and collaborative innovation across internal and external constituencies. Change management because digital transformation initiatives typically have a broader and deeper change impact than traditional ones, change management programs need to take a more holistic view across a wider range of stakeholders with a richer, ongoing engagement model. And Governance because digital transformation initiatives span traditional business units and silos, affecting

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

all parts of the organization. As a result, effective digital governance is important to promote the right levels of coordination and sharing to minimize risk and cost and to ensure close and continual alignment with strategic priorities.

As regards the fourth pillar, technology & capabilities, some of the key elements include disruptive technologies, platform business models and digital services mastery. Disruptive technologies because, when building the next wave of digital applications, disruptive technologies can be applied in powerful combinations – first, as digital experience essentials (with technologies such as social, mobile, analytics and cloud) and, then, as digital experience enhancers (intelligent automation, IoT and next generation cyber security) - to create unique new value propositions for customers. Platform business models because they convert traditional, linear value chains into multi-dimensional value networks. They convert the pipeline business model, where value creation is one-way and subject to bottlenecks throughout the supply chain, into a platform business model where value creation is two-way and continuous. Digital services mastery because the next step for IT is to consider the "how" as well as the "what". It's no longer sufficient to have an innovative set of products or services (the "what"). You have to be a master of how you design, develop, deploy, manage and continually evolve your digital services (the "how") as well.

Rogers (2016), on the other hand, presents five more concrete domains: customers, competitors, data, innovation and value, specifying the nature of the transformation to be carried out, according to Table 5.

Among other aspects, we can point out as critical the following aspects:

Table 5. Changes in strategic assumptions from the analog to the digital age

	From	To
Customers	Customers as mass market Communications are broadcast to customers Firm is the key influencer Marketing to persuade purchase One-way value flows Economies of (firm) scale	Customers as dynamic network Communications are two-way Customers are the key influencer Marketing to inspire purchase, loyalty, advocacy Reciprocal value flows Economies of (customer) value
Competition	Competition within defined industries Clear distinctions between partners and rivals Competition is a zero-sum game Key assets are held inside the firm Products with unique features and benefits A few dominant competitors per category	Competition across fluid industries Blurred distinctions between partners and rivals Competitors cooperate in key areas Key assets reside in outside networks Platforms with partners who exchange value Winner-takes-all due to network effects
Data	Data is expensive to generate in firm Challenge of data is storing and managing it Firms make use only of structured data Data is managed in operational silos Data is a tool for optimizing processes	Data is continuously generated everywhere Challenge of data is turning it into valuable information Unstructured data is increasingly usable and valuable Value of data is in connecting it across silos Data is a key intangible asset for value creation
Innovation	Decisions made based on intuition and seniority Testing ideas is expensive, slow and difficult Experiments conducted infrequently by experts Challenge of innovation is to find the right solution Failure is avoided at all cost Focus is on the "finished" product	Decisions made based on testing and validating Testing ideas is cheap, fast and easy Experiments conducted constantly, by everyone Challenge of innovation is to solve the right problem Failures are learned from, early and cheaply Focus is on minimum viable prototypes and iteration after launch
Value	Value proposition defined by industry Execute your current value proposition Optimize your business model as long as possible Judge change by how it impacts your current business Market success allows for complacency	Value proposition defined by changing customer needs Uncover the next opportunity for customer value Evolve before you must, to stay ahead of the curve Judge change by how it could create your next business "Only the paranoid survive"

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- The traditional one-way business relationship (supplier → customer) tends to be replaced by a two-way economic relationship (supplier ←→ customer);
- Commercial relations tend to be dictated more by the service than by the product, more by the value they provide and not by the associated price;
- Technologies tend to be adopted and framed more by their potential and strategic value than by the productivity gains and efficiency they can provide;
- Systems tend to be evaluated more for perceived quality, output quality and reliability relative to the operations performed, no longer being considered from the perspective of production;
- Customer loyalty tends to be associated more with the value generated by the system and with the opportunity of the services it provides.

Although we can consider that, due to the great adhesion of the majority of people to information and communication technologies, digital transformation is occurring naturally among companies and citizens, it cannot be passively classified by managers and organizations. The assumption of the centrality of the digital transformation should not only result in a reaction to the market or to competition as a result forced by the need for survival, or even a result of the cost reduction demand. The digital transformation must be understood as a strategic decision, which must correspond, on the part of the management, a process of immersion in the technological potential and the inclusion of the technologies in the diverse organizational dimensions, in view of a concrete response to the digital context. It is not only a matter of generating value through productivity or organizational efficiency, but also because of the strategic dimension of competitiveness, fully in line with market requirements. Technological innovation must be reflected in the innovation of activities, products and services, structures, relationships and knowledge.

Technological innovation opens up windows of opportunity insofar as it is possible to identify, know, make and reach in relation to the exterior. It should be noted that the concept of digital transformation has associated two dimensions that give meaning to the depth of its meaning. The first refers to the concept of transformation. A process of transformation presupposes, as the expression itself indicates, a change of a certain status quo and the transition to a different, higher value state. This transition, from a management perspective, must be a thoughtful, reflective and planned act, with well defined objectives and expected results. The second dimension concerns the inductive and central element of transformation, the digital dimension. This digital transformation is now an imperative of economic survival, and it is closely related to the way citizens and consumers are being increasingly supported in digital technologies. Opportunities provided by technological connectivity, ubiquity of services, business opportunities, among other examples, encourage users to demand appropriate business responses from service providers regarding the provision of products or services.

Many companies in sectors such as financial, distribution or health are making significant investments in this field in the expectation of generating competitive differentials. These competitive differentials between companies will depend on the knowledge they generate and have about their customers, the ability to interact with them and the ability to provide them with value. The central question lies in the relationship they achieve between these three dimensions, that is, in the capacity to meet their expectations, in the timing adequacy, in the innovation in services and products and in the quality of the technological platform that supports them.

An investment in technology that does not emerge its value in organizational structures and dynamics does not provide significant competitive and economic improvements. Salesforce's State of IT survey found that digitally transforming companies are 3.7 times more likely to adopt technology trends vis-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

à-vis competitors, invest 1.8 times more in software and customer interface technology (for example in sales apps, marketing and customer service applications), and are more likely to adopt digital channels (4.8 times more) for customer loyalty.

The benefits of digital transformation will only be noticeable if the organizational vision integrates IS / IT and its managers understand the benefits of the economic innovation of technologies. It is true that cloud computing, for example, allows the release of resources associated with the management and maintenance of the technological infrastructure of organizations. However, it will be in the ability to overcome the legacy of technologies and the destruction of information silos that will be the critical success factor of digital transformation. Associated with this generation of knowledge are also the set of functionalities and channels of access to customers through, for example, increasing the availability of apps to customers and employees, improving the quality of business functions, customer loyalty, security, etc.

The management vision of IS / IT will have to change radically. These will have to cease to be seen as cost centers and should be classified as revenue centers. This change should put IS / IT leaders in a position of great responsibility and enormous opportunity.

CRITICAL AREAS IN DIGITAL TRANSFORMATION

There may be several drivers associated with digital transformation that can support management in the development of strategies in this domain. For example, Hess *et al*. (2016) consider that there are four key dimensions to any digital transformation endeavor: the use of technologies, that must reflect a firm`s approach and capability to explore and exploit new digital technologies; change in value creation, that must reflects the influence of digital transformation on a firm`s value creation; structural changes, that must reflect the modifications in organizational structures, processes and skill sets that are necessary to cope with and exploit new technologies; and the financial aspects, that must relates to both a firm`s need for action in response to a struggling core business, as well as its ability to finance a digital transformation endeavor.

However, the existence of some questions regarding this transformation can help economic agents focus the objectives of this transformation, for example, what is the vision for improving the lives of customers? How do you want to put your vision into action? What are your digital capabilities? And how will you urbanize and re-architect the business and the organization? (Moore, w.d.).

We propose the analysis in three main central axes of this process of transformation:

- Business (change in business);
- Knowledge (about the activity and about the client);
- Value (generated for the customer).

It is true that other factors could be enunciated, however, we consider these as central and specific axes associated with this matter.

The change in the business must make evident how the organization and the managers can adopt innovation and the digital dimension in the organizational functioning, and the economic activities developed. It is important to analyze whether technological innovation has provided an opportunity for innovation at the business level and whether technologies, in addition to promoting productivity and organizational efficiency, have provided new ways of developing activities and greater reach in com-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

mercial actions. As mentioned previously, opportunities are not only achievable with the acquisition and introduction of technologies. The adoption of technologies must necessarily be analyzed and managed in order to provide the organization with new dynamics, both internal and external. In addition to the reflection on the improvement of the institutional image, in its brands, among other examples, there is a broad spectrum of opportunities in the approach to digital markets, such as the possibility of providing a wide range of new services and the possibility of customization or simulation, commercial advice or post-sale monitoring. These may be new requirements that, in digital markets, greatly contribute to the increase of customer loyalty.

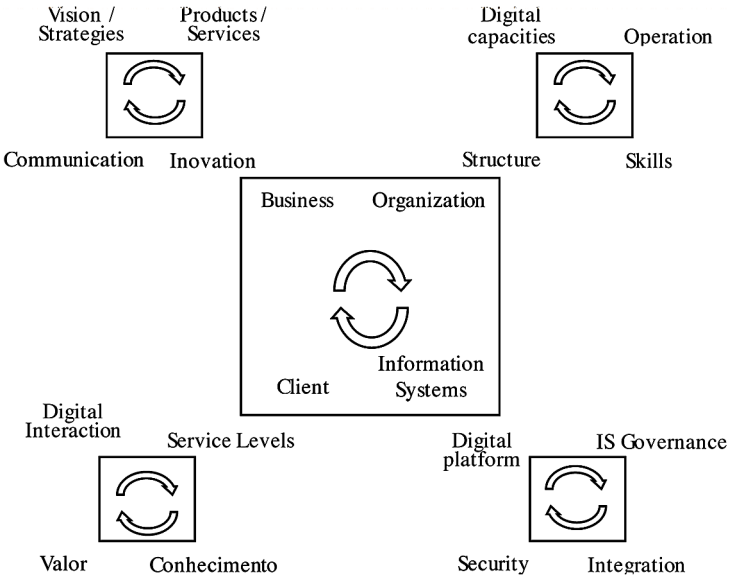
The transformation of the business presupposes, as has been shown previously, organizational adaptation. Traditional functions, such as sales, marketing, service, finance, will have to be redefined appropriate to the digital potential, but above all the boundaries traditionally delimited by hierarchical structures will have to be re-equated.

In this context, in order to understand and size the digital transformation of organizations in the aforementioned axes, we consider the following as domains or analysis strands the most relevant (Figure 1): business, organization, information systems and the customer.

In business domain, it is important to analyze, among others, the following aspects:

- **Business:**

Figure 1. Digital transformation domains



  - **Vision / Strategies:** What strategies are defined and assumed that specifically aim at the digital transformation of the business, activities, organization, products or services?
  - **Products / Services:** What digital products or services have been developed, are they developing or are they expected to be developed? How will these be complemented by the traditional offer?

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

    - **Innovation:** What digital initiatives, within the scope of organizational innovation or of products and services, are being developed or are expected to be developed by the institution?
    - **Communication:** What degree of digital communication is there and what is the expected increase in digital transformation?
- **Organization:**
    - **Digital Capabilities:** How deep is the digital dimension of processes, activities, products and services?
    - **Operation -** What changes have been or are expected to be recorded in organizational operation with a view to digital transformation?
    - **Competencies:** Are existing skills both internally and at the customer level sufficient to support digital transformation strategies?
    - **Structure:** Who takes responsibility for digital transformation?
- **Information Systems:**
    - **Digital Platform:** What is the scope of the digital platform in the framework of the activities carried out? What technological paradigms do they support (IoT, AI, etc.)?
    - **Information Systems Governance:** What policies exist in relation to systems, technologies and information (architecture, urban planning, security, investments, etc.)?
    - **Integration:** What level of integration is there in information systems? And what level is expected or desired?
    - **Security:** What policies and procedures exist in the area of information security and digital systems?
- **Client:**
    - **Digital Interaction:** What level of digital interaction exists or is expected to be generated with customers by virtue of the inclusion of digital technologies?
    - **Service Levels:** What increases our levels of service have been achieved or are expected to be achieved with the introduction of the digital dimension in organizational operation?
    - **Knowledge:** What level of knowledge is there and expected to have on customers? What technologies enhance this knowledge (for example, Business Intelligence)?
    - **Value:** What metrics are being adopted, are they adopted or will be adopted to measure the value generated for the client?

In addition to understanding the dimensions presented above, it is important that management defines a roadmap for a progressive and coherent transition to digital operation. According Weill & Woerner (2018), there are four different pathways that for a digital economy:

- **Standardize First:** Building a platform mindset with API (application programming interface) enabled business services that can be accessed across the enterprise and also externally;
- **Improve Customer Experience First:** Improve the customer experience across the whole enterprise, attempt to do several things at once: develop new attractive offers, build mobile apps and websites, improve call centers, and empower relationship managers;
- **Take Stair Steps:** Alternating their focus from improving customer experience to improving operations and then back again, shifting the focus back and forth as needed;
- **Create a New Organization:** Transform their existing organization.

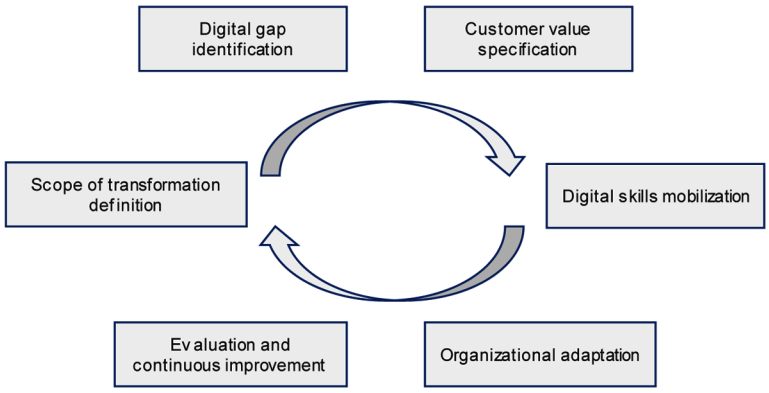
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

However, we propose a life cycle for the digital transformation process. This integrates a roadmap that, in our view, clarifies and facilitates management intervention and organizational adaptation. Thus, we suggest:

- **Scope of Transformation Definition:** Clear and objective identification of the transformation to be undertaken (vision, strategy, processes, products, services, value, etc.);
- **Digital Gap Identification:** Survey of the current information system and identification of the developments and investments to be made necessary for a transition to a digital operation;
- **Customer Value Specification:** Identification of the needs and services offered in the digital context, highlighting the experience and value provided;
- **Digital Skills Mobilization:** Increase of internal and external knowledge and skills for the adoption of digital products and services, highlighting the value provided;
- **Organizational Adaptation:** Flexibility in the structure and organizational functioning to ensure continuous operation, in tune with the needs of clients and according to the timings provided by the technologies;
- **Evaluation and Continuous Improvement:** Identification of technological developments and their potential as well as customer adherence to them, assessing the current status quo and innovating.

CONCLUSION

Figure 2. Life cycle for digital transformation



As Cox (2014) points out, the paradigm of digital transformation decrees a disruptive change that implies a strategy for the transition. This transition must be clearly assumed and fulfilled. It must go through the definition of the scope of transformation, identification of the digital gap, specification of customer value, mobilization for digital competencies, organizational adaptation and evaluation and continuous improvement.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

It is not a process that begins with the introduction of information and communication technologies or ends with its entry into production. As Evans (2017) points out, we must consider that the digital transformation is clearly a journey, not a destination. This is a permanent journey that begins with the auscultation of the Market in general and of the customers in particular.

As previously mentioned, the challenge is not only to provide instruments, means and services that meet customers' needs and expectations. Essentially, the focus of digital transformation is to generate knowledge through access to customer data, to their expectations and to adjust operations, products and services, in order to allow for better understanding and satisfaction. Therefore, it will be vital to use analytical tools that address the potential associated with the big data and that provide economic value to the organization. These tools enable the opportunity to develop deeper knowledge about customers, seeking to improve their experience, regardless of the device used in access to information.

All these challenges will necessarily have to be framed within a governance perspective, which provides a starting point for the information systems and the organization, in full harmony with the challenges of the market and in close relation with the organizational capacities.

REFERENCES

Albanese, J., & Manning, B. (2016). *REVIVE: How to Transform Traditional Businesses into Digital Leaders.* Pearson Education.

Anunciação, P. F. (2008). *The challenges of the Information and Knowledge Society. New challenges of Information Management*. Sílabo Publishing. (in Portuguese)

Anunciação, P. F. (2012). Ethics, Society and Information Systems, New Realities in Information Management and Management [in Portuguese]. *Sílabo Publishing*, *2012*, 57–80.

Anunciação, P. F. (2015). Organizational Change through Information Systems: Metavision-Project Management Model in Internet Banking. Handbook of Research on Effective Project Management through the Integration of Knowledge and Innovation, 450-465

Anunciação, P. F. (2016). Organizational Urbanism: A Value Proposal for the Generation of Organizational Intelligence to Healthcare Institutions – The Case of a Portuguese Hospital Center. Handbook of Research on Information Architecture and management in Modern Organizations, 458-486.

Anunciação, P. F., Esteves, F. J. M., & Santos, J. R. (2014). Some Information Systems Requirements in View of Organizational Sustainability in an Information Society. *Information Resources Management Journal*, *27*(1), 21–35.

Anunciação, P. F., & Santos, J. R. (2007, October). The Relevance of Ethics in the Professional Value Chain. *Proceedings of 2nd National Congress of Economists*. (in Portuguese)

Anunciação, P. F., & Zorrinho, C. (2006). *Organizational Urbanism - How Managing Technological Shock in Companies*. Lisbon: Sílabo Publishing. (in Portuguese)

Cox, I. (2014). *Disrupt IT – A New Model for IT in the Digital Age*. Axin.

Evans, N. D. (2017, August 4). Assessing your organization's digital transformation maturity. *CIO.*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gray, J., & Pearce, C. (2017). Canberra Hack Digital Transformation: Digital Transformation. *The Australian Financial Review, Melbourne*, *10*(Mar), 28.

Hess, T., Matt, C., Benlian, A., & Wiesbock, F. (2016). Options for Formulating a Digital Transformation Strategy. *MIS Quarterly Executive*, *15*(2), 123-139.

IDC. (2015). Communications - Global ICT Directory. Journal Communications, 14-15. (in Portuguese)

Ismail, S. (2014). *Exponential Organizations – Why new organizations are ten times better, faster, and cheaper than yours (and what go do about it)*. Diversion Books.

Marktest, G. (2017). *Increases Ownership of Smartphones*. Retrieved April 30, 2018, from http://www.marktest.com/wap/a/n/id~22a1.aspx

Moore, J. (n.d.). *From the Experts: Top Digital Transformation Strategies*. Techtarget.

Olavsrud, T. (2017, May 1). Digital disruption is coming but most businesses don't have a plan. *CIO*.

PR Newswire. (2016). *At 18% CAGR, Digital Transformation Market Potentially Worth $392.15 Billion by 2021 Led by Cloud Deployment Mode.* PR Newswire.

Rogers, D. L. (2016). *The Digital Transformation Playbook – Rethink Your Business for the Digital Age*. Columbia Business School Publishing.

Schwertner, K. (2017). Digital Transformation of Business. *Trakia*. *Journal of Science*, *15*(Suppl. 1), 388–393.

Shrivastava, S. (2017). Digital Disruption is Redefining the Customer Experience: The Digital Transformation Approach of the Communications Service Providers. *Telecom Business Review, 10*(1), 41–52.

Tiersky, H. (2017, May 25). The 5 key drivers of digital transformation today. *CIO*.

Weill, P., & Woerner, S. L. (2018). Is Your Company Ready for a Digital Future? MIT Sloan Management Review, 59(2), 21-25.

Westerman, G. (2017, October). Your Company doesn't need a digital strategy. *MIT Sloan Management Review*, 25.

Westerman, G. (2018). Your Company Doesn't Need a Digital Strategy. MIT Sloan Management Review, 59(3), 1-5.

Wire, B. (2016, November 21). Global Digital Transformation Market Worth USD 392.15 Billion by 2021 - Analysis, Technologies & Forecasts Report 2016-2021 - Vendors: Accenture, Adobe Systems, Apple - Research and Markets. *Business Wire.*

This research was previously published in the Handbook of Research on Business Models in Modern Competitive Scenarios; pages 197-210, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 8
Predictive Model of the Influence of Leadership Styles on Attitudes Towards Organizational Change Among Secondary School Teachers in Selangor

Yuen Fook Chan
Universiti Teknologi MARA, Malaysia

Nusrah Ahmad Mukhtar
Universiti Teknologi MARA, Malaysia

Norsidah Mohammed Noordin
Universiti Teknologi MARA, Malaysia

ABSTRACT

The chapter aimed to examine the relationship of leadership styles and attitude towards organizational change among 360 secondary school teachers in Selangor. Statistical analysis techniques, namely, mean and standard deviation, Pearson product moment correlation, and multiple regression analysis, were used. Findings indicated that although teachers perceived the leadership styles of their principals were only at the moderate level, teachers showed a high level of positive attitude towards organizational change. There were positive relationships between principals' leadership styles and teachers' attitudes towards organizational change. The results also revealed that 11.8% of the variance of attitude towards organizational change is explained by transformational leadership style. Hence, transformational leadership style has an influence on the teachers' attitudes towards organizational change. The practical implications of these findings were discussed to provide insights for the improvement on leadership practices towards organizational change in the secondary schools in Malaysia.

DOI: 10.4018/978-1-7998-7297-9.ch008

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Globalization, liberalization and information technology are three important change drivers that urge private and public organizations to endure a future constant change (Benn, Dunphy & Griffith, 2014; Osborne & Brown, 2013). Even though the goals of organizational change are varied, however, the common goals of most organizations are bettering the firm, and minimizing cost, crisis and intervention, and overcoming competition. In general, organizational change is a process to optimize performance in order to reach its ideal state. Hence, an organization that is able to deal with change will gain a competitive advantage (Chaston, 2012).

In today's rapid changing environment, it is unavoidable for any organization to undergo constant changes (Mossholder, Settoon, Armenankis & Harris 2000). Therefore, in view of the pressure from external environment such as globalization, internationalization, advancement of ICT and many others challenges, education system in Malaysia has undergone structural changes to face the challenge. In fact, Malaysian education system has entered an intensive phase of change with the introduction of the Malaysian Education Blueprint 2013-2025. (MOE, 2013). This policy was introduced in the context of rising international education standards and to uphold the Government's aspiration to better prepare Malaysia's children for the needs of the 21st century, and increase public and parental expectations of education policy. Hence, quality education has become the ultimate goal of transformation of Malaysian education for human capital development. Among the 11 strategies and operational shifts stated in the Malaysian Education Blueprint, there are two shifts (Shift 4 and 5) that are relevant to this study. The fourth shift is transforming teaching into a profession of choice, and the fifth shift is to ensure high-performing school leaders in every school. These two shifts have highlighted the roles of both the teachers and school head in school and in the transformation process of the Malaysian education system.

Since most educational changes happen in the classroom under the responsibility of teachers, hence teachers' attitude has become one of the crucial and critical factors in the process of organizational change (Wiboonuppatum, 2002). In fact, earlier, the Malaysian Ministry of Education has introduced Education Development Master Plan 2006 to 2010, with its six core agendas, that emphasis on commitment of the teaching workforce to increase the quality and efficiency of the educational system (Utusan Online, 2007). Nijhof, Jong and Beukhof (1998) and Wiboonuppatum (2002) have pointed out that teachers are main contributors to school success and quality. They deliver curriculum in bright, shiny new boxes and by the end of the academic year, students are expected to succeed (Loucks and Pratt, 1979). Undeniably, teachers are the ultimate key players in school organization and have the authority to make a difference in students' capital development. The teachers have the responsibilities to enhance the quality standard because all the actual education reform processes happen in the classroom. Hence, in this context, Nordin, Darmawan and Keeves (2009) agreed that teachers' dedication and commitment are vital in quality education. In this sense, teacher commitment has been identified as one of the most critical factors for the success of education and schools (Huberman, 1993).

To date, there are many issues and challenges emerged among school teachers after the Malaysian Education Blueprint has been implemented. These issues and challenges have great impacts on the teachers' attitudes towards the organizational change (Cheah, 2010; Noor & Sahip, 2010; Tan, 2010), and their reactions can range from quite positive and supportive to quite negative and very resistant. (Dunham, Grube, Gardner, Cummings & Pierce, 1989). In the second decade of the 21st century, teachers are likely to play the role as facilitators to provide scaffolding to students in developing their own personal ways of learning (Darling-Hammond, 2006). Teachers are no more like a sage talking in the front while

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

students are sitting and listening to the teachers. Teachers in 21st century learning are being more likely as a facilitator to invent active learning among students in the learning process. Thus, we visualize the aim of 21st century teaching as the development of knowledge, higher-order skills (such as the 4Cs of creativity, critical thinking, communication, collaboration), and character, as well as the establishment of lifelong learning habits and an ability to learn how-to-learn with technology as the central roles in the new picture of teacher effectiveness (Darling-Hammond, 2006).

As stated by KurÇunoğlu (2006), when attitudes of employees in an organization toward change have been identified, relevant preventive measures can be taken and right decisions can be adopted for change process and focus on change strategies. This is also applicable to teachers. It seems possible to take preventive actions and give right decisions about determining, planning, implementing and evaluating any type of change when attitudes of teachers toward change are exactly known. Teachers may either be willing to change or resisting change. Hence, Benveniste and McEwan (2000) suggested that adoption of educational changes such as new pedagogies can be attributed to the teachers 'willingness (motivation and commitment) to change.

For example, while schools are receiving intensive change, if the teachers, who are the front-line change implementers in schools, do not buy-in or apply the organizational change into practice, education transformation will only be adopted superficially or even fails. However, if teachers demonstrate positive attitude towards organizational change, they will cooperate and collaborate to make change happens. As according to Burke (2008) some organizational members are able to readily embrace the organizational change and they are moving towards it. Apparently, positive attitude towards organizational change has shown to be a crucial variable in accomplishing organizational aims and also succeeding the change programs (Eby, Adams, Russell & Gaby, 2000).

According to Lewin (1947), a successful change program should involve three stages namely unfreezing, movement and refreezing. The Kurt Lewin model provides guidance on how to make changes in an organization, with minimal disruption of the structure's operations, and making sure that the change adopted is permanent. Unfreezing stage is the most crucial stage as at this stage, the old attitude will be changed to the new one in order to prepare the employee to be ready for change and to overcome the resistance towards organizational change.

Movement stage, or sometimes known as implementation stage, is when the employees have open up their minds and becoming more ready to accept changes in the organization. Basically, movement stage is related to the development of new behaviors, values, and attitudes, through organizational structure and process changes and development techniques (Schein, 1996). During this implementation stage, there will be confusion as people move from the old ways of doing things to the new. Hence, it needs motivation to identify a specific outcome from planned change and it is not easy because of the complexity of the forces concerned. Instead, the leader should be proactive to look into all the forces at work to identify causes and to evaluate effectiveness.

Once the employees have already accepted the changes made in the organization, the last stage will take place; refreezing stage. Refreezing seeks to stabilize the group at a new quasi-stationary equilibrium in order to ensure that the new behaviors are able to sustain. The new behavior must be, to some extent, congruent with the rest of the behavior, personality and environment of the learner or it will simply lead to a new round of disconfirmation (Schein, 1996). This is why Lewin noticed that successful change is related group activity. Without the transform of the group norms and routines, changes to individual behavior will not be sustained. In organizational terms, refreezing often requires changes to organizational culture, norms, policies and practices (Cummings and Huse, 1989). Changes made in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the organization will reach its full effects only if it is made permanent. In this stage, every effort must be made to "cement" the change implemented earlier and thus making sure the organization becomes more standard. It has been argued that the reason for so many change efforts run into resistance is usually directly traceable to the lack of unfreezing process before attempting a change process (Armenakis & Bedeian, 1999). However, it is much easier to overcome resistance if there is a leadership key role in motivating the employees to accept change and creating a vision (Waddel, Cummings and Worley, 2004).

On one hand, leadership has been defined by Northouse (2004) as a process by which some individual influences a group of individuals to achieve common goals. Apparently, a leader who is able to deal with workers in change and shape them accordingly to follow the plan in order to achieve change is considered as an efficient leader (Kotter, 2012). Leader has a power to influence the employees to achieve target during that period (Brattianu & Anagnoste, 2011; Lussier & Achua, 2007). On the other hand, teachers' attitude towards organizational change has an important impact on the successful change process in schools if the school principal plays an important role in influencing teacher's attitudes toward organizational change. Previous research on education has shown that the ability of school leaders to manage change could give impact on school effectiveness (Fullan, 2007; Hallinger & Leithwood, 1996). Hence, principals have been identified as the important contributors to make the school innovation successful (Fullan,2001; Dixon, 1991). As mentioned in Malaysian Education Blueprint (2013-2015), shift 5 is to ensure high-performing school leaders in every school. International research on school leadership also shows that an outstanding principal who is focused on instructional and not administrative leadership can raise teacher quality and student outcomes (MOE, 2013). This shows that the factors of effective and influential leadership, which is the principals themselves, as well as teacher's attitude towards the transformation takes up a vital role in order for a particular transformation in schools to be implemented successfully.

ATTITUDE TOWARDS ORGANIZATIONAL CHANGE

Attitude towards organizational change is the internal factor that influences employee's selections of personal action, or a reaction tendency towards the change. It refers to the employees overall evaluative judgement, either positively or negatively, of an organizational change initiative implemented by organization (Lines, 2005). Attitude towards organizational change consists of three dimensions namely cognitive, affective and behavioral tendency (Dunham et al, 1989). The first dimension which is cognitive reaction towards change, refers to the beliefs about the need for change, the significance of change, the favorability of outcomes and the knowledge required to handle the change. The second dimension which is affective reaction towards change, refers to emotional state or feelings about the change ranging from positive emotions like pleasantness, excitement, enthusiasm and happiness to strong, negative emotions such as anger, resentment, frustration, anxiety, stress or fear. The third dimension is behavioral tendency towards change, refers to the extent to which employees would take action to support or initiate change, which means whether they want to move towards change or to go against change.

Readiness for change is a multifaceted concept, and involvement in the change process relates positively to emotional and intentional readiness for change (Bouckenooghe, et al., 2009). In scrutinizing the research on attitude towards organizational change, there are several terms appeared representing attitude such as readiness for change, commitment to change, openness to change and acceptance to change in regards to the positive term of attitude (Bernerth 2004; Chawla & Kelloway, 2004; Armenakis & Bede-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ian, 1999). On the other hand, terms like resistance to change, cynicism to change refers to the negative attitude towards change. (Bovey & Hede, 2001; Wanous, Reichers & Austin, 2000). Basically, all the terms are used interchangeably. These terms are having overlapping concept, and these attitude-related concepts, generally constrained to two constructs namely readiness to change and resistance to change (Bouckenooghe, 2009). Thus, it could be concluded that resistance to change is a negative attitude toward change, whereas readiness to change is a positive attitude toward change.

LEADERSHIP STYLES

Leaders succumb to various styles of leadership. Lussier and Achua (2007) stated that leadership style is the mixture of skills, traits and behaviors that used by leaders when they interact with followers. Studies exhibited that leadership styles are powerful influencing factors on subordinates' behavior and the use of different styles produce different outcomes (Hayes, 2013; Lynch, 2012; Klandermans & Roggebands, 2009). If employees are involved only at the implementation level of the change process, the role of the leader becomes even more important (Jones, Watson, Hobman, Bordia, Gallois & Callan, 2008). For example, the school principal is the most dominant factor in achieving the school's goals (Watts, 1980). The success of implementing any change or initiative in school depends very much on the school principal's leadership and ability to adapt to different situations (Friedman and Horowitz, 1998; Friedman, 1993; Fox, 1995). Undeniably, strong leaders are needed not only to create policies and procedures but also to push followers to perform beyond expectations and subsequently to achieve levels of excellence, sustain a positive culture, and motivate followers to become good leaders themselves.

The underpinning theory of this study is relating to the transactional leadership and transformational leadership styles advocated by Bass and Avolio (1993) that best fit into an organizational change. The style of transactional leadership is characterized by the circumstance when leader plays a role as a representative of change and supports the employees through fundamental change procedures that can enhance productivity. Whereas the style of transformational leadership infers that the leader authorizes the employees to assume the vision of the organization and is reflected into the enhancement of productivity, work satisfaction, employees' motivation and individual performance.

The transformational leadership style is represented by five dimensions; namely, idealized influence (attribute), idealized influence (behavior), inspirational motivation, intellectual stimulation and individualized consideration. On the other hand, there are also four dimensions of transactional leadership; namely contingent reward, active management by exception, passive management by exception and laissez-faire (Avolio & Bass, 2001). Among these two leadership styles, transformational leadership has been defined as "leader behaviors that transform and inspire followers to perform beyond expectations while transcending self-interest for the good of the organization" (Avolio et al., 2009, p. 423). Hence, transformational leadership has become the most frequently researched theory over the past two decades (Avolio, Walumbwa, & Weber, 2009; Judge & Bono, 2000) due to its dominant influence on followers' positive attitudes, behaviors, and levels of performance. It has extended other leadership theories through its focus on important behaviors that include motivating followers to commit to challenging goals, providing them with the confidence needed to perform beyond expectations, being role models for the organization, communicating and enthusiastic vision for the future, challenging the status quo, and developing their followers to meet their full potential (Bass & Avolio, 1990).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To date, numerous studies have shown that followers' commitment, loyalty, satisfaction, and performance are related to transformational leadership (Judge & Piccolo, 2004). This kind of leadership emphasizes how exceptionally effective leaders interact with followers in a manner that inspires them to higher levels of performance and commitment to their organizations (Bass, B. M. & Bass, R., 2009). This interaction is mainly realized through building trust, strong beliefs, values and vision of communication. Besides, leaders will express individual consideration about employees' development needs and encourage them to think out of the box to solve problem using intellectual stimulation (Bass & Avolio, 1994).

On the other hand, transactional leadership suggests leaders to approach followers with the intent of exchanging a reward for compliance (Burns, 1978). Since, the transactional leader's primary means of influence is through compliance, thus, a contractual type of agreement exists between the followers and leader by which duties and activities are accomplished for rewards. The rewards can be in terms of a follower's needs, including: economic, security, affiliation, or esteem. Normally, transactional leadership focuses on behaviors related to basic administrative and management tasks required for groups or organizations to function well in the short term. These behaviors include ensuring followers have the knowledge, skills, and resources required to accomplish their tasks. These behaviors lead to the creation of equitable reward systems, based on clear and explicit goals and performance expectations, and the delivery of rewards when performance is realized and goals are achieved (Rosenbach, Sashkin, & Harberg, 1996). On that note, transactional leadership also showed a positive influence on job satisfaction and organizational identification (Zhu, Sosik, Riggio & Yang 2012; Emery & Barker, 2007).

Hence, the combination of transformational and transactional leadership styles can be the most effective leadership styles in order to motivate employees by influencing their behaviors and attitudes, and improving their performance (Avolio & Bass, 2001). Transformational and transactional leadership styles, specifically the transformational leadership style, has been validated in numerous settings, yet there is no conclusion to be made on which standard leadership style is to be applied on standard setting. Different settings and cultures could make the leadership style being perceived differently (Bhagat & Steers, 2009). Apart from determining the relationship between the leadership styles and attitude towards organizational change, this study would like to see whether transformational or transactional leadership style, or both collectively, are applicable for the school setting. Furthermore, this study will help the principal to know how their teachers perceived their leadership styles.

RELATIONSHIP BETWEEN LEADERSHIP STYLES AND ATTITUDE TOWARDS ORGANIZATIONAL CHANGE

The past findings have clearly showed that leaders who were able to overcome resistance by making the employees ready for organizational change were considered as effective leaders (Armenakis & Bedeian, 1999; Armenakis & Harris, 2002; Foster, 2010; Holt, Armenakis, Field & Harris, 2007). Apparently, the role of leadership in an organization is critical in the organizational change process, particularly in creating readiness toward the change (Aarons, Sommerfeld, & Willging, 2011; Hammond, Gresch, & Vitale, 2011; Armenakis & Harris, 2009; Boga & Ensari, 2009; Choi, 2011; Gilley, Gilley, & Mcmillan, 2009).

Transformational and transactional leadership styles have been studied as the most important factor for leading certain types of change (Eisenbach, Watson & Pillai, 1999). However, transformational leadership style is widely known as an important leadership style for organizational change (Avolio & Bass, 2001). A study in mental health teams found that employees attitude towards innovative practice

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

showed positive relationship with transformational leadership style (Aarons & Sawitzky, 2006). Furthermore, attitude towards organizational change was also proven of having positive relationship with transformational leadership style during the first stage of downsizing initiative in Scandinavian study in team leadership (Svensen, Neset, & Eriksen, 2007).

Bass & Avolio (2003) found that there is a positive correlation between the transformational leadership style and high organizational performance. This is due to transformational leadership showed a positive influence on self-efficacy, motivation, creativity of the employee, and in return, directly influence the organizational performance (Pillai & Williams, 2004; Shin & Zhu, 2003). Besides that, there was a study showed that transformational leadership style has negative relationship with employees' cynicism towards organizational change in three Midwestern private companies (Bommer, Rich, & Rubin, 2005). Another study also found negative relationship between transformational leadership style and cynicism among the employees in a large organization in China (Wu, Neubert, & Yi, 2007). On the other hand, however, findings revealed that the relationship between transactional leadership styles and attitude towards organizational change were very scarce. There was one study showing a relationship between transactional leadership and readiness towards organizational change by Nordin (2011).

Obviously, arguments for the relevance of transformational leadership and attitude towards organizational change can be found extensively in the literature of transformational leadership. Empirical evidence supporting the theoretical assumptions on the positive impact of transformational leadership are available in various researches. However, the circumstances that may encourage transactional leadership on teacher's attitude towards organizational change were not sufficiently addressed in existing literature.

OBJECTIVES OF THE STUDY

1. To examine the attitude towards organizational change among secondary teachers in Selangor;
2. To identify the perceived leadership styles of the principal among secondary school teachers in Selangor;
3. To examine the influence of leadership styles on attitude towards organizational change among secondary school teachers in Selangor;
4. To identify the best principal leadership style for positive attitude of organizational change as perceived by secondary school teachers.

METHODOLOGY

This study was based on the adapted model from the Three-Stage planned change theory by Kurt Lewin (1947). This descriptive-correlational research study aims to examine, in an educational setting, the influence of leadership styles on attitude towards organizational change. This study employed the state cluster sampling design. The samples were drawn from secondary school teachers from nine districts in Selangor. By using G*power (Faul, Erdfelder, Lang & Buchner, 2007) analysis program and sample size recommended by Krejcie and Morgan (1970), a sample size of 360 was chosen. Hence, the respondents in this study are 360 teachers from daily secondary schools in Selangor. Teachers from secondary school was chosen in this study because most 15-year-old secondary school Malaysian students are involved in the international exams; namely, Trend in Mathematics and Science Study (TIMSS) and Programme for

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

International Student Assessment (PISA). The Organization for Economic Co-operation and Development (OECD) launched the triennial survey of 15-year-old students around the world. PISA assesses the extent to which 15-year-old students, near the end of their compulsory education, have acquired key knowledge and skills that are essential for full participation in modern societies. The assessment focuses on the core school subjects of science, reading and mathematics. Students' proficiency in an innovative domain of collaborative problem solving is also assessed (OECD, 2018). Both TIMSS and PISA tests indicated the quality of educational outcomes at the global state (Blueprint, 2013). This proves that it is crucial to use secondary school level as a benchmark of the Malaysian education quality.

Two self-rating questionnaires have been used as the research instrument to collect data from respondents. First, the inventory of attitude towards change developed by Dunham et al (1989) was used to determine teachers' attitudes towards organizational change. This instrument contains 18 items and 3 dimensions towards change. The reliability coefficient of the instrument was 0.925. Second, Multifactor Leadership Style Questionnaire (MLQ-5x form), developed by Bass and Avolio (2001) has been used to measure transformational and transactional leadership styles. This instrument contains 36 items and the reliability coefficient of the instrument was 0.967 for transformational leadership and 0.785 for transactional leadership.

All the items are rated on a Likert type scale ranging from 7 (strongly agree) to 1 (strongly disagree). Both descriptive and inferential statistics were used in the analysis. Descriptive statistics such as mean and standard deviation, and frequency and percent were used to describe the research variables. Pearson's Product Moment Correlation Coefficient (r) was used to examine the relationship between each of the independent variable with the dependent variable. Meanwhile, multiple regression analysis was used as a tool to identify the contribution of each of the significant independents variables towards the variance of attitude towards organizational change.

FINDINGS

This section presents the level of the attitude towards organizational change as the dependent variable. This discussion addresses the first research objective of the study that is: 'To examine the attitude towards organizational change among secondary school teachers in Selangor."

For descriptive data analyses purposes, three arbitrary levels were employed to ease the interpretation of the attitude towards organizational change frequency levels amongst teachers in the Selangor districts. Classification was derived by subtracting the lowest value from the highest value. The resulting value was then, divided proportionately into three parts to form the range values among the three categories that are high, moderate and low. Besides that, the descriptive statistics (namely, means, standard deviation, range frequency distribution and percentages) were computed on the dependent variable. A total of eighteen items with seven-point Likert scale ranging from; 1 = Strongly Disagree to 7 = Strongly Disagree, was used to measure all the three components under the attitude towards organizational change.

The following are the results and description of the teachers' attitude towards organizational change based on the total scores for the overall components.

The results in Table 1 indicates that for the composite construct of Attitude towards Organizational Change overall, the majority of the teachers (100%) reported a moderate (33.1%) to high level (66.9%). Indeed, none of the teachers showed low attitude towards organizational change score. The small standard deviation observed, indicated that most of the scores were bunching around the mean value. The

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. The mean level of overall attitude towards organizational change

Level	Frequency	Percentage
Low (1.00 – 2.99)	-	-
Moderate (3.00 – 4.99)	119	33.1
High (5.00 - 7.00)	241	66.9
Total	360	100

Note: Mean = 5.38, Min = 3.28, Max = 6.78, SD = 0.79

Table 2. Components of attitude towards organizational change mean scores

Component	Mean	Standard Deviation
Cognitive Reaction	5.73 (High)	0.81
Affective Reaction	5.37 (High)	1.28
Behavioral Reaction	5.04 (High)	0.95

Mean indicator: 1.00 – 2.99 (Low), 3.00 – 4.99 (Moderate), 5.00 – 7.00 (High)

mean value for the total score of attitude towards organizational change was 5.38. This seems to signal that overall, the teachers felt themselves to be having a highly positive attitude towards organizational change. Further analysis was conducted to examine each of the components in the attitude towards organizational change in Table 2.

Table 2 displays the mean and standard deviation scores of the three components of attitude towards organizational change. The mean scores were arranged in descending order and the result depicted that the mean scores of all the three domains range from 5.73 to 5.04 and the level of all components were high. Teachers showed the highest mean score of 5.73 in cognitive reaction component, followed by affective reaction component with a mean score of 5.37 and 5.04 mean score for behavioral reaction component.

The next section presents the level of the leadership styles as the independent variable to address the second research objective of the study that is: 'To identify the nature of principal leadership styles as perceived by secondary school teachers in Selangor. The Multifactor Leadership Style Questionnaire (MLQ-5X form) was used to assess the teachers' perceptions of principal's transformational and transactional leadership styles. Transformational leadership was assessed with five dimensions; namely of idealized influence (attribute), idealized influence (behavior), inspirational motivation, intellectual stimulation, and individual consideration. Transactional leadership style was assessed with four dimensions; namely, contingent reward, active management by exception, passive management by exception and laissez-faire. Teachers were asked to judge the extent to which their principals engaged in specific styles measured by the MLQ. Each style was rated on a 7-point scale ranging from 1 = strongly disagree, to 7 = strongly disagree. Table 3 presented the description of the school teachers' perceptions on transformational leadership style towards their principals based on total scores for the overall dimension.

Table 3. The mean level of overall transformational leadership style score

Level	Frequency	Percentage
Low (1.00 – 2.99)	20	5.6
Moderate (3.00 – 4.99)	196	54.4
High (5.00 - 7.00)	144	40
Total	360	100

Note: Mean = 4.66, Min = 2.3, Max = 6.20, SD = 0.94

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The results in Table 3 indicated that for the construct of transformational leadership style score. Based on the Likert scale used in the survey instrument that was 1 to 7, the results showed that the minimum rating was 2.30 and the maximum was 6.20 with a range of 3.90. The mean value for the total score was 4.66. This seems to signal that at overall; the teachers felt their principals were practicing moderate transformational leadership style such as in inspiring or motivating the teachers. Further analysis was conducted to examine each of the dimensions in transformational leadership style as presented in Table 4.

Table 4. The dimension of transformational leadership style

Dimensions	Mean	SD
Inspirational motivation	5.04	0.98
Idealized influence (Behavior)	4.87	1.03
Intellectual stimulations	4.61	1.02
Idealized influence (Attribute)	4.40	1.20
Individual considerations	4.39	1.06

Mean indicator: 1.00 – 2.99 (Low) 3.00 – 4.99 (Moderate) 5.00 – 7.00 (High)

Table 4 reports the mean and standard deviation scores for five dimensions associated with transformational leadership style. The mean scores for each transformational leadership style were arranged in descending order to rank them from the most to the least exhibited dimension of transformational leadership behavior. The daily secondary school teachers in the districts of Selangor perceived their principals' transformational leadership style as having highest score of inspirational motivation with 5.04 mean score. Meanwhile, the teachers perceived that their principals were moderately practiced the four transformational leadership style dimensions namely idealized influence (behavior), intellectual stimulation, idealized influence (attribute) and individualized consideration which were rated with 4.87, 4.61, 4.40 and 4.39 mean scores respectively.

Table 5 shows the results and description of the school teachers' perceptions on transactional leadership style towards their principals based on the total scores for the overall dimension.

Table 5. The mean level of overall transactional leadership style score

Level	Frequency	Percentage
Low (1.00 – 2.99)	20	5.6
Moderate (3.00 – 4.99)	314	87.2
High (5.00 - 7.00)	26	7.2
Total	360	100

Note: Mean = 4.30, Min = 2.25, Max = 5.88, SD = 0.64

Based on the Likert scale used in the survey instrument that was from 1 to 7, the results showed that the minimum rating was 2.25 and the maximum was 5.88 with a range of 3.63. The mean value for the total score was 4.30. This seems to signal that overall; the teachers felt their principals were practicing moderate transactional leadership style such as in rewarding or monitoring the teachers. Further analysis was conducted to examine each of the dimensions in transactional leadership style (Table 6).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 6. Transactional leadership style dimensions mean scores

Dimensions	Mean	SD	Indicator
Contingent reward	4.94 (moderate)	0.98	Moderate
Management by exception (Active)	4.76 (moderate)	1.03	Moderate
Laissez-faire	3.78 (moderate)	1.02	Moderate
Management by exception (Passive)	3.71 (moderate)	1.20	Moderate

Mean indicator: 1.00 – 2.99 (Low), 3.00 – 4.99 (Moderate), 5.00 – 7.00 (High)

Table 6 indicates the mean scores of the transactional leadership dimensions. The results revealed that all the dimensions in the transactional components mean scores were moderate. Ranked from the highest to the lowest, they are contingent reward, management by exception (active), laissez faire and management by exception (passive) means scores of 4.94. 4.76, 3.78 and 3.71 respectively.

Table 7 covers the findings pertaining to the relationship between the dependent variable and the independent variables. The purpose was to address the third objective that is: 'To examine the influence of leadership styles on attitude towards organizational change among secondary school teachers in Selangor. The results of the correlation between attitude towards organizational change and leadership style of the principal in daily secondary school were summarized in Table 7. The correlation coefficients showed each domain was individually compared to attitude towards organizational change and the result depicted that the domains showed positive to negative linear. The relationship strength also was varied from strong to weak. The elements of transformational leadership; idealized influence (behavior) (r=0.358, p=0.000), inspirational motivation (r=0.478, p=0.000) and intellectual stimulation (r=0.313, p=0.000) were found to have a moderate and positive linear relationship. The remaining elements namely idealized influence (attribute) (r=0.226, p= 0.000) and individualized consideration (r=0.190, p=0.000) showed weak but positive relationship.

As for transactional leadership domains, contingent reward and active management by exception showed moderate and positive (r=0.328, p=0.000) and (r=0.303, p=0.000) linear relationship. However, passive management by exception and laissez-faire correlates negatively with attitude towards organizational change with correlation coefficient values of (r=-0.107, p=0.042) and (r=-0.060, p=0.260) respectively.

Table 7. Correlation coefficient between leadership style and attitude towards organizational change

Dimensions	Attitude Towards Organizational Change
Overall transformational leadership	**0.348****
Idealized influence (attribute)	0.226**
Idealized influence (behavior)	0.358**
Inspirational motivation	0.478**
Intellectual stimulation	0.313**
Individualized consideration	0.190**
Overall transactional leadership	**0.185****
Contingent reward	0.328**
Management by exception (active)	0.303**
Management by exception (passive)	-0.107**
Laissez-faire	-0.060**

** Correlation is significant at 0.01 level

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 8 presented the analysis on the contribution of each of the significant predictors' variables towards the variance of the criterion variables. Based on the ENTER method, as shown in Table 8, the findings reveal that, out of two variables that were regressed, only one predictor variable was found to be significant. The predictor variable was transformational leadership style with its t and p values ($t = 6.021$, $p = 0.000$). Besides, Table 8 also indicates the coefficient of determination, that is, R squared. It is the value which indicates the percentage of total variation of the dependent variable explained by the independent variables.

Table 8. Multiple regression analysis on attitude towards organizational change

Dimensions	Un-Std. Coefficient		Std Coefficient	t	Sig.
	B	Std. Error	Beta		
Constant	3.828	0.279		13.708	0.000
Transformational	0.272	0.045	0.326	6.021	0.000
Transactional	0.066	0.066	0.054	1.004	0.316

Note: F Statistic = 25.128, $R^2 = 0.123$, Adjusted R = 0.118, sig. < 0.05

Therefore, as shown in Table 8, the total amount of variance of the criterion variable that was predictable from the predictor was 12.3%, and the adjusted R square change of 11.8%. Since the adjusted R square could give a better estimation of the true population value, the contribution of the predictor variable towards the variance in the criterion variable in this study was reported based on the adjusted R-square value. Therefore, the overall regression model was successful in explaining approximately 11.8% of the adjusted variance in attitude towards organizational change. A further analysis was carried out on the nine dimensions of transformational and transactional leadership styles to examine which of these components could be identified as the significant predictors of attitude towards organizational change. The purpose was to address the fourth objective that is: 'To identify the best principal leadership style for positive attitude towards organizational change as perceived by school teachers in Selangor.

Table 9. Multiple regression analysis on attitude towards organizational change with the nine dimensions of transformational and transactional leadership styles

Dimensions	Un-Std. Coefficient		Std. Coefficient	t	Sig.
	B	Std. Error	Beta		
Constant	*3.626*	*0.294*		*12.319*	*0.000*
Idealized influence (attribute)	0.049	0.054	0.075	0.908	0.364
Idealized influence (behavior)	-0.026	0.119	-0.034	-0.215	0.830
Inspirational motivation	0.675	0.085	0.848	7.938	0.000
Intellectual stimulation	-0.026	0.100	-0.034	-0.263	0.792
Individualized consideration	-0.204	0.064	-0.277	-3.192	0.002
Contingent reward	-0.059	0.075	-0.082	-0.792	0.429
Active management by exception	-0.083	0.073	-0.117	-1.138	0.256
Passive management by exception	-0.009	0.064	-0.013	-0.136	0.892
Laissez-faire	-0.001	0.049	0.002	0.018	0.986

Note: F Statistic = 15.567, R2 = 0.286, Adjusted R = 0.438 sig. < 0.05

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The findings in Table 9 revealed that two out of nine transformational and transactional leadership styles predictors had significant relationship ($p < 0.05$) with the overall attitude towards organizational change score. For these data, all the two dimensions namely inspirational motivation and individualized consideration which both from the transformational leadership style were the significant predictor of the attitude towards organizational change ($t = 7.983$, $p = 0.000$) and ($t = -3.192$, $p = 0.002$) respectively.

DISCUSSION

At recent times, we notice that the world is changing fast. The changes, that is, transitions occurred in all aspects of the world may be self-directed and are usually triggered by external environment. Tekeli (2003) argued that changes from an industrial society to a knowledge society, alterations from nation-states to global world and from modern to postmodern way of thinking have a tremendous impact on educational systems of many countries. On that note, the attitude of the teachers towards organizational change and the influence of the leadership styles of the school principal have become key issues to be discussed in this study.

Obviously, there were positive cognitive reactions portrayed by the teachers in this survey. According to Bouckenooghe (2009), cognitive reaction to change refers to beliefs of people about the need for organizational change, the significance of it and the favorability of the outcomes from the organizational change. Thus, it could be inferred as the mindset of the teachers showing that they are ready to accept change as according to Dunham et al (1989), those who have positive cognitive reaction towards change are looking forward to organizational change and support it and they think that people in the organization will get benefit from the organizational change as well.

Meanwhile, the affective reaction to change in this survey also showed a positive sign. However, there was no negative affective reaction towards change showed by the teachers because those who are having negative affective reaction will resist new ideas, do not like the organizational change, they also feel frustrated and irritated by the organizational change (Dunham et al, 1989).

The last dimension, behavioral tendency to change, which refers to the actions for or against change also received an encouraging response from the teachers. They showed positive behavioral tendency meaning that the organizational change would help them to perform better by stimulating them, improve unsatisfactory situation at their organization and they intend to do whatever possible to support organizational change (Dunham et al, 1989). The leader's daily activities and decisions reflect the pervasive focus and style of the school's leadership (Noonan & Walker, 2008). School administrators who build school capacity through an effective leadership style may influence student achievement through teachers (Christie, Thompson, & Whiteley, 2009). Hence, the school leader must develop the capacity to work with teachers to focus on curriculum, instruction and student learning gains (Fullen, 2001). Undeniably, a teacher-focused leader who works toward the development of school capacity will builds upon positive teacher capacity with the end results of increasing students' academic achievement.

The findings showed that the teachers in this study already possessed positive attitude towards organizational change in terms of cognitive reaction, affective reaction and behavioral reaction. Hence, the organizational change to be specific, the Malaysian Education Blueprint that has been introduced by the government could be positively accepted by the teachers. Referring to Eby et al (2000) positive attitude towards organizational change was found to be crucial in accomplishing organizational aims and also in succeeding the change programs. What is expected from education is no longer to enable individuals

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to compete with others. On the contrary, societies should be educated to compete with each other to challenge with the changing concepts of the world (Dülger, 2002).

Based on the findings on the leadership styles, when the teachers rank inspirational motivation with a prominent mean score, it can be concluded that teachers perceived their principals articulate a compelling vision for the team's future and able to motivate them whereas leaders with inspirational motivation could induce positive attitude among employees (Avolio and Bass, 2001). The actions of school leader's impact on school capacity may enhance student achievement. School capacity is defined as the collective power of a teacher to raise student achievement (King & Youngs, 2002). An effective educational leader is one who has the ability to develop a school's capacity to enhance student learning through the motivation of teachers, staff and students (Daley, Guarino & Santibanez, 2006). Such leadership is determined by the followers, not the leaders (Bhindi, Hansen, Rall, Riley, & Smith, 2008). Therefore, it may be claimed that student achievement is affected by the teacher's perception of school leadership.

The data analysis suggested that most of the principals exercised the four transformational leadership dimensions moderately as perceived by the teachers. It can be inferred that they have adequately become a trusted role model in behavior or attribute and adequately engaged teachers in dealing with problems in new ways in their work and adequately pay attention to each employee's needs and goals. As a whole, it could be said that the respondents perceived their principals also exhibited adequate transformational leadership behavior.

When portraying transactional leadership style as falling along a continuum scale, Bass (1995) displayed contingent reward as the highest level while laissez-faire at the lower end of the continuum. Based on the results, the majority of the teachers perceived that their principals succumb ranked contingent reward dimension the highest for transactional leadership. It can be inferred that the principals adequately set out clear goals and expectations and rewards teachers for working toward them. Referring to Peters and Waterman (1982) research, they found that contingent rewards among top rated companies were frequently used to provide reinforcement for task completion. Followed by active management by exception which explained the principals adequately monitor teachers for mistakes and try to correct them.

The finding also revealed that some principals exhibited laissez faire characteristics as they avoid making decisions and were typically absent when needed. Passive management by exception was ranked the lowest moderate level portraying that principals seldom wait for mistakes to occur before acting to correct them. As a whole, it could be said that the respondents perceived their principals exhibited adequate transactional leadership style, and rare of laissez faire leadership style.

According to Burns (1978) and Avolio (1999), leaders who embrace the elements of transformational leadership behavior inspire, motivate and facilitate strategic renewal by empowering their staff members to question old assumptions. On the other hand, the transactional leadership styles are based on assignment and task-oriented. Task completion and employee compliance are mandated and enforced by organizational rewards and punishments designed to influence both compliance and performance (Burn, 1978).

The findings suggested, the majority of the respondents perceived their principals as showing a moderately transformational and transactional leadership styles. However, the data revealed that the mean score of transformational leadership style was higher than the mean score of transactional leadership style indicating that secondary school teachers in Selangor perceived that their principals exhibited a transformational leadership style rather than transactional leadership style.

For discussion on the relationship between transformational and transactional leadership styles and attitude towards organizational change, the finding was also in line with the previous literatures in the change context that stated transformational leaders were positively related to attitude towards

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

organizational change (Svensen, Neset & Eriksen, 2007; Aarons & Sawitzky, 2006). Therefore, this study provides empirical evidence that the transformational leadership styles where principals provide inspiration, intellectual stimulation, individualized consideration and idealized influence are able to create positive attitude towards organizational change among their teachers in the organization. Apart from transformational leadership, the results also showed that the transactional style of leadership that provides rewards when employees demonstrate performance also influences attitude towards organizational change. As mentioned by Kotter (2012) and Tichy and Devanna (1986), a leader has to create readiness for change. Transactional leadership occurs when leaders reward or discipline the followers depending on the adequacy of their performance, and depends on contingent reinforcement, either positive contingent reward or negative forms of management (Bass, 1998). Hence, leaders must prepare people for an ongoing change to provide long term growth and stability. Effective principals have to create a constructive change process, getting teachers involved in the change process so that resistance to change can give way to new developments.

The significant predictors of the transformational and transactional leadership styles on the attitude towards organizational change results also mirrored that different leadership styles were significantly related to the attitude towards organizational change. Inspirational motivation and individualized consideration were predicting attitude towards organizational change. Transformational leadership style with inspirational motivation is about the way leaders motivate their followers by optimistically looking at the future, emphasizing ambitious goals, projecting an idealized vision and communicating to followers that the vision is attainable (Bass & Avolio, 1993).

Furthermore, the fact that teachers attitude towards organizational change was predicted by inspirational motivation is congruent with Lewin's (1947) three-stage planned theory. During the unfreezing stage, the key leadership role is to motivate and to create a vision in order to make the employees to accept the organizational change. The second predictor was the leaders with individualized consideration who signify organizational mentors as they show a high concern towards employees and treat them as an important mechanism of an organization (Barbuto, 2005). Therefore, principals who motivate teachers and show concern are able to influence attitude towards the organizational change of the teachers.

In sum, transformational leadership style was found to be positively linked attitude towards organizational change at a significant level of 0.05. Thus, indicated that attitude towards organizational change could occur in situations where teachers showed positive attitude towards organizational change if principals showed transformational leadership style.

RECOMMENDATION

In order to make teachers ready to perform new task, school principals should be able to motivate and support them. According to Burke (2008), employees resist to change or to perform new task is due to the fear of the unknown. Professional development programs could be introduced to prepare the teachers to face the organizational change. Resistance towards organizational change could be overcome if teachers think that they have adequate knowledge and skills. Furthermore, school principals should equip themselves with transformational leadership style so as to be able to analyze the organizational change results and its limitations to ensure that the implemented change is at the desired state.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

Teachers' attitude towards organizational change is greatly influenced by the transformational leadership style. Positive attitude towards organizational change becomes the critical factor which leads teachers to accept change. The envisage transformation planned change by the Malaysian government needs teachers as the key players and with the help of principal leadership styles as a complementary role.

REFERENCES

Aarons, G. A., & Sawitzky, A. C. (2006). Organizational culture and climate and mental health provider attitudes toward evidence-based practice. *Psychological Services*, *3*(1), 61–72. doi:10.1037/1541-1559.3.1.61 PMID:17183411

Aarons, G. A., Sommerfeld, D. H., & Willging, C. E. (2011). The soft underbelly of system change: The role of leadership and organizational climate in turnover during statewide behavioral health reform. *Psychological Services*, *8*(4), 269–281. doi:10.1037/a0026196 PMID:22229021

Antonakis, J., Avolio, B. J., & Sivasubramaniam, N. (2003). Context and leadership: An examination of the nine-factor full-range leadership theory using the Multifactor Leadership Questionnaire. *The Leadership Quarterly*, *14*(3), 261–295. doi:10.1016/S1048-9843(03)00030-4

Antoniou, A. S. G., & Cooper, C. L. (Eds.). (2005). *Research companion to organizational health psychology*. Edward Elgar Publishing. doi:10.4337/9781845423308

Armenakis, A., Harris, S. G., & Mossholder, K. W. (2000). *Creating readiness for organizational change*. Sage Publishing.

Armenakis, A. A., & Bedeian, A. G. (1999). Organizational change: A review of theory and research in the 1990s. *Journal of Management*, *25*(3), 293–315. doi:10.1177/014920639902500303

Armenakis, A. A., & Harris, S. G. (2002). Crafting a change message to create transformational readiness. *Journal of Organizational Change Management*, *15*(2), 169–183. doi:10.1108/09534810210423080

Armenakis, A. A., & Harris, S. G. (2009). Reflections: Our journey in organizational change research and practice. *Journal of Change Management*, *9*(2), 127–142. doi:10.1080/14697010902879079

Avissar, G. (2002). Teachers discuss inclusion: current status. *Issues regarding Special Education and Rehabilitation, 17*, 15-24.

Avissar, G., Reiter, S., & Lesyer, Y. (2003). Inclusion of special education students in general education: The school principal as the change agent. *Issues in Management and Educational Organization*, *27*, 62–92.

Avolio, B. J. (1999). Full leadership development: Building the vital forces in organizations. *Sage (Atlanta, Ga.)*.

Avolio, B. J., & Bass, B. M. (Eds.). (2001). *Developing potential across a full range of Leadership Tm: Cases on transactional and transformational leadership*. Psychology Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Avolio, B. J., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: Current theories, research, and future directions. *Annual Review of Psychology*, *60*(1), 421–449. doi:10.1146/annurev.psych.60.110707.163621 PMID:18651820

Barbuto, J. E. Jr. (2005). Motivation and transactional, charismatic, and transformational leadership: A test of antecedents. *Journal of Leadership & Organizational Studies*, *11*(4), 26–40. doi:10.1177/107179190501100403

Bass, B. M. (1995). Theory of transformational leadership redux. *The Leadership Quarterly*, *6*(4), 463–478. doi:10.1016/1048-9843(95)90021-7

Bass, B. M., & Avolio, B. J. (1993). Transformational leadership and organizational culture. *Public Administration Quarterly*, 112–121.

Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *The Journal of Applied Psychology*, *88*(2), 207–218. doi:10.1037/0021-9010.88.2.207 PMID:12731705

Bass, B. M., & Bass, R. (2009). *The Bass handbook of leadership: Theory, research, and managerial applications*. Simon and Schuster.

Benn, S., Dunphy, D., & Griffiths, A. (2014). *Organizational change for corporate sustainability*. London: Routledge.

Bernerth, J. (2004). Expanding our understanding of the change message. *Human Resource Development Review*, *3*(1), 36–52. doi:10.1177/1534484303261230

Bhagat, R. S., & Steers, R. M. (Eds.). (2009). *Cambridge Handbook of Culture, Organizations, and Work*. Cambridge University Press. doi:10.1017/CBO9780511581151

Boga, I., & Ensari, N. (2009). The role of transformational leadership and organizational change on perceived organizational success. *The Psychologist Manager Journal*, *12*(4), 235–251. doi:10.1080/10887150903316248

Bommer, W. H., Rich, G. A., & Rubin, R. S. (2005). Changing attitudes about change: Longitudinal effects of transformational leader behavior on employee cynicism about organizational change. *Journal of Organizational Behavior*, *26*(7), 733–753. doi:10.1002/job.342

Bouckenooghe, D. (2010). Positioning change recipients' attitudes toward change in the organizational change literature. *The Journal of Applied Behavioral Science*, *46*(4), 500–531. doi:10.1177/0021886310367944

Bovey, W. H., & Hede, A. (2001). Resistance to organisational change: The role of defence mechanisms. *Journal of Managerial Psychology*, *16*(7), 534–548. doi:10.1108/EUM0000000006166

Bratianu, C., & Anagnoste, S. (2011). The role of transformational leadership in mergers and acquisitions in emergent economies. *Management & Marketing*, *6*(2), 319.

Brown, K., & Wynn, S. (2009). Finding, supporting, and keeping: The role of the principal in teacher retention issues. *Leadership and Policy in Schools*, *8*(1), 37–63. doi:10.1080/15700760701817371

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Burke, W. W. (2008). *Organization Change Theory and Practice* (2nd ed.). Los Angeles, CA: Sage Publications.

Burnes, B. (2004). Kurt Lewin and the planned approach to change: A re-appraisal. *Journal of Management Studies*, *41*(6), 977–1002. doi:10.1111/j.1467-6486.2004.00463.x

Burns, J. M. (1978). *Leadership New York*. Harper and Row Publishers.

Chaston, I. (2012). *Public sector reformation: values-driven solutions to fiscal constraint*. Palgrave Macmillan. doi:10.1057/9780230379350

Chawla, A., & Kevin Kelloway, E. (2004). Predicting openness and commitment to change. *Leadership and Organization Development Journal*, *25*(6), 485–498. doi:10.1108/01437730410556734

Cheah, U. H. (2010, February). Assessment in primary mathematics classrooms in Malaysia. *Fourth APEC-Tsukuba International Conference: Innovation of Mathematics Teaching and Learning through Lesson Study-Connection between Assessment and Subject Matter*.

Choi, M. (2011). Employees' attitudes toward organizational change: A literature review. *Human Resource Management*, *50*(4), 479–500. doi:10.1002/hrm.20434

Christie, K., Thompson, B., & Whiteley, G. (2009). *Strong leaders, strong achievement: Model policy for producing the leaders to drive student success*. Education Commission of the States.

Cohen, E. (2015). Principal leadership styles and teacher and principal attitudes, concerns and competencies regarding inclusion. *Procedia: Social and Behavioral Sciences*, *186*, 758–764. doi:10.1016/j.sbspro.2015.04.105

Darling-Hammond, L. (2006). Constructing 21st-century teacher education. *Journal of Teacher Education*, *57*(3), 300–314. doi:10.1177/0022487105285962

Dinh, J. E., Lord, R. G., Gardner, W. L., Meuser, J. D., Liden, R. C., & Hu, J. (2014). Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives. *The Leadership Quarterly*, *25*(1), 36–62. doi:10.1016/j.leaqua.2013.11.005

Dixon, V. D. (1991). A study of change: Principals as facilitators and teachers as implementors during year one of an innovation (Ed.D.). Columbia University Teachers College. (AAT 9210531)

Dulger, I. (2004, May). *Case study on Turkey rapid coverage for compulsory education program. In conference on scaling up poverty reduction, Shanghai, China*. Retrieved from http://siteresources.WorldBank.org/INTTURKEY/Resources/Compulsory_Education.pdf

Dunham, R. B., Grube, J. A., Gardner, D. G., Cummings, L. L., & Pierce, J. L. (1989). *The inventory of change in organizational culture*. Madison, WI: Authors.

Eby, L. T., Adams, D. M., Russell, J. E., & Gaby, S. H. (2000). Perceptions of organizational readiness for change: Factors related to employees' reactions to the implementation of team-based selling. *Human Relations*, *53*(3), 419–442. doi:10.1177/0018726700533006

Eisenbach, R., Watson, K., & Pillai, R. (1999). Transformational leadership in the context of organizational change. *Journal of Organizational Change Management*, *12*(2), 80–89. doi:10.1108/09534819910263631

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Emery, C. R., & Barker, K. J. (2007). The effect of transactional and transformational leadership styles on the organizational commitment and job satisfaction of customer contact personnel. *Journal of Organizational Culture. Communications and Conflict*, *11*(1), 77.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. doi:10.3758/BF03193146 PMID:17695343

Foster, R. D. (2010). Resistance, justice, and commitment to change. *Human Resource Development Quarterly*, *21*(1), 3–39. doi:10.1002/hrdq.20035

Fullan, M. (2001). *Leading in a culture of change*. San Francisco: Jossey-Bass.

Fullan, M. (2002). The change. *Educational Leadership*, *59*(8), 16–20.

Fullan, M. (2007). *The new meaning of educational change*. Routledge.

Ghanizadeh, A., & Jalal, F. K. C. (2017). A Study of Iranian EFL Teachers' Attributions, Job Satisfaction, and Stress at Work. *The Alberta Journal of Educational Research*, *63*(3).

Gilley, A., McMillan, H. S., & Gilley, J. W. (2009). Organizational change and characteristics of leadership effectiveness. *Journal of Leadership & Organizational Studies*, *16*(1), 38–47. doi:10.1177/1548051809334191

Gu, H., Duverger, P., & Yu, L. (2017). Can innovative behavior be led by management? A study from the lodging business. *Tourism Management*, *63*, 144–157. doi:10.1016/j.tourman.2017.06.010

Hallinger, P., & Leithwood, K. (1996). Culture and educational administration: A case of finding out what you don't know you don't know. *Journal of Educational Administration*, *34*(5), 98–116. doi:10.1108/09578239610148296

Hammond, G. D., Gresch, E. B., & Vitale, D. C. (2011). Homegrown process improvement employing a change message model. *Journal of Organizational Change Management*, *24*(4), 487–510. doi:10.1108/09534811111144638

Hardman, B. K. (2011). *Teachers' perception of their principal's leadership style and the effects on student achievement in improving and non-improving schools* (500th ed.). University of South Florida.

Hayes, N. (2013). *Principles of Social Psychology*. Psychology Press.

Holt, D. T., Armenakis, A. A., Feild, H. S., & Harris, S. G. (2007). Readiness for organizational change: The systematic development of a scale. *The Journal of Applied Behavioral Science*, *43*(2), 232–255. doi:10.1177/0021886306295295

Jackson, T. A., Meyer, J. P., & Wang, X. H. (2013). Leadership, commitment, and culture: A meta-analysis. *Journal of Leadership & Organizational Studies*, *20*(1), 84–106. doi:10.1177/1548051812466919

Jones, L., Watson, B., Hobman, E., Bordia, P., Gallois, C., & Callan, V. J. (2008). Employee perceptions of organizational change: Impact of hierarchical level. *Leadership and Organization Development Journal*, *29*(4), 294–316. doi:10.1108/01437730810876122

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Judge, T. A., & Hurst, C. (2008). How the rich (and happy) get richer (and happier): Relationship of core self-evaluations to trajectories in attaining work success. *The Journal of Applied Psychology*, *93*(4), 849–863. doi:10.1037/0021-9010.93.4.849 PMID:18642988

Jung, D. I., Bass, B. M., & Sosik, J. J. (1995). Bridging leadership and culture: A theoretical consideration of transformational leadership and collectivistic cultures. *The Journal of Leadership Studies*, *2*(4), 3–18. doi:10.1177/107179199500200402

Kasapoğlu, K. O. R. A. Y. (2010). *Relations between classroom teachers' attitudes toward change, perceptions of "constructivist" curriculum change and implementation of constructivist teaching and learning activities in class at primary school level*. Ankara: Yüksek Lisans Tezi. Ortadoğu Teknik Üniversitesi. Sosyal Bilimler Enstitüsü.

Kerin, R. (2010). *The process of change in leadership development: Using 360-degree feedback to study the roles of reflection, planning, and support* (Doctoral dissertation). The George Washington University.

Klandermans, B., & Roggeband, C. (Eds.). (2007). *Handbook of Social Movements Across Disciplines*. Springer.

Kotter, J. (2012). Leading change (New ed.). Boston: Harvard Business Review.

Kotter, J. P. (2008). *A sense of urgency. America*. Harvard Business Press.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607–610. doi:10.1177/001316447003000308

Leithwood, K., & Mascall, B. (2008). Collective leadership effects on student achievement. *Educational Administration Quarterly*, *44*(4), 529–561. doi:10.1177/0013161X08321221

Leithwood, K., & Riehl, C. (2005). *What we know about successful school leadership. In A New Agenda: Directions for Research on Educational Leadership*. New York: Teacher College Press.

Lewin, K. (1947). Frontiers in group dynamics: Concept, method and reality in social science; social equilibria and social change. *Human Relations*, *1*(1), 5–41. doi:10.1177/001872674700100103

Liao, H., & Chuang, A. (2007). Transforming service employees and climate: A multilevel, multisource examination of transformational leadership in building long-term service relationships. *The Journal of Applied Psychology*, *92*(4), 1006–1019. doi:10.1037/0021-9010.92.4.1006 PMID:17638461

Lines, R. (2005). The structure and function of attitudes toward organizational change. *Human Resource Development Review*, *4*(1), 8–32. doi:10.1177/1534484304273818

Louis, K., & Marks, H. (1999). Teacher empowerment and the capacity for organizational learning. *Educational Administration Quarterly*, *35*(5), 707–750. doi:10.1177/0013161X99355003

Louis, K., Mayrowetz, D., Murphy, J., & Smylie, M. (2007). Trust and the development of distributed leadership. *Journal of School Leadership*, *17*(4), 469–503.

Lussier, R. N., & Achua, C. F. (2007). *Effective leadership*. Thomson South-Western.

Lynch, M. (2012). *A Guide to Effective School Leadership Theories*. Routledge.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Martin, E. (1992). The end of the body? *American Ethnologist*, *19*(1), 121–140. doi:10.1525/ae.1992.19.1.02a00070

MOE. (2013). *Preliminary Report Malaysian Education Blueprint 2013-2025*. Putrajaya: Ministry of Education. Retrieved from https://www.moe.gov.my/images/dasar-kpm/articlefile_file_003108.pdf

Nijhof, J. M., Jong, M. J., & Beukhof, G. (1998). Employee commitment in changing organizations: An exploration. *Journal of European Industrial Training*, *22*(6), 243–248. doi:10.1108/03090599810224701

Noor, N. M., & Sahip, S. (2010). Pelaksanaan Pentaksiran Kerja Kursus Berasaskan Sekolah Bagi Mata-pelajaran Kemahiran Hidup Di Sekolah Menengah Kebangsaan Daerah Johor Bahru, Kawasan Skudai. *JurnalPendidikan*, *24*(3), 102–110.

Nordin, N. (2011). The influence of emotional intelligence, leadership behaviour and organizational commitment on organizational readiness for change in higher learning institution. *Procedia: Social and Behavioral Sciences*, *29*, 129–138. doi:10.1016/j.sbspro.2011.11.217

Northouse, P. G. (2015). *Leadership: Theory and Practice*. Sage Publications.

Opatokun, K. A., Hasim, C. N., & Hassan, S. S. S. (2013). Authentic leadership in higher learning institution: A case study of international Islamic university Malaysia (IIUM). *International Journal of Leadership Studies*, *8*(1), 49–66.

Osborne, S. P., & Brown, L. (Eds.). (2013). *Handbook of innovation in public services*. Edward Elgar Publishing.

Peters, T. J., Waterman, R. H., & Jones, I. (1982). *In search of excellence: Lessons from America's best-run companies*. HarperCollins.

Pillai, R., & Williams, E. A. (2004). Transformational leadership, self-efficacy, group cohesiveness, commitment, and performance. *Journal of Organizational Change Management*, *17*(2), 144–159. doi:10.1108/09534810410530584

Razak, N. A., Darmawan, I. G. N., & Keeves, J. P. (2010). The influence of culture on teacher commitment. *Social Psychology of Education*, *13*(2), 185–205. doi:10.100711218-009-9109-z

Schein, E. H. (1996). Kurt Lewin's change theory in the field and in the classroom: Notes toward a model of managed learning. *Systems Practice*, *9*(1), 27–47. doi:10.1007/BF02173417

Shin, S. J., & Zhou, J. (2003). Transformational leadership, conservation, and creativity: Evidence from Korea. *Academy of Management Journal*, *46*(6), 703–714. doi:10.2307/30040662

Strom, D. L., Sears, K. L., & Kelly, K. M. (2014). Work engagement: The roles of organizational justice and leadership style in predicting engagement among employees. *Journal of Leadership & Organizational Studies*, *21*(1), 71–82. doi:10.1177/1548051813485437

Svensen, E., Neset, G., & Eriksen, H. R. (2007). Factors associated with a positive attitude towards change among employees during the early phase of a downsizing process. *Scandinavian Journal of Psychology*, *48*(2), 153–159. doi:10.1111/j.1467-9450.2007.00577.x PMID:17430368

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Tan, A. M. (2010). *Pentaksiran berasaskan sekolah (PBS) di Malaysia: kesediaan guru, isu, dan panduan pelaksanaan*. Gerakbudaya Enterprise.

Tichy, N. M., & Devanna, M. A. (1986). *The Transformational Leader*. New York: Wiley.

Utusan Online. (2007). *Pelan Induk Pembangunan Pendidikan*. Retrieved from http://ww1.utusan.com.my/utusan/info.asp?y=2007&dt=0118&sec=Pendidikan&pg=pe_01.htm

Waddell, D., Cummings, T. G., & Worley, C. G. (2004). *Organisation Development & Change*. Thomson.

Wanani, D. (2017). *The role of psychological ownership in influencing evolutionism in organizational change*. GRIN Verlag Publisher.

Wanous, J. P., Reichers, A. E., & Austin, J. T. (2000). Cynicism about organizational change: Measurement, antecedents, and correlates. *Group & Organization Management*, *25*(2), 132–153. doi:10.1177/1059601100252003

Wiboonuppatum, R. (2002). Evaluating the quality of an elementary school in rural Thailand: Villagers' perspectives. *Examining the Effectiveness of Executive Coaching on Executives*, *3*(2), 104.

Wu, C., Neubert, M. J., & Yi, X. (2007). Transformational leadership, cohesion perceptions, and employee cynicism about organizational change: The mediating role of justice perceptions. *The Journal of Applied Behavioral Science*, *43*(3), 327–351. doi:10.1177/0021886307302097

Youngs, P., & King, M. B. (2002). Principal leadership for professional development to build school capacity. *Educational Administration Quarterly*, *38*(5), 643–670. doi:10.1177/0013161X02239642

Zhu, W., Sosik, J. J., Riggio, R. E., & Yang, B. (2012). Relationships between transformational and active transactional leadership and followers' organizational identification: The role of psychological empowerment. *Journal of Behavioral and Applied Management*, *13*(3), 186.

This research was previously published in Predictive Models for School Leadership and Practices; pages 219-240, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 9
Developing Project Management Maturity as an Organizational Change Process

Gilbert Silvius
LOI University of Applied Sciences, The Netherlands & University of Johannesburg, South Africa

ABSTRACT

The entanglement of project management and the management of organizational change is not reflected in the literature on and standards of project management maturity. Studies on maturity concentrate on identifying the components that determine an organization's maturity, the levels in which this maturity can be expressed, and the effects of maturity. However, the process of changing from one level to another level is hardly or not addressed. By taking an organizational change perspective on developing maturity, this chapter develops a framework that provides guidance for the development of maturity. For every transition, from one level to another, a set of interventions is provided that addresses both the hard and the soft dimensions of organizational change. Successful project management maturity development requires that equal attention is being paid to both the hard and the soft dimensions of organizational change. The framework developed in this chapter provide guidance for this.

INTRODUCTION

The ability or competence of an organization to successfully perform projects, often addressed as Project Management Maturity, is considered of strategic importance for the success of that organization (Srivannaboon, 2006). In today's dynamic business environment, organizations need to constantly anticipate or react on developments in their markets (Doppler et al., 2008). And projects are temporary organizations that are instrumental in realizing these changes in organizations (Silvius et al., 2012). Projects and organizational change are therefore concepts that are inseparable, with as a logical consequence the integration of aspects of change management into the discipline of project management (Pollack & Algeo, 2014).

DOI: 10.4018/978-1-7998-7297-9.ch009

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

This entanglement of project management and the management of organizational change is not reflected in the literature on project management maturity. Studies on maturity seem to concentrate on identifying the components that determine an organization's maturity, and the levels in which this maturity can be expressed (Batenburg et al., 2014). The resulting maturity models therefore quite often result in a matrix of components and levels, that for each component provides descriptions of the defining characteristics of each level. Following the capability maturity model (CMM), most maturity models recognize four or five levels (Pöppelbuß & Röglinger, 2011). However, the process of changing from one level to another level is hardly or not addressed. The descriptions of the different levels for each component provide a certain amount of direction for this change, but it would be underestimating the complexity of organizational change to assume that this suffices for the change of developing maturity. Project management maturity models focus on the 'What?' of developing project management maturity, not on the 'How?'.

It is this observation that forms the inspiration for this chapter. In this chapter we plan to discuss the process of developing project management maturity from an organizational change perspective. What approaches can be derived from the theory of organizational change, in order to develop project management maturity in an organization? And factors impact the effectiveness of the approach?

In order to answer these questions, this chapter is structured as follows. After the introduction, the following paragraph will discuss the approaches to organizational change and the evolving insights on this. In the paragraph following this one, we will discuss the concept of project management maturity and the main standards for maturity. We will then apply the insights from organizational change to the concepts of project management maturity in the development of a framework for the development of maturity.

A CONTINGENCY APPROACH TO ORGANIZATIONAL CHANGE

While there appears to be consensus about that organizations are subject to frequent, and perhaps even continuous, change, the management of these changes remains an area of debate. Traditional models of organizational change depict organizational change as a linear and planned process. An example of such a model is Lewin's well-known model that depicts the change process as three-stages (Lewin, 1947):

- **Unfreezing:** Ensuring that employees are ready for change;
- **Change:** Executing the intended change;
- **Re-Freezing:** Ensuring that the change becomes permanent.

Also Kotter (1995), in his article on change management, suggests that change develops in a series of phases and that it requires a considerable length of time (Kotter, 1995). This series of phases can be summarized as:

- Establishing a sense of urgency;
- Forming a powerful guiding coalition;
- Creating a vision;
- Sharing the vision;
- Empowering others to act on the vision;
- Planning for and creating short-term wins;
- Consolidating improvements and producing still more change;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

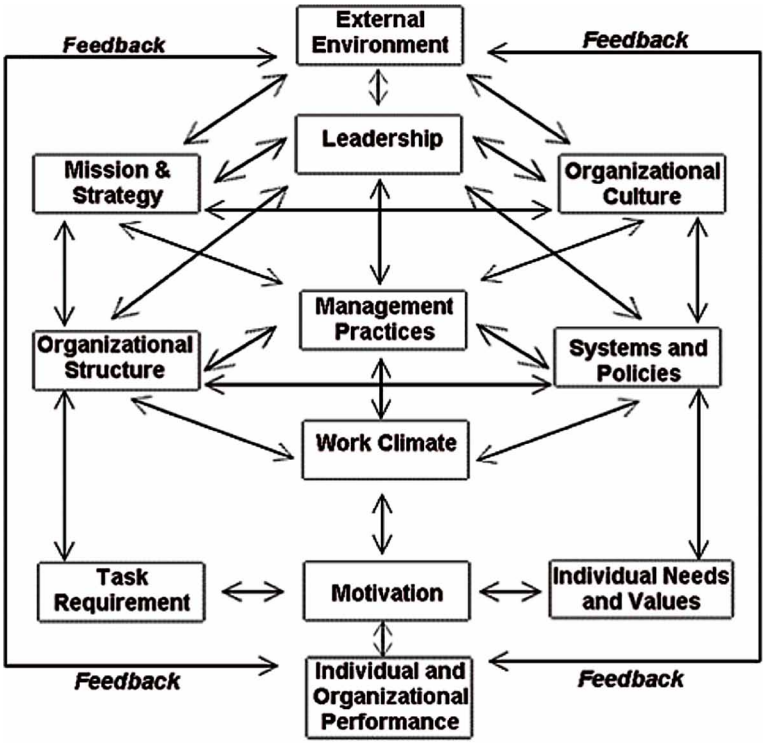
- Institutionalizing the new approaches.

Despite the contribution that these seminal process models made to the understanding of organizational change, the critique on these models pointed out that the practice of change is much more chaotic, with frequent change to react to or anticipate on an equally rapidly changing environment (Gleick, 1987). Also the assumption of a planned and controlled change, that is inherent to the process models, is contested, as change often creates resistance that makes control of the change impossible.

Later authors, such as Homan (2005) and de Caluwé and Vermaak (2004), therefore describe organizational change as a much more continuous process, that only to a limited degree can be controlled. Homan adds to this the insight that different actors in the change process often create their own vision of the change. According to him, organizational change is not the outcome of a univocal centrally planned process, but a multivocal decentrally emerging reality.

Burke and Litwin (1992) built upon the view of organizational change as a rather chaotic process in their model of transactional factors effecting organizational performance and change (Figure 1).

Figure 1. Overview of the transaction factors of organizational performance and change
Burke & Litwin, 1992.



The Burke and Litwin model shows that changing an aspect within an organization, for example the organizational structure or a work process, cannot be considered in isolation. An "organization' constitutes of several interconnected dimensions or elements and changing one dimension will effect also

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

other aspects of the organization. This perspective can also be found in the McKinsey 7S model, that received wide attention with the 1982 bestselling book "In search of Excellence" (Peters and Waterman, 1982). The 7S model shows 7 interconnected dimensions of an organization (Table 1). Of the different dimensions, 'Strategy', 'Structure', 'Systems' and 'Staff' are considered the 'hard' dimensions of an organization, as described in regulations, documents, quality handbooks, procedures, standards, etc. The dimensions 'Style/Culture', 'Skills' and 'Shared values' are more intangible in nature and are considered the 'soft' dimensions of the organization.

Table 1. The 7 organizational dimensions from the 7S model

Dimension	Description
Strategy	Actions a company plans in response to changes in its external environment.
Structure	Basis of specialization and co-ordination influenced primarily by strategy, size, and diversity of organization.
Systems	Formal and informal procedures that support the strategy and structure.
Style/Culture	Consisting of two components as below: Organizational culture: the dominant values, beliefs, and norms which develop over time and become relatively enduring features of organizational life. Management style: more a matter of what managers do than what they say; how do company managers spend their time; what are they focusing on.
Staff	The people/human resource management- processes used to develop managers, socialization processes, and ways of introducing young recruits to the company.
Skills	The distinctive competences- what the company does best.
Shared Values	Guiding concepts, fundamental ideas around which a business is built.

The different views on organizational change effect the approach to the management of this change. Based on a study of 75 successful organizational change cases, Reitsma and van Empel (2004) identify four distinct approaches to the management of organizational change: Directing, Tell/Sell, Interacting and Developing. These four approaches are briefly discussed in the following section.

- **Directing:** In the Directing approach, the content of the change is predetermined. During the process of change there is little or none degree of freedom and the management of the change is focused on controlling the progress towards the predetermined outcome. The locus of power is the top of the organization and the information flow about the change is dominantly top-down, informing the rest of the organization about the content of the change.
- **Tell/Sell:** The Tell/Sell approach resembles the Directing approach in the sense that the content of the change is also predetermined and communicated top-down. However, in this approach, the communication aims to 'sell' the change, by making it attractive to the rest of the organization. This means that in the communication about the change there is room for some bottom-up input, however, this input does not always change the change.
- **Interacting:** In the Interacting approach, the content of the change is more open and not predetermined by the leadership of the organization. The change is discussed with a limited number of key-players, that, within boundaries, co-decide about the change. The communication about the change is therefore interactive and open.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Developing:** In the Developing approach, the content of the change is largely left open, allowing the participants in the change to co-design the exact change in the cause of the change process. Power is shared by a large number of actors involved, that together shape the change. The management of the change is focused on controlling the process of change, and not its content.

Table 2 provides an overview of the main characteristics of the four approaches.

The four approaches are not only distinctive in their approach, but also in their effectiveness in managing different changes. This effectiveness is influenced by the characteristics of the change. The approach needs to 'fit' the characteristics of the change in order to be effective. Intuitively this makes a lot of sense, but the practice of how changes are managed in organizations does not always show these contingencies.

Table 2. Characteristics of the four change management approaches

Characteristics of the Approach	Change Management Approach			
	Directing	**Tell/Sell**	**Interacting**	**Developing**
Vision of the future and goals	Clear	Clear	Reasonable clear	Not clear
Degree of freedom with regards to the content of the change	None	Low	Within boundaries	A lot
Role of the change owner	Dictating	Selling	Boundary setter	Co-creator
Character of the interaction about the change	Informing	Explaining	Co-deciding	Designing

Reitsma & van Empel, 2004.

A factors that influence the effectiveness of a change management approach is logically the object of change. That is to say, that one approach is more effective in the change of certain aspects of an organization, whereas another approach is more effective in the change of other aspects. According to Reitsma and van Empel (2004), a more top-down approach, such as the Directing or Tell/Sell approaches, may be effective for changing the 'hard' aspects of an organization, such as organizational structures, procedures and systems. However, for a change of 'softer' aspects of the organization, such as behavior and culture, a more developing approach is expected to me most effective. Also the urgency of the change, and the perceived urgency, are factors of influence. As a developing approach will take more time for the change to unfold, this may not be effective in a very urgently needed change.

Another contingency factor is the expected resistance to the change. When the expected resistance is high, a directive and top-down oriented approach to the change will not create the acceptance needed for effectuating the change. In such a case, a more developing approach might be more effective. Other situational factors influencing the effectiveness of the change approach are organizational culture and prior experience with change within the organization.

Table 3 shows the situational characteristics and their fit with the four change management approaches.

The model of change management approaches of Reitsma and van Empel, puts emphasize on the contingent factors influencing the effectiveness of a change management approach. The management of organizational change is not a 'one size fits all' concept. An effective approach takes into account several factors, such as the (objective and perceived) urgency of the change, the objects of change, the culture of the organization that 'hosts' the change and the expected resistance and prior experiences with change within the organization.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Situational characteristics of organizational change and their fit with the four change management approaches

Characteristics of the Change	Change Management Approach			
	Directing	**Tell/Sell**	**Interacting**	**Developing**
Urgency of the change	High	High	Low	Low
Perceived sense of urgency	High	Low	High	High or Low
Object of change	Structures/ Processes/ Systems	Structures/ Processes/ Systems	Structures/ Processes	Behavior/ Culture/ Processes
Expected resistance to change	Low	Low	High	High
Culture of the organization that is the object of change	Hierarchical culture	Market driven culture	Family culture	Adhocracy

Reitsma & van Empel, 2004.

PROJECT MANAGEMENT MATURITY

The Oxford English Dictionary (Stevenson, 2010) defines maturity as "*the state, fact, or period of being reached in the most advanced stage in a process*". In the 1970's, publications such as Gibson and Nolan (1974) and Crosby (1979), first applied the term maturity to indicate organizational capabilities. The popularity of the concept of organizational maturity was especially intensified by the introduction of the Capability Maturity Model (CMM, later CMMI), in the late 1980's (Paulk et al. 1993).

Following the success of this model, its five maturity level architecture also served as inspiration for the development of several project management maturity models, for example the Project Management Process Maturity $(PM)^2$ model by Ibbs and Kwak (1997) and the Project Management Maturity Model (PMMM) by Kerzner (2001). Project Management Maturity in this context may be defined as being prepared (as an organization) for effectively and efficiently implementing a portfolio of projects (Cooke-Davies, 2002). The issuers of the most influential project management standards, the Project Management Body of Knowledge (PMBoK) by the Project Management Institute (PMI) and PRojects In Controlled Environments (PRINCE2) by the Office of the Government Crown (OGC) and later Axelos, also contributed to the development of project management maturity standards with their standards Organizational Project Management Maturity Model (OPM3) (Project Management Institute, 2004; 2013) and Project, Programme and Portfolio Management Maturity Model (P3M3) (Office of the Government Crown, 2006; Axelos, 2015).

Despite this widespread development and use of these maturity models, they also remain subject to severe criticism.

A first line of critique on the nature of organizational maturity models in general is that they are not well theorized (Kohlegger et al., 2009) and that they "*lack a clear definition and contextualization.*" (Mettler and Rohner, 2009). Also project management maturity models have been criticized for lacking foundation (Cooke-Davies, 2004; Jugdev and Thomas, 2002; Mullaly, 2006).Following this lack of foundation, researchers also seem to lack agreement on what comprises the project management maturity

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

construct (Ibbs and Kwak, 2000; Pasian et al., 2014).The third line of criticism concerns the lack of evidence of the relationship of maturity and perceived outcomes (Besner and Hobbs, 2006; Mullaly, 2014).

As this chapter is focusing on developing maturity from an organizational change perspective, the second line of criticism, the antecedents of project management maturity, is most relevant for our discussion. Most models of organizational project maturity, for example $(PM)^2$ (Ibbs and Kwak, 2000), OPM3 (Project Management Institute, 2004) and P3M3 (Office of the Government Commerce, 2006), define this maturity in levels of controlled structures and processes. These levels are expressed in terms such as 'Defined', 'Managed' and 'Optimized'. And although the wording of the different models differ somewhat, the shared intention of the models is to provide a comprehensive description of each level that expresses an increased level of control. Table 3 provides a brief overview of the descriptions of the five levels in the models $(PM)^2$, CMMI, OPM3 and P3M3.

From Table 4 it appears that the elements that define project management maturity are primarily identified as "processes", "standards", "systems", "data", "methods", "procedures" and "technologies". According to the earlier discussed 7S model of organizational dimensions, these may all be considered as 'hard' elements within an organization. The project management maturity models seem to neglect the 'soft' aspects of an organization. A criticism of the models above, and also the general understanding of project management maturity in practice, is therefore that they lack attention for intangible assets (Jugdev and Thomas, 2002), and "human factors" (Pasian et al., 2014), such as culture and attitude (Jiang et al., 2004). The authors mentioned also consider these 'soft' factors in an organization relevant in the development of organizational maturity.

DEVELOPING PROJECT MANAGEMENT MATURITY

The project management maturity models discussed in the previous paragraph consider maturity as a measurable status in or of an organization. For the development of maturity, the moving from one level to another, however, this static perspective does not provide much support. The descriptions of the different levels may provide a 'snapshot' of the desired state, however, for the organizational change to this desired state, a more dynamic perspective is required. A perspective for which the theories of organizational change may provide useful.

From the discussion on project management maturity, the conclusion arose that the constituting elements of maturity cover both the 'hard' elements within the organization (processes, standards, systems, data, methods, procedures, structures, knowledge, technologies, etc.) and the 'soft' elements within the organization (experience, culture, attitude, trust, values, vision, etc.).

Following the contingency approach to the management of organizational change that Reitsma and van Empel (2004) suggest, these elements require different change approaches. And although reality always presents more diversity than that models or typologies can capture, a basic distinction can be made between an effective approach for the change of hard and mostly tangible elements and an effective approach for changing the soft and intangible elements. Table 5 shows this distinction. For the hard elements a more Directive or Tell/Sell approach may work well, However, the soft elements, such as values, attitude and trust, cannot be changed 'on demand'. These elements of maturity require a much more Developing approach.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Overview of the maturity levels of selected project management maturity models

	(PM)²	CMMI	OPM3	P3M3
Level 1	• No project management processes or practices are consistently available • No project management data are consistently collected or analyzed	*Initial:* Processes are unpredictable, poorly controlled and reactive	*Ad Hoc:* No formal standards, processes, methods, procedures, or staff to constitute a project management discipline. Standard technologies and reporting are sporadic.	*Initial:* • The organization recognizes projects and runs them differently from its ongoing business? • Projects may be run informally with no standard process or tracking system.
Level 2	• Informal project management processes are defined • Informal project management problems are identified • Informal project management data are collected	*Managed:* Processes are defined for the project and are often reactive	*Planned:* Project management standards, processes, methods, procedures, and staff exist in the organization, but are not considered to be an organizational standard. Basic documentation exists, inconsistent management support rarely/occasionally applied.	*Repeatable* • The organization ensures that each project is run with its own processes and procedures to a minimum specified standard? • There may be limited consistency or co-ordination between projects.
Level 3	• Formal project planning and control systems are managed • Formal project management data are managed	*Defined:* Processes are defined for the organization and are often reactive	*Managed:* • All project management standards, processes, methods, procedures, and staff are in place as organizational standards. • Formal documentation exists, consistent management support, execution irregularly/inconsistently applied.	*Defined:* • The organization has its own centrally controlled project processes. Individual projects can flex within these processes to suit the particular project.
Level 4	• Project management data and processes are integrated • Project management processes data are quantitatively analyzed, measured, and stored • Multiple project management processes are recognized (program management)	*Quantitatively Managed:* Processes are measured and controlled	*Integrated:* • More refined project management standards, processes, methods, procedures, and staff are in place. • More refined documentation, consistent management support, consistent execution, and efficiency exist across all projects. • Metrics are in place to collect performance data across all projects.	*Managed:* The organization obtains and retains specific measurements on its project management performance and runs a quality management organization to better predict future performance.
Level 5	• Project management processes are continuously improved • Project management processes are fully understood • Project management data are optimized and sustained	*Optimized:* Processes are continuously improved	*Sustained:* Lessons learned and best practices are applied to continuously improve existing standards, processes, methods, procedures, and staff. Metrics are collected and applied at the project, portfolio, and organizational levels. The organization is in a position to evaluate future decisions based on past performance and maximize its competitive advantage in the industry.	*Optimized:* The organization continuously improves its processes with proactive problem and technology management for projects, in order to improve its ability to depict performance over time and optimize processes.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Illustration of different constituting elements of organizational maturity and their matching change management approaches

	Constituting Elements of Organizational Maturity	
	'Hard' Elements	**'Soft' Elements**
Objects of Change	processes, standards, systems, data, methods, procedures, structures, knowledge, technologies	experience, culture, attitude, trust, values, vision
Matching Change Management Approach	Directing / Tell/Sell	Interacting / Developing

The conclusion from this analytical mapping of elements of maturity and change management approaches is that developing project management maturity requires a holistic approach in which both hard and soft elements are effectively addressed. As the industry standards for project management maturity, such as OPM3 and P3M3, are biased towards the hard elements of an organization, their implementation should be accompanied by a change process that puts equal emphasis on developing the vision, culture experience, attitude, trust and values around projects. The approach of this change process will need to reflect a much more developing approach in order to be effective.

Developing the soft elements of project management maturity therefore may take much more time, and will involve many more stakeholders, compared to the implementation of a standards such as OPM3 or P3M3. These standards lay the practical and necessary foundation on which maturity can develop. However, the development of project management maturity may be hindered by inflated expectations of the implementation of these standards and the following disappointment.

This final section of this chapter develops a framework for the development of project management maturity within an organization. The framework is based on two pillars: The maturity models discussed earlier and the 7S model of organizational dimension. However, the framework demonstrates a more dynamic view on the maturity levels. Instead of describing the status of the organizational components that define project management maturity, the framework describes the transitions between the levels. The 7S model of organizational dimensions is consequently used as a model to describe these transitions. As the 7S model covers both the hard elements in the organization and the soft elements, the framework summarizes most of the insights developed in the previous paragraphs.

Tables 6 and 7 presents this framework, with a first identification of transition interventions filled in in the different cells of the model.

The framework presented in Tables 6 and 7 provides guidance for organizations that aim to develop their organizational maturity in performing projects. For obvious reasons the framework only describes the transitions to a higher level of maturity, and not to a lower level.

The framework may be especially helpful in creating a better vision of the 'How?' of developing maturity. However, Kotter (1995) pointed out that every change starts with establishing a 'sense of urgency'. An insight that many that have been involved in organizational change projects will acknowledge. The sense of urgency relates to the 'Why?' of developing project management maturity. Questions such as *Which problem is experienced? Who experiences this problem?* and *How important is this problem?* need to be answered before the development of project management maturity can have the managerial support this change needs in order to be successful.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 6. Framework for the organizational development of project management maturity (hard dimensions)

	Strategy	Structure	Systems	Staff
Transition from level 1 to level 2	Formulating in all project proposal, the contribution of the project to the strategy of the organization.	Explicitly formulating project team roles in project plans.	• Implementing a structured project management process in all projects. • Implementing identifiers for project related work and costs in the organization's administrative systems.	Creating temporary project management jobs.
Transition from level 2 to level 3	Translating organizational goals in programs and projects.	Establishing a Project Management Office for support and coordination of projects.	• Implementing organization-wide processes and standards for project management. • Implementation of project management and collaboration tooling. • Implementing time registration.	Creating permanent project management positions.
Transition from level 3 to level 4	Translating organizational strategy in programs of projects and drive realization of that strategy through project, program and portfolio management.	• Establishing board-level leadership of projects and programs. • Establishing a portfolio management office.	• Implementing portfolio management processes. • Contributing to professional project management development.	• Developing project management career paths. • Introducing project responsibilities in general management career paths.

Table 7. Framework for the organizational development of project management maturity (soft dimensions)

	Style/ Culture	Skills	Shared Values
Transition from level 1 to level 2	Development of a task-oriented culture in projects.	Investing in project management competence by training or external support.	Establishing the shared view that projects are a relevant to the organization.
Transition from level 2 to level 3	Creating acceptance for cultural differences between the permanent part of the organization and projects.	Investing in organization-wide competence development in projects and project management.	Establishing the shared view that projects are not an incident, but that they are a regular activity within the organization that contributes to the realization of the strategy.
Transition from level 3 to level 4	Creating project 'heroes' and success stories.	Investing in organization-wide project management maturity.	Establishing the shared view that projects are essential for the innovation, success and survival of the organization.

FUTURE RESEARCH DIRECTIONS

As most research into project management maturity focusses on the effects of maturity on project success and/or the constituting elements of maturity, the dynamics of developing organizational project management maturity is an underdeveloped field of study. The perspective of developing maturity as an organizational change process, promises to be a useful perspective. However, the framework developed in this chapter should be considered as a first exploration of this perspective. Future research may therefore expand the framework with more insights from the developing theory on organizational change, in which also the contingency view is further developed. For example the relationship between

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

interventions to develop project management maturity and organizational culture is an interesting topic for further study, as temporary organizations, such as projects and programs, tend to interfere with the hierarchical structures of the permanent organization.

Another direction for future research is the empirical testing and development of the framework developed in this chapter. Especially the further development and testing of interventions to develop maturity would deepen the insights provided.

CONCLUSION

This chapter started from the observation that most models and industry standards of project management maturity focus on measuring a current level or 'state' of maturity. By doing this, the models implicitly take a static perspective on maturity, whereas the aim of the models is to help organizations develop maturity in order to improve the success rates of projects. However, the process of changing from one level to another level is hardly or not addressed. Project management maturity models focus on the 'What?' of developing project management maturity, not on the 'how?'.

By taking an organizational change perspective on developing maturity, this chapter developed a more dynamic framework, aimed at providing guidance for the development of maturity, detailed in the transitions from one level to another. For every transition, a set of interventions is listed, as an example, that addresses both the hard and the soft dimensions of organizational change. As the industry standards for project management maturity, such as OPM3 and P3M3, are biased towards the hard elements of an organization, the implementation of these models will not be sufficient for the transition to a higher level of project management maturity. Successful project management maturity development requires that equal attention is being paid to the soft dimensions of organizational change, such as sense of urgency, shared vision, culture experience, attitude, trust and values around projects. The framework developed in this chapter may provide guidance for this, with as recommendation for future research, the empirical validation of the framework and the development of successful interventions.

REFERENCES

Axelos. (2015). *Project, Programme and Portfolio Management Maturity Model (P3M3)*, *version 3.0*. Axelos.

Batenburg, R., Neppelenbroek, R., & Shahim, A. (2014). A maturity model for governance, risk management and compliance in hospitals. *Journal of Hospital Administration*, *3*(4), 43–52. doi:10.5430/jha.v3n4p43

Besner, C., & Hobbs, B. (2006). The perceived value and potential contribution of project management practices to project success. *Project Management Journal*, *37*(3), 37–48.

Burke, W., & Litwin, G. (1992). A causal model of organization performance and change. *Journal of Management*, *18*(3), 523–545. doi:10.1177/014920639201800306

Caluwé, L., & Vermaak, H. (2004). Change paradigms, an overview. *Organization Development Journal*, *22*(4), 9–18.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Cooke-Davies, T. J. (2002, May). Project management maturity models: Does it make sense to adopt one? *Project Manager Today*, 1-4.

Cooke-Davies, T. J. (2004). Measurement of organizational maturity. In D. P. Slevin, D. I. Cleland, & J. K. Pinto (Eds.), Innovations -- project management research (pp. 523-542). Project Management Institute.

Crosby, P. B. (1979). *Quality is free: The art of making quality certain*. New York: McGraw-Hill.

Doppler, K., & Lauterburg, C. (2008). *Change Management: Den Unternehmenswandel gestalten*. Frankfurt a Main: Campus.

Gibson, C. F., & Nolan, R. L. (1974). Managing the four stages of EDP growth. *Harvard Business Review*, *52*(1), 76–88.

Gleick, J. (1987). *Chaos – Making a new science*. New York: Viking.

Görög, M. (2016). A broader approach to organisational project management maturity assessment. *International Journal of Project Management*, *34*(8), 1658–1669. doi:10.1016/j.ijproman.2016.08.011

Homan, T. H. (2005). *Organisatiedynamica: Theorie en praktijk van organisatieverandering*. SDU.

Ibbs, C. W., & Kwak, Y. H. (2000). Assessing project management maturity. *Project Management Journal*, *31*(1), 32–43.

Jiang, J. J., Klein, G., Hwang, H.-G., Huang, J., & Hung, S.-Y. (2004). An exploration of the relationship between software development process maturity and project performance. *Information & Management*, *41*(3), 279–288. doi:10.1016/S0378-7206(03)00052-1

Jugdev, K., & Thomas, J. (2002). Project management maturity models: The silver bullets of competitive advantage? *Project Management Journal*, *33*(4), 4–14.

Kerzner, H. (2001). *Strategic planning for project management: using the project management maturity model*. New York: John Wiley & Sons.

Kohlegger, M., Meier, R., & Thalmann, S. (2009). Understanding Maturity Models. Results of a Structured Content Analysis. *Proceedings of the 9th International Conference on Knowledge Management and Knowledge Technologies*.

Kotter, J. P. (1995). Leading Change - Why Transformation Efforts Fail. *Harvard Business Review*, 59–67.

Mettler, T., & Rohner, P. (2009). Situational Maturity Models as Instrumental Artifacts for Organizational Design. *Proceedings of the DESRIST'09*. 10.1145/1555619.1555649

Mullaly, M. (2006). Longitudinal analysis of project management maturity. *Project Management Journal*, *36*(3), 62–73.

Mullaly, M. (2014). If maturity is the answer, then exactly what was the question? *International Journal of Managing Projects in Business*, *7*(2), 169–185. doi:10.1108/IJMPB-09-2013-0047

Office of the Government Crown. (2006). *Project, Programme and Portfolio Management Maturity Model (P3M3)*. OGC.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pasian, B. L. (2014). Extending the concept and modularization of project management maturity with adaptable, human and customer factors. *International Journal of Managing Projects in Business*, *7*(2), 186–214. doi:10.1108/IJMPB-01-2014-0006

Paulk, M. C., Curtis, B., Chrissis, M. B., & Weber, C. V. (1993). Capability maturity model, version 1.1. *IEEE Software*, *10*(4), 18–27. doi:10.1109/52.219617

Peters, T. J., & Waterman, R. H. (1982). *In search of excellence: Lessons from America's best-run companies*. New York: Harper & Row.

Pollack, J., & Algeo, C. (2014). The Contribution of Project and Change Managers to Different Project Activities. In *PMI Research and Education Conference*. Project Management Institute.

Pöppelbuß, J., & Röglinger, M. (2011). What makes a useful maturity model? A framework of general design principles for maturity models and its demonstration in business process management. *19th European Conference on Information Systems (ECIS)*.

Project Management Institute. (2004). *Organisational Project Management Maturity Model*. Newtown Square, PA: PMI.

Project Management Institute. (2013). *Organisational Project Management Maturity Model* (3rd ed.). Newtown Square, PA: PMI.

Reitsma & van Empel. (2004). *Wegen naar verandering*. Academic Service.

Silvius, A. J. G., Schipper, R., Planko, J., van den Brink, J., & Köhler, A. (2012). *Sustainability in Project Management*. Farnham: Gower Publishing.

Srivannaboon, S. (2006). Linking project management with business strategy. *Project Management Journal*, *37*(5), 88-97.

Stevenson, A. (2010). *Oxford Dictionary of English* (3rd ed.). Oxford University Press.

This research was previously published in Developing Organizational Maturity for Effective Project Management; pages 296-308, copyright year 2018 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 10
Leveraging Enterprise Resource Planning Systems to Digitize Business Functions

Jessy Nair
https://orcid.org/0000-0001-6557-6228
PES University, India

D. Bhanu Sree Reddy
VIT University, India

ABSTRACT

The successful implementation of Enterprise Resource Planning (ERP) system is a challenge to many organizations. Though an intervention, ERP brings in large scale tangible and intangible benefits to an organization. It poses significant intervention on firm level endogenous dimensions; internal stakeholders, internal organization, business processes and technology. Though literature recognizes that ERP intervention brings about technological change during ERP implementation, hardly any article has conceptualized these interventions in evaluating its performance. Drawing on the Socio Technical system perspective the objective of this article is to conceptualize the ERP intervention on the endogenous dimensions of the organization and develop a comprehensive conceptual model to assess the success or failure of ERP system implementation. The conceptual model, Process-Variance and Adapted Socio-Technical (PVAST), proposed in this article will enable decision makers and practitioners to measure ERP project performance at every stage of its life cycle in a coherent method and adopt corrective measures.

INTRODUCTION

Information Systems (IS) of organizations have evolved from disjointed business processes to a boundaryless and cross functional structure by transforming functional enterprises and organizing their independent functions into process value chains. ERP system software, an Information Technology (IT) driven initiative enables a value chain (Shehab, Sharp, Supramaniam & Spedding, 2004) based organization

DOI: 10.4018/978-1-7998-7297-9.ch010

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

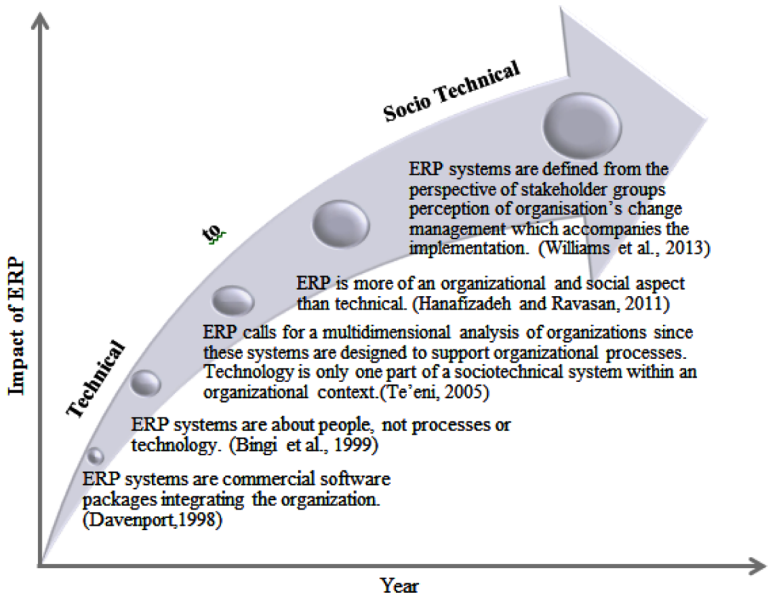
structure by allowing seamless flow of real time information across functional processes of the organization and empowering organizational stakeholders with precise decision making (Arnold, 2006). External indicators like globalization of markets and operations (Gunasekaran, 2005) and competitive pressure; internal indicators such as increasing costs in inventory, administration and so forth, resulted in Hammer & Stanton (1999) claiming that organizations have to inevitably restructure into process enterprises by strategically orienting themselves in this manner to stay competitive. Henderson and Mitchell (2007) emphasize that while organizations develop their strategy and align resources for implementing strategy it is very pertinent that decision makers identify key dimensions internal to the organization. They further state that this will enable the organizations to develop organizational capabilities and the capabilities can be leveraged to shape the environment and match the organizational performance necessitated by the competitive business environment. A technological resource such as ERP is a strategic tool that results in organizational change while bringing about tangible and in-tangible benefits to the organization. Hence successful ERP intervention is therefore an outcome of high investments and organizations have achieved operational efficiencies, yet a large group of organizations have been unable to translate ERP implementations into a success (Nwankpa, 2015).

ERP as an application software is distinguished from other general software due to the tangible and intangible benefits it can bring about by its organizational impact. Review of literature of over a decade clearly points that even though ERP is an application software its implementation should not only consider technical perspective but interactions with social factors in an organizational context (see Figure 1).Therefore, organization stakeholders can consider internal factors like organizational context, stakeholders, culture, processes and external factors like globalization, competitiveness and customer requirements for successful implementation of ERP. Organizational change that occurs with ERP project necessitates organization stakeholders to implement ERP successfully and evaluate its performance. ERP intervention requires managing change brought about by implementing IS and the mutual interaction it has with the organization's socio-technical context, which is intertwined of technology, people (Davis & Olson, 1985), organizational context and processes (Uzoka, Abiola & Nyangeresi, 2008).

ERP systems are vendor developed software applications necessitating enormous monetary investment by the organizations for its implementation. Costs of ERP project constitute a larger amount (Janssens, Kusters, & Heemstra, 2008) which many organizations find difficult to estimate compared to the ERP software itself. Symons (2006) claims organizations are under increasing pressure from top management to demonstrate and improve the business value of their investments made for IT. The risk associated (Grant & Tu, 2005) with the intervention of ERP system monetarily as well as the organizational changes it brings about, implies that practice of only *post facto* performance evaluation in itself is inadequate. Emphasizing importance of evaluating IS, Beynon-Davies, Owens, & Williams (2004) claim organizations need to evaluate the IS during the life cycle of the IS development process and develop a framework to accommodate the evaluation process during every stage of development. Though the author's research question is contextual to IS development, this question is valid for ERP systems as well. Contemporary literature categorizes ERP implementation as either a process approach; performance of the system is evaluated through a series of phases or variance approach; identifies *a priori* Critical Success Factors (CSF) essential for success of ERP project. ERP implementation frameworks based on either approach defeats the purpose of mitigating risk because the former approach necessitates rigor in evaluation as ERP project transitions from antecedent to consequent phase. In the latter perspective, a CSF based framework is insufficient in addressing the performance of ERP implementation in each phase and taking appropriate corrective measures. The objective of the research is to address this conceptual gap in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Evolution of ERP definition from technical to socio technical perspective



twofold: first, by developing an integrated framework of process and variance perspectives to identify CSF for each phase of ERP implementation and second, to categorize CSF into four dimensions; internal stakeholders, internal organization, business processes and technology. This will give a better perspective for stakeholders to take up corrective actions at each phase of ERP implementation. This research contributes to development of theory to measure the performance of ERP system implementation and develop associated concepts to evaluate the success or failure of ERP project. Theory development in this article sets a foundation for an empirical study with statement of propositions which are relationships between units observed or approximated in the empirical world, contains concepts, definitions and propositions (Bacharach; 1989; Kerlinger; 1988 Pawar; 2009). Hence the following research questions arise:

1. What theoretical perspectives can be deliberated upon to conceptualize the dimensions to evaluate ERP success or failure?
2. Can these dimensions be based on sociotechnical organizational change perspective since ERP is a technological intervention on the organization?

The article is organized as follows. The first section sets forth the foundation and elucidates the gaps in analysing ERP implementation by comprehensively reviewing theoretical facets of ERP implementation methods based on process, variance and sociotechnical perspectives. Process perspective as pertinent to ERP projects describes implementation from an organizational change standpoint, factor perspective lists causal factors to be deliberated upon for ERP project and sociotechnical perspective describes ERP as an intervention on an organization that causes synergy in the social and technical endogenous environment. The subsequent section explains the merit of integrating process, variance and sociotechnical perspectives to develop an integrated conceptual framework that assists in measuring the performance of ERP system thereby reducing the risk associated with ERP implementation. Then we delineate the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

theoretical constructs and operationalize them to state the propositions associated with the study. The section that follows develops the proposed PVAST model explaining its elements and discussing the model's applications for practitioners and organization's decision makers. Finally we draw up conclusions, state the implications and explain the further scope of this research.

BACKGROUND: A COMPREHENSIVE STUDY OF ERP IMPLEMENTATION METHODS FROM A CHANGE PERSPECTIVE

Premise One: Process Approach to ERP Implementation- An Organizational Change Perspective

ERP restructures organization as value chain enabling information integration and the decision to implement such a technological artifact brings in both tangible and intangible benefits. This indicates the need to go beyond traditional project management principles (Holland & Light, 1999) as there is an inherent need to reengineer the organizations business processes which is accompanied by organizational change on core elements of organization. Stewart, Milford, Jewels, Hunter & Hunter (2000) refer to ERP as an intervention and change agent and recommend that organizations have a planned change management program that accommodates not only change of technology but also business processes, personnel and organization context to realize the benefits of ERP. Therefore it will be practical to consider Kurt Lewin's (1952) three step change management process model as it is profoundly used to theorize and institutionalize change in organizations. "It is a truly elegant and infinitely practical guide to the host of complex and sometimes baffling issues inherent in the change process" (Levasseur, 2001, pp. 71) where the change process in this model consists of three stages; first-unfreeze enables organizations to unlearn legacy processes and systems being practiced in the organization, second-transition is when the enterprise adopts new work practices and readies standards, systems and employees for the change and finally-refreeze the organization adapts to the new changes brought about in the organization by freezing the new ways of work and skills. Strong parallels can be drawn between Kwon & Zmud's (1987) stage model for IS and Markus & Tanis' (2000) emergent process model for ERP implementation with Lewin's generic model for change to manage technological intervention. Lewin's model can be used as a baseline and a practical guide to evaluate the success of ERP, since as a system it has to diffuse and evolve during the phases of the project.

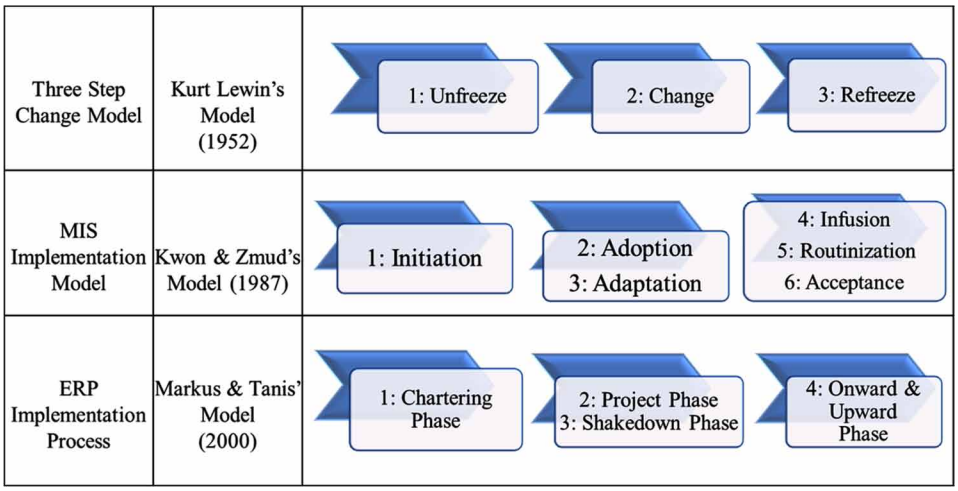
Mapping Change Models

Figure 2 summarizes Kwon & Zmud's (1987) stage model and Markus & Tanis' (2000) ERP emergent process model with Kurt Lewin's (1952) change model for ERP implementation. The two models are mapped to Lewin's (1952) three step change management model to appreciate that IS implementation stage models are based upon organizational change. To assist organizations in the change process (Hawking, Stein & Foster, 2004) it befits to deliberate on a framework based on organizational change to successfully implement ERP. Kwon & Zmud's (1987) stage model for IT implementation follows six stages: initiation, adoption, adaptation, acceptance, routinization and infusion. This IT implementation research model is founded on Lewin's (1952) change model (Cooper & Zmud, 1990). The initiation stage is related to unfreeze stage, adoption and adaptation are linked to change stage and the acceptance,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

routinization and infusion stages are correlated to the refreeze stage in Lewin's change management model. This model was applied to study implementation of Materials Requirement Planning (MRP) system by Cooper and Zmud (1990). MRP systems are specifically oriented towards the functional view of organizations where organizational changes were restricted to functional departments thereby being technically specific rather than organizational specific and therefore did not necessitate large scale process reengineering and change management. Markus & Tanis' (2000) model of ERP implementation consists of four phases namely; chartering: decisions regarding the business case and solution constraints; project: getting the system and end users started; shakedown: stabilizing, eliminating bugs, getting to normal operations; onward and upward: systems, supporting users, get results, upgrading system extensions. This model posits the necessary actions to be deliberated by decision makers in each phase of the ERP project where actions in each phase are mentioned *a priori*.

Figure 2. Mapping ERP implementation process with other implementation process



The above paragraphs illustrate IS implementation as an organizational change process while associating it to Kurt Lewin's change management model. This is referred to as process perspective and it helps us understand how ERP implementation efforts have happened and it therefore gives a moving picture about how we got from time 1 to time 2 (Aladwani, 2001). Several researchers fragment the implementation process into *a priori* stages or phases (Sabherwal & Robey, 1993). A synthesis of IS literature illustrated in Table 1 indicates that the number of stages or phases varies from at least three to six. Hence process approach seeks to understand outcomes by observing how events occur over time and in ERP transitions, processes may be conceived as sequence of events that occur over time (Boudreau & Robey, 1999) and though these events begin in a particular phase they may continue to overlap one another while another stage begins (Janssens, Kusters, & Heemstra, 2008). Boudreau & Robey (1999) affirm that an organization implementing ERP at any moment in time is influenced by conditions beyond its control and can achieve motivated behavior by way of plans and actions. As a result phase models are limited because they portray only one possible sequence of events through which all organizations

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Process perspective of ERP implementation

Reference: Author	Description of Phases	Number of Phases
Bhatti (2006)	Analysis, Installation, Final Preparation and Go Alive	4
Ehie & Madsen (2005)	Project Preparation, Business Blueprint, Realization, Final Preparation, Go Live and Support	5
Bajwa, Garcia, & Mooney (2004)	Awareness, Preparation, Selection, Implementation, Operation	5
Yusuf, Gunasekaran, & Abthorpe (2004)	Strategy and Direction, Planning Analysis and Early Deployment, Implementation	3
Aladwani (2001)	Knowledge Formulation Phase, Strategy Implementation Phase, Status Evaluation Phase	3
Esteves & Pastor (1999)	Adoption Decision Phase, Acquisition Phase, Implementation Phase, Use and Maintenance Phase, Evolution Phase, Retirement Phase	6
Ross (1998)	Design, Implementation, Stabilization, Continuous Improvement, Transformation	5
Kwon & Zmud (1987)	Initiation, Adoption /Adaption, Acceptance, Routinization, Infusion	6
Nolan (1973)	Initiation, Contagion, Control, Integration	4

are expected to progress. In the case of ERP implementation, the organization cannot risk the project by monitoring the success or failure *post facto.*

Premise Two: Variance Perspective to ERP Implementation- Assessing Change Perspective Through *a priori* Factors

Literature points to majority of articles which identify requisite conditions or factors *a priori* to analyze the performance for successful ERP implementation. CSF are widely used in the information systems arena (Rockart, 1979) and within the context of ERP implementation context CSF are defined as factors needed to ensure a successful ERP project (Gibson, Holland, & Light, 1999; Parr & Shanks, 2000). An implicit goal of variance research is to establish the conditions necessary to bring about an outcome (Van de Ven & Poole, 2005) and is the focus of much of the research published in IS literature (March & Storey, 2008). Consequently, this article will interchangeably use the terms variance or factor perspective in the context of CSF. A review of literature confirms that the conditions necessary to evaluate the performance of ERP project are listed by way of "a laundry list of causal factors" (Richmond, 1993, pp.117). A majority of literature related ERP research is dedicated to listing CSF (Farzaneh, Vanani, & Sohrabi, 2013; Finney & Corbett 2007; Jarrar, Al-Mudimigh & Zairi, 2000; Markus & Tanis, 2000; Motwani, Subramanian, & Gopalakrishna, 2005; Nah, Lau, & Kuang, 2001; Soja 2006; Somers & Nelson, 2001; Toni & Klara, 2001; Zhang, Lee, Zhang, & Banerjee, 2002). Kini & Basaviah (2013) found CSF for large organizations and Small and Medium Businesses (SMB) similar.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Somers and Nelson (2001) argue that organizations must learn to identify the critical issues that affect the implementation process and know when in the process to address them effectively to ensure that the promised benefits can be realized and potential failures avoided. Rockart (1979) states that CSF are limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department or organization. While CSF identified *a priori* facilitates planning resources for successful ERP implementation, it adopts a rather static view, which limits its adequacy in explaining the dynamics of the implementation process (Aladwani, 2001) and it is unclear how these CSF interrelate (Akkermans & van Helden, 2002), affirming this Esteves & Pastor (2001) report there is practical evidence that CSF do not have the same importance along the various phases of a SAP [Systems, Applications, and Products in Data Processing] implementation project. This is emphasized by Nah, Lau, & Kuang (2001) while developing a conceptual model for successful ERP project by listing eleven CSF across the phases of Markus & Tanis' model where they identified through an exploratory study, CSF that influences ERP implementation in various phases of ERP life cycle. A cumulative list of CSF clustered for each phase may not remain static over the life cycle of all ERP projects and also claim that organizations are influenced by exogenous factors that are beyond its control (Markus & Tanis, 2000). Tavana (2011) affirms this while describing the significance of considering an organization adapting to the ERP project through change and system in-built flexibility, organizations are influenced by dynamic environment and becomes essential to consider progressive changes that occur during the life cycle of ERP due to intervention of technology on people and organization. Hence it may be appropriate if CSF can be clustered into an integrated process variance framework where we can cluster CSF based on a model of organization that will enable the organization stakeholders identify and consider a plan of action to implement ERP.

Premise Three: SocioTechnical System Perspective to ERP Implementation – A Technological Intervention for Organizational Change

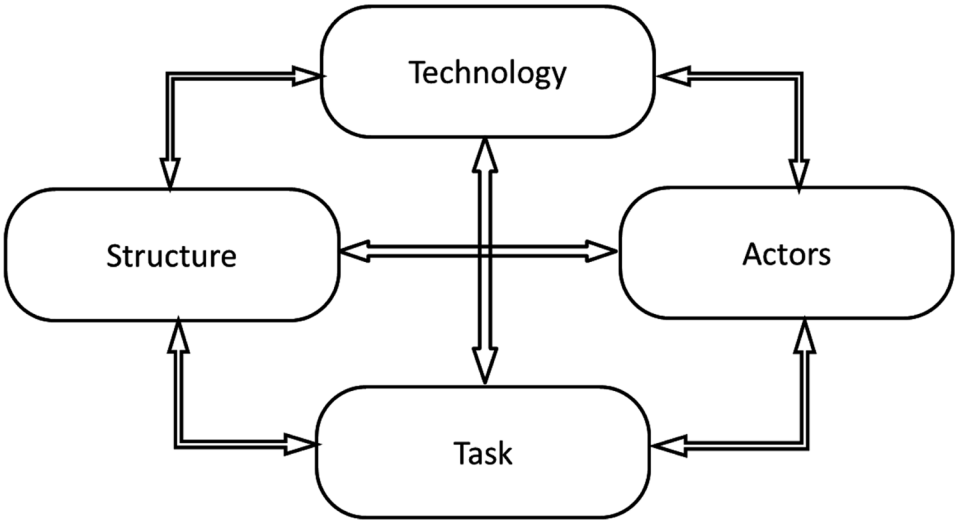
Conceptualizing ERP project as an organizational intervention creating change we draw Socio Technical (ST) system perspective to identify and define key constructs to analyse the performance of ERP system. ST system perspective began with the purpose of improving the Quality of Work Life (QWL) of workers on the production line (Mumford, 2006), the theory gradually found its application in design and implementation of new technologies (Dillon, 2000), clinical workplace (Wears & Berg, 2005), healthcare systems (Coiera, 2006) and computer information systems (Palvia, Sharma & Conrath, 2001). Recognizing significance of technological change in organization Appelbaum (1997) points to technology as an intervention and appraises the ST system theory to practitioners since this approach accommodates both social and technical elements of organization whereas Mumford (2006) considers ST system theory as a means for optimizing the intelligence and skills of human beings. ERP implementation is considered to rely on behavioural processes and actions (Al-Mudimigh, Zairi, & Al-Mashari, 2001) hence ST system can be a change perspective to examine interaction between social relationships of people with their environment explicitly organization and technical system using methods and materials.

ST system perspective is a synergy of social and technical subsystems and offers a standpoint to analyse performance of ERP implementation. We draw upon Leavitt's (1965) diamond model of organizational change and uncertainty due to its appeal and simplistic nature (Lyytinen, Mathiassen & Ropponen, 1996) to describe an organization as a social structure. Leavitt (1965) categorizes an organization as four distinct elements- task, actor, structure and technology interdependent to each other. Task refers to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

expected outcomes in terms of goals and deliverables (Lyytinen, Mathiassen & Ropponen, 1998), structure implies a means of communication, systems of authority and systems of work flow, actors refer to those participants involved that carry out tasks and technology is defined as any technical means, know-how and tools to carry out tasks (Lyytinen, Mathiassen & Ropponen, 1996). Grant & Mergen (1996) applied modified Leavitt's model to study the relation between task, technology, organization structure, people and an additional element of communication within a large corporation to reduce the cycle time of its products to keep up with the competition. Their evaluation of other organization frameworks reveals that Leavitt's ST system model was most appropriate since it is simple and explicit to stakeholders from diverse background in the organization. Leavitt's model is as illustrated in Figure 3. Here each element is interdependent on the other and any change in one element causes effects on other elements; in this case implementation of ERP involves changing the organization's technology component which automatically triggers changes in other components of the organization (Sarker, 2000).

Figure 3. Leavitt's diamond model for sociotechnical change



To summarize, in premise one and two we compare and contrast the process and variance theoretical perspectives to explain why any one of the perspectives used in isolation may not serve the purpose of evaluating the performance of ERP implementation from an organizational change viewpoint. Since ERP is a technological intervention on the social structure of the organization it may be appropriate to leverage Leavitt's model to evaluate ERP performance through CSF. Integrating process-variance perspective with ST system based on Leavitt's diamond model is an attempt to monitor ERP performance and pinpoint areas where corrective actions need to be taken up during the ERP life cycle. DiMaggio (1995) argued that "many of the best theories are hybrids, combining the best qualities" (p. 392) of these approaches. This research article attempts to fulfil this gap in the literature. The following section discusses the research approach to evaluate performance of ERP implementation by integrating process and variance perspectives with ST system perspective.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

RESEARCH APPROACH

The article is an exploratory study to conceptualize the performance of ERP implementation from process, variance and ST system perspectives. To review literature based on these perspectives we adopted grounded theory approach. According to Wolfswinkel, Furtmueller, & Wilderom (2011) grounded theory approach enables to identify the key concepts to surface, instead of being deductively derived beforehand; the concepts emerge during the analytical process of substantive inquiry. With vast ERP implementation literature available Allan (2003) recommends a form of content analysis in grounded theory called coding to conceptualise the underlying issues amongst the 'noise' of the data. Key steps of this approach are: *open coding*- adopted to break down the data into distinct units of meaning called categories or concepts, *axial coding*- used to appreciate concepts in terms of their dynamic interrelationships which should form the basis for the construction of the theory and *selective coding*- adopted to identify and develop relations between the main categories (Goulding, 1999; Wolfswinkel, Furtmueller & Wilderom, 2011).

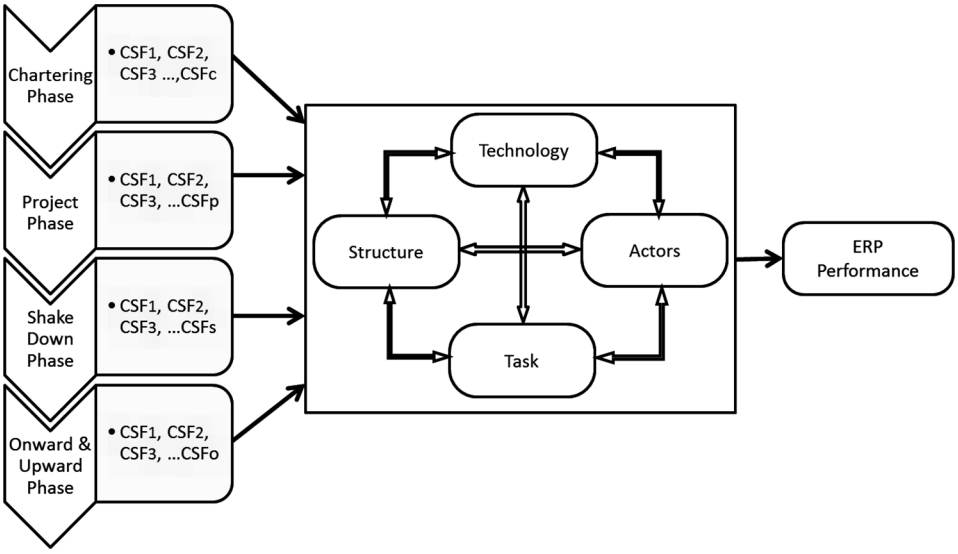
Integrated Conceptual Framework to Evaluate ERP Performance

In this section, we detail and develop an initial conceptual framework by integrating process and variance (PV) perspectives with sociotechnical (ST) perspective as described in the above premises. Literature review indicates that there have been significant efforts to group factors into dimensions and integrate under different frameworks to get a better understanding to analyse ERP implementation. Belassi and Tukel's (1996) empirical study to identify the factors for success or failure of projects highlights the significance of grouping factors based on criteria such as project elements, factors concerning project manager and team members, organization elements and external environmental elements to enable project managers understand the relationship between the grouped factors. Therefore, if CSF can be organized into dimensions, it will enable stakeholders to gain a better perspective of ERP project. ERP literature attempts to list such dimensions, another empirical study by Hanafizadeh and Ravasan (2011) chose to assess the first stage of ERP project-called ERP readiness assessment by leveraging McKinsey 7S framework by classifying the dimensions as hard and soft elements where the framework can be considered comprehensive and provides a specific list of factors for each of the elements: strategy, structure, systems, style, staff, skills and shared values for the readiness phase of ERP life cycle.

According to Sabherwal and Robey (1993) either phases or CSF approach during ERP project may not be conclusive to measure the performance of ERP implementation and they state that such a context as "cooking with a list of ingredients but without the recipe" (p. 449). Figure 3 shows the integrated conceptual framework proposed in this paper by integrating PV and ST perspectives. The left side of the schematic is an integrated PV framework (Nah, Lau & Kuang, 2001) leveraged from literature and the right side of this schematic is the ST framework. Nah, Lau and Kuang (2001) have identified CSF for each phases of ERP implementation and integrated the CSF with the process approach of Markus and Tanis' (2000). Collating PV perspectives with a generic model such as Leavitt's diamond model which is based on ST perspective will enable organizations to consider temporal nature of ERP implementation. It will enable in clustering and classifying CSF along the phases of ERP life cycle model. This will enable in adapting to the dynamic changes of business environment and simultaneously monitoring the ERP project. Next we deliberate on grounded theory methodology of coding the literature to identify constructs in an attempt to develop a research model based on the conceptual research framework, Figure 4.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 4. Conceptual research framework: Integration of Process and Variance (PV) perspective with ST perspective



Adapted SocioTechnical (AST) System Model to Evaluate ERP Implementation

Literature search with appropriate keywords was conducted to identify articles in peer reviewed journals that analyse ERP implementation. This review is focused on two areas:

1. Articles associated to ERP implementation.
2. Articles that listed CSF for each phase of lifecycle model of ERP.

Initially, the articles that related to ERP implementation were analysed and summarised. Adopting the grounded theory approach, articles were reviewed for themes that emerged from the researchers' interpretation. A representative sample of reviewed articles and its summary is illustrated in Table 2. The emerging themes observed while reviewing the literature are stakeholders, organization, processes and technology. These themes are categorized and called concepts or constructs and this content analysis process of grounded theory is called open coding and the outcome of this open coding process resulted in four constructs.

For the next step, articles that list CSF for different phases (Dawson & Owens, 2008; Kronbichler, Ostermann & Staudinger, 2009; Motwani, Subramanian & Gopalakrishna, 2005; Nah, Lau & Kuang, 2001; Somers & Nelson, 2001) of ERP life cycle are considered for consolidating CSF. Table 3 summarises a list of 36 CSF obtained from the literature. To provide clarity and meaning to the four constructs, stakeholders, organization, processes and technology the CSF obtained through literature were clustered on the basis of their interrelationships and attributes using the process of axial coding. In the final step applying selective coding to data illustrated in Table 4, we observe an interrelationship between the constructs stakeholders and organization which is collated as social factors likewise we group processes and technology as technical factors and this defines a new SocioTechnical (ST) framework for ERP implementation. These four constructs can be mapped to equivalent dimensions of Leavitt's ST change

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Consolidated concepts of sociotechnical Perspective for ERP implementation

Author	Summary	Context	Concepts			
			Stakeholders	Organization	Processes	Technology / Technical
Pan (2005)	Organization derives ES [Enterprise Systems] benefits through technical integration and re-engineering the processes.	Implementation of CRM systems, a module of ERP			√	√
Kamhawi (2007)	Empirical study of CSF in a developing country - Bahrain. Article stresses on dimensions such as organizational fit , process fit and BPR having significant influence on ERP implementation. Specifically employees resistance to ERP system during project needs to assessed for user acceptance.	ERP implementation	√	√	√	√
Janssens, Kusters, & Heemstra (2008)	ERP activities are classified into three dimensions: project, system and organization each of which have sub-clusters which depicts activities required to be taken up for successful ERP project	ERP implementation		√	√	√
Pries-Heje (2008)	The case study at a company adopted process model to implement ERP systems . The involvement of users the design and project activities caused a conflict of interest between the multiple stakeholders.	ERP implementation specifically assimilation stage	√	√		√
Uzoka, Abiola & Nyangeresi (2008)	Empirical study discusses organizational ERP software buying behaviour and emphasizes the involvement of organizational stakeholders for purchase process due to their awareness of business processes.	ERP software purchase decision making	√		√	
Yeoh, Koronios & Gao (2008)	Delphi study to develop or explore CSF for BI systems which is a module of ERP systems points to organizational factors more important than technological factors.	Implementation of Business Intelligence(BI) systems	√	√		
Hanafizadeh & Ravasan (2011)	McKinsey 7S framework to analyse readiness of an organization to avoid ERP project failure.	ERP readiness in the organization	√	√	√	√

model. The modified Leavitt's model with the new SocioTechnical (ST) framework is referred as Adapted SocioTechnical (AST) model (Figure 5) for assessment of ERP implementation. In the following section we discuss the conceptualization of constructs which are enablers of ERP performance and set forth the propositions for the proposed model. Setting limits to research in a conceptual paper by emphasizing theory (Schultz, Ginzberg & Lucas, 1994) answers what (constructs) and how (conceptual framework) (Whetten, 1989; Pawar, 2009) by setting directions to develop the propositions for the research article.

DELINEATING THE THEORETICAL CONSTRUCTS AND STATEMENT OF PROPOSITIONS

This section discusses and defines the five constructs of conceptual framework. The dependent variable is ERP performance which is a surrogate measure used to evaluate ERP success and independent variables are stakeholders, organization, processes and technology influencing the ERP performance. The constructs for the study is operationalized as shown in Table 5 and propositions are stated as a guide to enable in developing the research model.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Representative list of CSF for ERP implementation

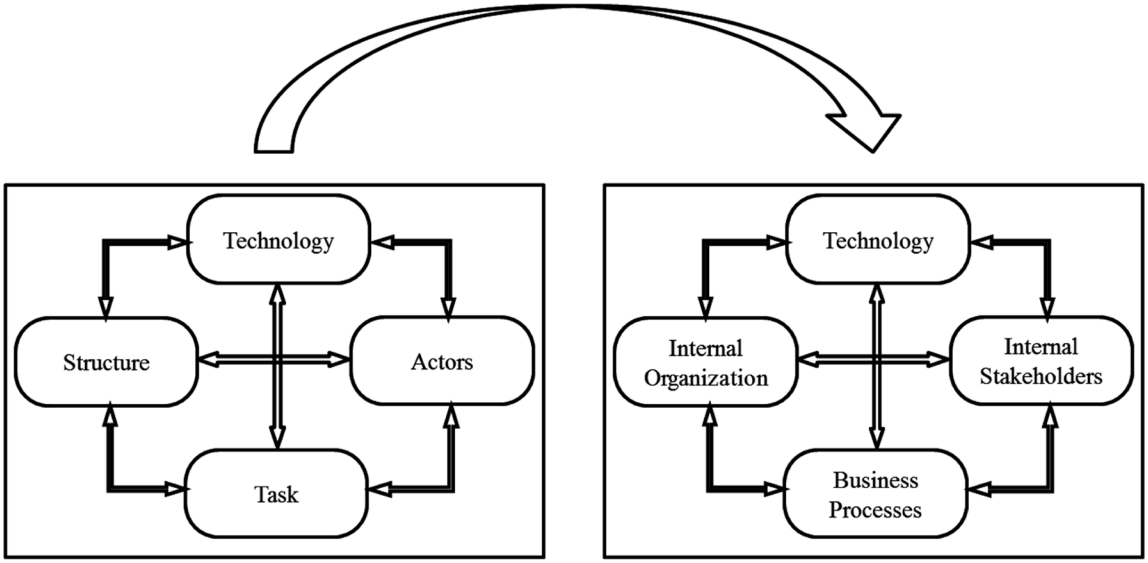
Key Authors	Nah,Lau & Kuang (2001),	Somers & Nelson (2001)	Motwani, Subramanian & Gopalakrishna (2005)	Dawson & Owens (2008)	Kronbichler, Ostermann & Staudinger (2009)
Critical Success Factors	• Top Management Support, • ERP Teamwork & Composition, • Effective Communication, • Project Management, • Business Plan & Vision, • Project Champion, • Change Management Program & Culture, • Appropriate Business & IT Legacy Systems, • BPR & Minimum Customization, • S/W Dev. Testing & Troubleshooting, • Monitoring & Evaluation of Performance	• Architecture Choices, • Clear Goals and Objectives, • Top Management Support, • Project Team Competence, Use of Steering Committee, • Interdepartmental Communication, • Interdepartmental Cooperation, • User Training on Software, • Dedicated Resources, • Change Management, • Partnership with Vendor, • Use of Vendors' Tools, • Use of Consultants, • Education on new Business Processes, • Vendor Support, • Project Management, • Management of Expectations, • Project Champion, • Careful Selection of Package, • Data analysis & Conversion, • Business Process, Reengineering • Minimal Customization,	• Clear Understanding of strategic goals for ERP, • Commitment by Top Management , • Cultural & structural changes / Readiness, • Excellent Project Management, • ERP Package Selection that best with current business procedures, • Open information & communication Policy, • Exhaustive analysis of current business processes, • Importance of Data Accuracy, • IT leveragability & knowledge capability, • A great implementation team , • Focuses performance measures, • Appropriate celebration when project completed, • Post Implementation Audit, • Documentation and advertising ERP success, • Benchmarking	• Top Management Support, • Project Management , • ERP Team and Composition, • Effective Communication, • Business Plan & Vision, • Project Champion, Appropriate Business & IT Legacy Systems, • Commitment to the Change, • A Vanilla ERP Approach	• Architecture Choices, technical implementation, technological infrastructure, • Vendor Support, • Top Management Support, • Project Management, • Project Champion / Empowered Decision Makers, • Team Composition & Teamwork, • Business Plan & Vision, • Partnership, • Interdepartmental Cooperation and Communication, • Change Management, • User Involvement / training, • Business Process Reengineering, • S/W Dev. Testing & Troubleshooting, • Legacy Systems Knowledge, • Deliverable dates / Smaller scope

Table 4. Final categorization of CSF under Adapted SocioTechnical (AST) framework

Social Factors		Technical Factors	
Stakeholder	**Organization**	**Processes**	**Technology**
Partnership with Vendor Top Management Support Project Team Competence A Great Implementation Team and Competence & Teamwork Use of Steering Committee User Training on Software Vendor Support User Involvement & Training Project Champion Empowered Decision Makers	Clear Goals and Objectives Interdepartmental / Effective Communication Interdepartmental Cooperation Dedicated Resources Education on New Business Processes Cultural & Structural Change Readiness Appropriate Celebration when Project Completed Business Plan & Vision A Vanilla Approach	Excellent Project Management Exhaustive Analysis of Current Business Processes Focuses Performance Measures Post Implementation Audit & Monitoring Documentation and Advertising ERP Success Benchmarking BPR & Minimum Customization Deliverable Dates / Smaller Scope Business Process Reorganization	Architecture Choices Technical Implementation Technological Infrastructure Careful Selection of Package Data Accuracy IT Leveragability & Knowledge Capability Appropriate Business & IT Legacy Systems Use of Vendors' Tools S/W Development, Testing & Troubleshooting
No of Factors: 9	No of Factors: 9	No of Factors: 9	No of Factors: 9

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Leavitt's diamond model and Adapted SocioTechnical (AST) constructs for ERP implementation



Social Factors (Stakeholder and Organization) and Technical Factors (Process and Technology)

AST framework developed in Table 4 displays CSF classified as social and technical dimensions. This emergent reaction between the social setting and technology is a phenomenon (Lee, 2000) that cannot be considered in isolation. As they interact with each other, it reinforces the need to look beyond technological perspective and study IT/IS implementation impact on humans and organizations and contribution of these interdependent elements by way of change on various contextual factors impacting the organization (Sarmento, 2005). Literature is opinionated with technology imperative which proposes that ERP technology being standardized software imposes organizations to adapt even though it is developed and implemented by humans to develop better explanations of human and machine interactions in organizations (Rose, Jones & Truex, 2005). However social imperative points out that new technology referred to as technical system has an effect on "users, the organisation, and work processes" and cannot be independent from the humans (Karsh, 2004). Hence by adopting a humane perspective to ERP project and relating it to "child rearing", managers who affiliate to technical side and the others who orient to human side of technology should communicate and co-ordinate as one unit to bring about successful organizational change (Tavana, 2011) and a symbiosis of social system and technical system will achieve the goals set if the combined systems is regularly monitored and controlled (Lee, 2004). In this research article we define the social dimension as consisting of two sub-systems- stakeholders and organization and the technical sub-system comprises of business processes and technology and evaluates ERP implementation through its performance grounded on the following statement:

The technical system is concerned with the processes, tasks, and technology needed to transform inputs to outputs. The social system is concerned with the attributes of people (e.g., attitudes, skills, values), the relationships among people, reward systems, and authority structures. It is assumed that the outputs

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of the work system are the result of joint interactions between these two systems. (Bostrom & Heinen, 1977, p.17)

Stakeholders to Internal Stakeholders

Stakeholders also referred to as actors (Keen, 1981; Leavitt, 1965) are group of people in an organization who share a pool of values that define what the desirable features of an IS are, and how they should be obtained (Beynon-Davies, Owens & Williams, 2004). Stakeholders are critical resource and necessitate a dedicated support (Orlikowski & Hofman, 1997; Zhang, Lee, Zhang & Banerjee, 2003). Employee's perception of the usefulness of the new system and acceptance of the new way of doing business (Beheshti & Beheshti, 2010) is modified by the attitudes of others to these behaviours (Coiera, 2006) and presence of the surrounding stakeholders, i.e. top management, project management, project champion, software vendor and consultants were identified as the root causes driving performance (Akkermans & van Helden, 2002). Boonstra (2011), for example has illustrated the impact of various stakeholders in each phase of ERP project life cycle so that their initiatives for the project can be planned by decision makers and defines stakeholders as "... any person or group who can affect or is affected by the EIS [Enterprise Information System] is a stakeholder (p.160)".

ERP project consultant and vendors are external players and their involvement begins well before pre-implementation stage by partnering with client in enabling them plan the type of implementation, modules of ERP system, business processes to be modified, training needs to adapt to new system and resources required for the project. They play a significant role by being part of ERP project which is referred by Markus, Axline, Petrie & Tanis (2000) as socially complex activities and they continue to assist organizations to assimilate the new systems. Therefore this study assumes consultant team and ERP vendors as internal stakeholders of a particular organization implementing ERP. It encompasses their perception towards project, usage of ERP system and attitude towards project stakeholders. Hence we rename our construct in AST model from stakeholders to internal stakeholders.

Proposition 1: Success of ERP implementation is related to performance of ERP and is positively related to the social perspective of internal stakeholders of an organization to ERP project.

Organization to Internal Organization

Lyttinen & Newmann (2008) argue that identifying business environment as a dimension can bring forward key elements that influence change in IS systems. Though the article calls upon consideration of internal and external organizational environment, this article deliberates on the internal organization context since it forms the controllable component and the decision makers are able to plan the resources to leverage the performance of ERP project. This is supported by Table 3 an exhibit of CSF represents endogenous organizational context. Organization strategies, mechanisms to communicate about ERP project and change management methods are made conducive to enable internal stakeholders adapt to ERP project. Duncan (1972) defines internal environment as consisting of those relevant physical and social factors within the boundaries of the organization.

An often overlooked aspect of ERP implementations is the effect that the new system will have on employees (Okrent & Vokurka, 2004) as a result, appropriate change methods and techniques that help individuals and groups make the best use of available technology are needed (Appelbaum, 1997). This

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is consistent with (Geels, 2004) that sociotechnical systems do not function autonomously, but are the outcome of activities of human actors and organizations. Another important aspect that effectively brings about change in organizations is culture (Grabski, Leech & Schmidt, 2011; Orlikowski & Hofman, 1997). Culture is used as a means to understand organizations (Robey & Boudreau, 1999) and in the context of ERP implementation, culture signifies a mechanism of sharing values, believes and ideas among organizational stakeholders. Hence internal organization is defined as the endogenous organizational context planned for ERP implementation.

Proposition 2: ERP implementation success is related to ERP performance and is positively related to the internal organization from a social perspective.

Process to Business Processes

Implementing ERP application software (Rashid, Hossain, & Patrick, 2001) force companies to reengineer their business processes to accommodate the logic of the software modules for streamlining data flow throughout the organization. ERP system causes mutual interactions between IT and organization by pointing to the requirement that organizations must reengineer its business processes to fit the processes that the ERP software was programmed to manage (Lee, 2004). The Business Process Reengineering (BPR) paradigm is an enabler to bring about changes in business process. ERP deployment requires extensive effort (Al-Mudimigh, Zairi & Al-Mashari, 2001) to transform the business processes, bring about radical organizational change (Kwahk, 2006) and a thorough strategic thinking that allows companies to gain better understanding of their business processes (Ehie & Madsen, 2005). A business process in the context of ERP deployment can be defined as a method of identifying as-is business processes and configuring the ERP software for the new to-be business processes. Therefore, in this study we redefine processes in AST model as business processes.

Proposition 3: ERP implementation success is related to its performance and is positively related to processes from a technical perspective.

Technology

ERP implementations are usually large, complex projects, involving large groups of people and other resources, working together under considerable time pressure and facing many unforeseen developments (Akkermans & van Helden, 2002). The enterprise has its own thoughts, but the software of ERP has also certain thoughts, therefore, how to synthesize them is a critical work (Jing & Qiu, 2007). In this regard to bring about change effectively another key organizational context dimension is technology (Orlikowski & Hofman, 1997). The technical infrastructure is unlike other software systems where organization has to pay special attention to the existing technology, generically known as legacy systems and will be a good indicator of the nature and scale of potential problems (Finney & Corbett, 2007; Karsh, 2004).

Another issue faced by organizations relates to ERP customizations. Since ERP is vendor developed application software developed based on best practices of organizations worldwide while implementing ERP, nearly most organizations reengineer their processes and standardize them to meet the needs of ERP software rather than customizing the software to the requirements of the organization processes. Though ERP has the rich potential for customizing that distinguishes it from other packages (Klaus, Rosemann

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

& Gable, 2000), while implementing ERP the objective of customization is to achieve a fit between the ERP system and the process that the system supports. This calls for decision makers to collaborate as a team with the top management and consultants to draw consensus while establishing a fit between the processes and technology (Parthasarathy & Anbazhagan, 2007). Hence we observe that technical systems cannot be stand-alone systems but must align with environment and involve sub-systems such as humans (Lee, 2000). This article defines organization's technology as the combination of hardware-software infrastructure (Whitworth, 2009) and software architecture framework.

Proposition 4: ERP implementation success is related to its performance and positively related to the technology from a technical perspective.

Table 5. Operational definition of conceptualized constructs to evaluate ERP performance

Constructs	Working / Operational Definition of Proposed PVAST Model
Independent Variables	
Internal Stakeholders	Defined as the attitude and perception of the members (top management, project team members, end users, vendors and consultants) who are part of the ERP project towards ERP deployment in the organization.
Internal Organization	The endogenous environment of organization is defined as a context where appropriate strategic planning process, effective communication tools, tools for decision making and change management methods and techniques is undertaken for ERP implementation.
Business Processes	Defined as the process of analysing as-is state of the organization and plan for the to-be processes on account of ERP implementation.
Technology	Tools (ERP system) required, its associated hardware, network, communication and software architecture framework for the organization to fulfil its objectives and end user to carry out their tasks.
Dependent Variable	
ERP Performance	The dependent variable. ERP success is measured with a surrogate measure, ERP performance. This surrogate measure is represented with three items to incorporate tangible (the cost of ERP did not outweigh the benefits), intangible benefits (ERP implementation has significant positive effectiveness for the business) and the organization gains with ERP implementation (improved overall business efficiency).

ERP Implementation Performance

ERP success or failure is a concern for organizations due to the risk associated with the project by way of investments made by the organization, acceptance of software by stakeholders, reengineering business processes, unlearning old practices and adapting to new systems. IS implementation can be defined in terms of management change and improvement (Schultz, Ginzberg & Lucas, 1998). This is consistent to the three theoretical premises based on change in this study. Therefore it is significant for IS professionals to understand how the implementation of such IS can bring about firm value through their performance (March & Storey, 2008).The full benefits of productivity improvement measures are realised when productivity is examined from two perspectives: operational efficiency of an *individual*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

worker or a *business unit* and effectiveness through *system performance* (Beheshti & Beheshti, 2010). Hence ERP implementation is viewed from the perspective of *internal stakeholder's* at all hierarchical level of the organization and *business unit* which is *represented by constructs* of AST Leavitt's model in this study. ERP success during implementation is measured through *ERP performance* by evaluating the social and technical factors.

Proposition 5: ERP implementations success is related to ERP performance assessed through social and technical dimensions of organization.

THEORETICAL MODEL DEVELOPMENT AND DISCUSSIONS

In this section we propose a theoretical model that shows the relationship among the constructs. The proposed Process Variance and Adapted SocioTechnical (PVAST) model is illustrated in Figure 6. This PVAST model is an assimilation of three theoretical perspectives: process, variance and adapted sociotechnical. PVAST model is based on five constructs; one dependent variable: ERP implementation performance which enables in evaluating the success or failure of ERP implementation; four independent variables: internal stakeholders, internal organization, business processes and technology. The key for our research model is based on:

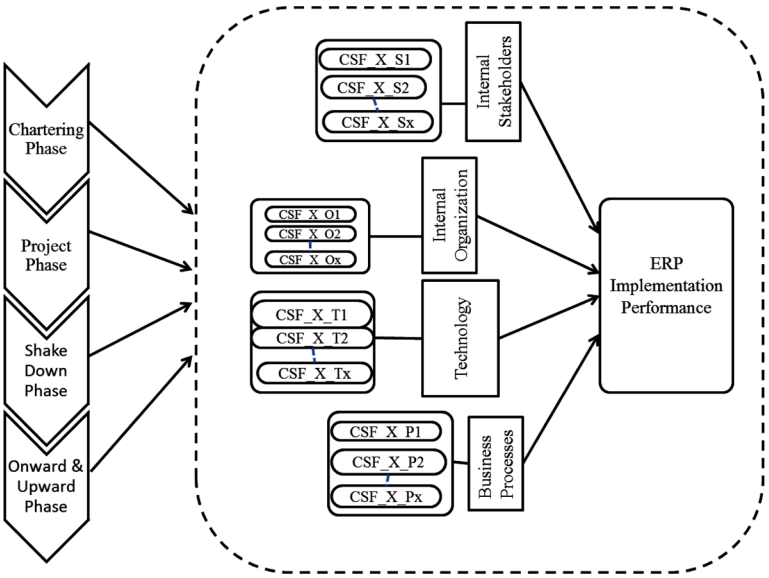
…the lessons that emerge in the interactive system effects between the technological [technical] and the organizational [social], where these lessons pertain to the management of information technology and the uses of information technology for managerial and organizational purposes. (Lee, 2000, p.vii)

The PVAST model is developed in two stages; firstly, integration of variance perspective under AST as illustrated in Table 4; and secondly, four instances of the above integrated model are generated for each phase namely chartering, project, shakedown and onward-upward. *CSF_X_Sx, CSF_X_Ox, CSF_X_Px* and *CSF_X_Tx* represent the CSF associated with internal stakeholders, internal organization, business processes and technology respectively, where *X* represents phases of implementation and *x* is number of CSF in the phase X. To illustrate this (see Figure 5), *CSF_C_S1* and *CSF_O_P6* represent the first CSF under internal stakeholder construct in chartering phase and sixth CSF under the business processes construct in the onward and upward phase respectively. This proposed model will facilitate to evaluate the performance of ERP project. This process of monitoring will also enable stakeholders of the project plan their resources based on temporal conditions of time and account for changes in CSF due to the dynamic competitive environment before the next stage of ERP project.

Uniqueness of PVAST model for ERP implementation is that it enables organization decision makers leverage simplicity of AST Leavitt's change model which can be understood easily by members with diverse backgrounds and frames of reference (Grant & Mergen, 1996). This is consistent with Alter's (2010, p. 3) view "a model that fosters better communication between business and IT professionals should consist of terms that are understandable to typical business professionals". Though the integrative model of Somers, Nelson, & Ragowsky (2000) is based on ST perspective view of organizations consisting of domains- actors, structure, technology, tasks and data, accounts for the external and internal environment of the organization, and is based on software life cycle model but it does not explain how the organization can apply the model to evaluate ERP implementation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 6. Proposed conceptual PVAST model for ERP implementation assessment based on Adapted SocioTechnical framework



The proposed PVAST conceptual model allows an organization to gain perspective on the performance of ERP implementation can be powerful means of providing focus and improving the effectiveness of the systems efforts and will enable organization to diminish the risk associated with the technological interventions; nevertheless organizing CSF along the phases from a sociotechnical perspective enables stakeholders in conceptualizing ERP performance based on organization elements. This is consistent with Beheshti & Beheshti's (2010) call upon organizations if it wants to meet the challenges of the dynamic environment to consider ERP system as contained with people, management, strategic goals, business processes, the hardware and the ERP software. These components are the constructs of PVAST model and hence measuring ERP success with this model will enable organizations evaluate its performance.

CONCLUSION AND IMPLICATIONS

The objective of this research has been to develop a rich theoretical background to evaluate the success of ERP systems. An integrated PVAST conceptual model that associates process and variance perspectives with sociotechnical perspective in conjunction with an adapted Leavitt's change model has been theorized. The conceptual model draws on the synergy of social and technical dimensions of the organization to represent it as a social structure in Leavitt's adapted change model. The key constructs identified from this model are internal stakeholders, internal organization, business processes and technology. The article operationalizes the constructs by adopting the grounded theory approach and develops propositions for the study. The four instances of the PVAST model across the implementation phases (chartering, project, shakedown and onward-upward) enable decision makers to evaluate the success of ERP during its life cycle.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

From an academic perspective this research has developed a novel integrated framework grounded on process, variance and sociotechnical perspectives to evaluate the success of ERP through its life cycle. The PVAST model enables practitioners to identify CSF for each phase in ERP life cycle model and cluster them under the adapted Leavitt's model and provides them a better standpoint to underpin areas where corrective measures are essential during planning, implementation and up-gradation of ERP system. The proposed model is developed by rigorously reviewing literature based on the grounded theory approach and further empirical study can be carried out to validate the proposed model. Future studies can extend the organization environment to take account of exogenous context to include concepts such as customers and suppliers as stakeholders.

ACKNOWLEDGMENT

The authors wish to thank anonymous reviewers for their valuable feedback on earlier versions of this research article. The feedback received from the reviewers has enabled us to improve this article substantially. The authors would also like to acknowledge the support received from the editor during this process. This chapter is a revised version of the research article "Conceptualizing Dimensions of Enterprise Resource Planning Systems Success: A SocioTechnical Perspective" published in the International Journal of Enterprise Information Systems, 10(1), 53-75.

REFERENCES

Akkermans, H., & van Helden, K. (2002). Vicious and Virtuous Cycles in ERP Implementation: A Case Study of Interrelations between Critical Success Factors. *European Journal of Information Systems*, *11*(1), 35–46. doi:10.1057/palgrave.ejis.3000418

Al-Mudimigh, A., Zairi, M., & Al-Mashari, M. (2001). ERP software implementation: An integrative framework. *European Journal of Information Systems*, *10*(4), 216–226. doi:10.1057/palgrave.ejis.3000406

Aladwani, A. M. (2001). Change management strategies for successful ERP implementation. *Business Process Management Journal*, *7*(3), 266–275. doi:10.1108/14637150110392764

Allan, G. (2003). A critique of using grounded theory as a research method. *Electronic Journal of Business Research Methods*, *2*(1), 1–10.

Alter, S. (2010). *Bridging the Chasm between Sociotechnical and Technical Views of Systems in Organizations*. Paper presented at the Thirty First International Conference on Information Systems, St. Louis, MO.

Appelbaum, S. H. (1997). Socio-Technical Systems Theory: An Intervention Strategy for Organizational Development. *Management Decision*, *35*(6), 452–463. doi:10.1108/00251749710173823

Arnold, V. (2006). Behavioral research opportunities: Understanding the impact of enterprise systems. *International Journal of Accounting Information Systems*, *7*(1), 7–17. doi:10.1016/j.accinf.2006.02.001

Bacharach, S. B. (1989). Organizational Theories: Some Criteria for Evaluation. *Academy of Management Review*, *14*(4), 496–515.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bajwa, D. S., Garcia, J. E., & Mooney, T. (2004). An Integrative Framework for the Assimilation of Enterprise Resource Planning Systems: Phases, Antecedents, and Outcomes. *Journal of Computer Information Systems*, *44*(3), 81–90.

Beheshti, H. M., & Beheshti, C. M. (2010). Improving productivity and firm performance with enterprise resource planning. *Enterprise Information Systems*, *4*(4), 445–472. doi:10.1080/17517575.2010.511276

Belassi, W., & Tukel, O. I. (1996). A new framework for determining critical success/failure factors in projects. *International Journal of Project Management*, *14*(3), 141–151. doi:10.1016/0263-7863(95)00064-X

Beynon-Davies, P., Owens, I., & Williams, M. D. (2004). Information systems evaluation and the information systems development. *The Journal of Enterprise Information Management*, *17*(4), 276–282. doi:10.1108/17410390410548689

Bhatti, T. R. (2005, September). Critical success factors for the implementation of enterprise resource planning (ERP): empirical validation. *The Second International Conference on Innovation in Information Technology*, 110.

Bingi, P., Sharma, M. K., & Godla, J. K. (1999). Critical Issues Affecting an ERP Implementation. *Information Systems Management*, *16*(5), 7–15. doi:10.1201/1078/43197.16.3.19990601/31310.2

Boonstra, A. (2011). Aligning Systems, Structures and People: Managing Stakeholders. Managing Adaptability, Intervention, and People in Enterprise Information Systems, 157.

Bostrom, R. P., & Heinen, J. S. (1977). MIS Problems and Failures: A Socio- Technical Perspective Part I: The Causes. *Management Information Systems Quarterly*, *1*(3), 17–32. doi:10.2307/248710

Boudreau, M. C., & Robey, D. (1999, January). Organizational transition to enterprise resource planning systems: theoretical choices for process research. In *Proceedings of the 20th international conference on Information Systems* (pp. 291-299). Association for Information Systems.

Coiera, E. (2007). Putting the technical back into socio-technical systems research. *International Journal of Medical Informatics*, *76*, S98–S103. doi:10.1016/j.ijmedinf.2006.05.026 PMID:16807084

Cooper, R. B., & Zmud, R. W. (1990). Information Technology Implementation Research: A Technological Diffusion Approach. *Management Science*, *36*(2), 123–139. doi:10.1287/mnsc.36.2.123

Davenport, T. (1998). Putting Enterprise into the Enterprise system. *Harvard Business Review*, *76*(4), 1–11. PMID:10181586

Davis, G. B., & Olson, M. (1985). *Management information systems: Conceptual foundations, methods and development*. New York: McGraw Hill.

Dawson, J., & Owens, J. (2008). Critical success factors in the chartering phase: A case study of an ERP implementation. *International Journal of Enterprise Information Systems*, *4*(3), 9–24. doi:10.4018/jeis.2008070102

Di Maggio, P. (1995). What Theory is not. *Administrative Science Quarterly*, *40*(3), 391–397. doi:10.2307/2393790

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Dillon, A. (2000). Group Dynamics Meet Cognition: applying socio-technical concepts in the design of information systems. In The New SocioTech: Graffiti on the Long Wall, (pp. 119-125). Springer Verlag.

Duncan, R. B. (1972). Characteristics of Organizational Environments and Perceived Environmental Uncertainty. *Administrative Science Quarterly*, *17*(3), 313–327. doi:10.2307/2392145

Ehie, I., & Madsen, M. (2005). Identifying critical issues in enterprise resource planning (ERP) implementation. *Computers in Industry*, *56*(6), 545–557. doi:10.1016/j.compind.2005.02.006

Esteves, J., & Pastor, J. (1999). An ERP lifecycle-based research agenda. *International Workshop in Enterprise Management and Resource. Planning: Methods, Tools and Architectures–EMRPS*, 1-12.

Esteves, J., & Pastor, J. (2001). Enterprise Resource Planning: An Annotated Bibliography. *Communications of the AIS*, *7*(8), 1–51.

Farzaneh, M., Vanani, I. R., & Sohrabi, B. (2013). A Survey Study of Influential Factors in the Implementation of Enterprise Resource Planning Systems. *International Journal of Enterprise Information Systems*, *9*(1), 76–96. doi:10.4018/jeis.2013010105

Finney, S., & Corbett, M. (2007). ERP implementation: A compilation and analysis of critical success factors. *Business Process Management Journal*, *13*(3), 329–347. doi:10.1108/14637150710752272

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, *33*(6-7), 897–920. doi:10.1016/j.respol.2004.01.015

Gibson, N., Holland, C. P., & Light, B. (1999). Enterprise Resource Planning: A Business Approach to Systems Development. *Proceedings of the 32nd Hawaii International Conference on System Sciences*. 10.1109/HICSS.1999.772816

Goulding, C. (1999). *Grounded Theory: some reflections on paradigm, procedures and misconceptions.* Working Paper Series, Number WP006/99, ISSN Number ISSN 1363-6839, pp.1-26.

Grabski, S. V., Leech, S. A., & Schmidt, P. J. (2011). A Review of ERP Research: A Future Agenda for Accounting Information Systems. *Journal of Information Systems*, *25*(1), 37–78. doi:10.2308/jis.2011.25.1.37

Grant, D., & Mergen, E. (1996). Applying quality to Leavitts framework to solve information technology problems: A case study. *Information Technology & People*, *9*(2), 43–60. doi:10.1108/09593849610121598

Grant, D., & Tu, Q. (2005). Levels of enterprise Integration: Study Using Case Analysis. *International Journal of Enterprise Information Systems*, *1*(1), 1–22. doi:10.4018/jeis.2005010101

Gunasekaran, A. (2005). Enterprise Information Systems & Organizational Competitiveness. *International Journal of Enterprise Information Systems*, *1*(1), i–vi.

Hammer, M., & Stanton, S. (1999). How Process Enterprises Really Work. *Harvard Business Review*, 108–118. PMID:10662000

Hanafizadeh, P., & Ravasan, A. Z. (2011). A McKinsey 7S model-based framework for ERP readiness assessment. *International Journal of Enterprise Information Systems*, *7*(4), 23–63. doi:10.4018/jeis.2011100103

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hawking, P., Stein, A., & Foster, S. (2004, January). Revisiting ERP systems: benefit realization. In *System Sciences, 2004. Proceedings of the 37th Annual Hawaii International Conference on* (pp. 1-8). IEEE.

Henderson, R., & Mitchell, W. (1997). The interactions of organizational and competitive influences on strategy and performance. *Strategic Management Journal*, *18*(S1), 5–14. doi:10.1002/(SICI)1097-0266(199707)18:1+<5::AID-SMJ930>3.3.CO;2-9

Holland, C. P., & Light, B. (1999). A critical success factors model for ERP implementation. *IEEE Software*, *16*(3), 30–36. doi:10.1109/52.765784

Janssens, G., Kusters, R., & Heemstra, F. (2008). Sizing ERP implementation projects: An activity-based approach. *International Journal of Enterprise Information Systems*, *4*(3), 25–47. doi:10.4018/jeis.2008070103

Jarrar, Y. F., Al-Mudimigh, & Zairi, M. (2000). ERP Implementation Critical Success Factors–The Role and Impact of Business Process Management. ICMIT (pp. 122–127). IEEE.

Jing, R., & Qiu, X. (2007). A Study on Critical Success Factors in ERP Systems Implementation. *International Conference on Service Systems and Service Management*, 1-6. 10.1109/ICSSSM.2007.4280192

Kamhawi, E. M. (2007). Critical Factors for Implementation Success of ERP Systems: An Empirical Investigation from Bahrain. *International Journal of Enterprise Information Systems*, *3*(2), 34–49. doi:10.4018/jeis.2007040103

Karsh, B.-T. (2004). Beyond usability: Designing effective technology implementation systems to promote patient safety. *Quality & Safety in Health Care*, *13*(5), 388–394. doi:10.1136/qshc.2004.010322 PMID:15465944

Keen, P. G. (1981). Information systems and organizational change. *Communications of the ACM*, *24*(1), 24–33. doi:10.1145/358527.358543

Kerlinger, F. N. (1986). *Foundations of Behavioral Research* (3rd ed.). New York: Holt, Rinehart, & Winston.

King, J. L., & Kraemer, K. L. (1984). Evolution and Organizational Information Systems: An Assessment of Nolans Stage Model. *Communications of the ACM*, *27*(5), 466–475. doi:10.1145/358189.358074

Kini, R. B., & Basaviah, S. (2013). Critical Success Factors in the Implementation of Enterprise Resource Planning Systems in Small and Midsize Businesses: Microsoft Navision Implementation. *International Journal of Enterprise Information Systems*, *9*(1), 97–117. doi:10.4018/jeis.2013010106

Klaus, H., Rosemann, M., & Gable, G. (2000). What is ERP? *Information Systems Frontiers*, *2*(2), 141–162. doi:10.1023/A:1026543906354

Kronbichler, S. A., Ostermann, H., & Staudinger, R. (2009). A Review of Critical Success Factors for ERP Projects. *The Open Information Systems Journal*, *3*(1), 14–25. doi:10.2174/1874133900903010014

Kwahk, K. (2006, January). ERP acceptance: organizational change perspective. In *System Sciences, 2006. HICSS'06. Proceedings of the 39th Annual Hawaii International Conference on System Sciences* (*Vol. 8*, pp. 172b-172b). IEEE. 10.1109/HICSS.2006.159

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kwon, T. H., & Zmud, R. W. (1987). Unifying the Fragmented Models of Information Systems Implementation. In Critical Issues in Information Systems Research (pp. 227-51). John Wiley.

Leavitt, H. J. (1965). *Applying organizational change in industry: Structural, technological and humanistic approaches. In Handbook of Organizations*. Chicago: Academic Press.

Lee, A. (2000). Researchable Directions for ERP and Other New Information Technologies, Editors Comments. MIS Quarterly, 24(1), iii-viii.

Lee, A. S. (2004). *Thinking about Social Theory and Philosophy for Information Systems.* In L. Willcocks & J. Mingers (Eds.), *Social Theory and Philosophy for Information Systems* (pp. 1–26). Chichester, UK: John Wiley & Sons.

Levasseur, R. E. (2001). People Skills: Change Management Tools - Lewin's Change Model. *Interfaces*, *31*(4), 71–73.

Lewin, K. (1952). *Field theory in social science: Selected theoretical papers* (D. Cartwright, Ed.). London: Tavistock.

Lyytinen, K., Mathiassen, L., & Ropponen, J. (1996). A framework for software risk management. *Journal of Information Technology*, *11*(4), 275–285. doi:10.1057/jit.1996.2

Lyytinen, K., Mathiassen, L., & Ropponen, J. (1998). Attention Shaping and Software Risk – A Categorical analysis of Four Classical Risk Management Approaches. *Information Systems Research*, *9*(3), 233–255. doi:10.1287/isre.9.3.233

Lyytinen, K., & Newman, M. (2008). Explaining information systems change: A punctuated socio-technical change model. *European Journal of Information Systems*, *17*(6), 589–613. doi:10.1057/ejis.2008.50

March, S. T., & Storey, V. C. (2008). Design Science in the Information Systems Discipline: An Introduction to the Special Issue on Design Science Research. *Management Information Systems Quarterly*, *32*(4), 725–730.

Markus, M. L., Axline, S., Petrie, D., & Tanis, C. (2000). Learning from adopters experiences with ERP: Problems encountered and success achieved. *Journal of Information Technology*, *15*(4), 245–265. doi:10.1080/02683960010008944

Markus, M. L., & Tanis, C. (2000). The Enterprise System Experience– from adoption to success. In Framing the Domains of IT Management: Projecting the Future through the Past (pp. 173-207). Pinnaflex Educational Resources, Inc.

Motwani, J., Subramanian, R., & Gopalakrishna, P. (2005). Critical factors for successful ERP implementation: Exploratory findings from four case studies. *Computers in Industry*, *56*(6), 529–544. doi:10.1016/j.compind.2005.02.005

Mumford, E. (2006). The story of socio-technical design: Reflections on its successes, failures and potential. *Information Systems Journal*, *16*(4), 317–342. doi:10.1111/j.1365-2575.2006.00221.x

Nah, F., Lau, J., & Kuang, J. (2001). Critical Factors for Successful Implementation of Enterprise Systems. *Business Process Management Journal*, *7*(3), 285–296. doi:10.1108/14637150110392782

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Nwankpa, J. K. (2015). ERP system usage and benefit: A model of antecedents and outcomes. *Computers in Human Behavior*, *45*, 335–344. doi:10.1016/j.chb.2014.12.019

Okrent, M. D., & Vokurka, R. J. (2004). Process mapping in successful ERP implementations. *Industrial Management & Data Systems*, *104*(8), 637–643. doi:10.1108/02635570410561618

Orlikowski, W., & Hoffman, D. (1997). *An Improvisational Model for Change Management: The Case of Groupware Technologies. In Inventing the Organizations of the 21st Century* (pp. 265–282). Boston, MA: MIT.

Palvia, S. C., Sharma, R. S., & Conrath, D. W. (2001). A Socio-Technical Framework for Quality Assessment of Computer Information Systems. *Industrial Management & Data Systems*, *101*(5), 237–251. doi:10.1108/02635570110394635

Pan, S. L. (2005). Customer perspective of CRM Systems: A Focus Group Study. *International Journal of Enterprise Information Systems*, *1*(1), 65–68. doi:10.4018/jeis.2005010105

Parr, A. N., & Shanks, G. (2000). A Taxonomy of ERP Implementation Approaches. *Proceedings of the 33rd Hawaii International Conference on System Sciences*, 1-10.

Parthasarathy, S., & Anbazhagan, N. (2007). Evaluating ERP implementation choices using AHP. *International Journal of Enterprise Information Systems*, *3*(3), 52–65. doi:10.4018/jeis.2007070104

Pawar, B. S. (2009). *Theory building for hypothesis specification in organizational studies.* Sage Publications.

Pries-Heje, L. (2008). Time, attitude, and user participation: How prior events determine user attitudes in ERP implementation. *International Journal of Enterprise Information Systems*, *4*(3), 48–65. doi:10.4018/jeis.2008070104

Rashid, M., Hossain, L., & Patrick, J. (2001). The Evolution of ERP Systems: A Historical Perspective. In L. Hossain, J. Patrick, & M. Rashid (Eds.), *Enterprise Resource Planning: Global Opportunities & Challenges* (pp. 1–16). Idea Group Publishing.

Richmond, B. (1993). Systems thinking: Critical thinking skills for the 1990s and beyond. *System Dynamics Review*, *9*(2), 113–133. doi:10.1002dr.4260090203

Robey, D., & Boudreau, M. C. (1999). Accounting for the Contradictory Organizational Consequences of Information Technology: Theoretical Directions and Methodological Implications. *Information Systems Research*, *10*(2), 167–185. doi:10.1287/isre.10.2.167

Rockart, F. (1979). Chief executives define their own data needs. *Harvard Business Review*, *57*, 81–93. PMID:10297607

Rose, J., Jones, M., & Truex, D. (2005). Socio-Theoretic Accounts of IS: The Problem of Agency. *Scandinavian Journal of Information Systems*, *17*(1), 133–152.

Ross, J. W. (1998), *The ERP Revolution: Surviving Versus Thriving.* Centre for Information Systems Research, Research Report, CISR Working Paper No. 307, Sloan School of Management.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sabherwal, R., & Robey, D. (1993). An Empirical Taxonomy of Implementation Processes Based on Sequences of Events in Information Systems Development. *Organization Science*, *4*(4), 548–576. doi:10.1287/orsc.4.4.548

Sarker, S. (2000). Toward a Methodology for Managing Information Systems Implementation: A Social Constructivist Perspective. *Informing Science*, *3*(4), 195–205.

Sarmento, A. (Ed.). (2004). Preface. In Issues of human computer interaction. IGI Global.

Schultz, R. L., Ginzberg, M. J., & Lucas, H. C. (1984). A structural model of implementation. In R. L. Schultz & M. J. Ginzberg (Eds.), *Management Science Implementation*. Greenwich, CT: JAI Press.

Shehab, E. M., Sharp, M. W., Supramaniam, L., & Spedding, T. A. (2004). Enterprise resource planning: An integrative review. *Business Process Management Journal*, *10*(4), 359–386. doi:10.1108/14637150410548056

Soja, P. (2006). Success factors in ERP systems implementations Lessons from practice. *Journal of Enterprise Information Management*, *19*(4), 418–433. doi:10.1108/17410390610678331

Somers, T. M., & Nelson, K. (2001, January). The impact of critical success factors across the stages of enterprise resource planning implementations. In *System Sciences, 2001. Proceeding of the 34th Hawaii International Conference on System Sciences*, 1-10. 10.1109/HICSS.2001.927129

Somers, T. M., Nelson, K., & Ragowsky, A. (2000). Enterprise Resource Planning (ERP) for the Next Millennium: Development of an Integrative Framework and Implications for Research. *AMCIS 2000 Proceedings of the 2000 Americas Conference of Information Systems*, 998-1004.

Stewart, G., Milford, M., Jewels, T., Hunter, T., & Hunter, B. (2000). Organisational Readiness for ERP Implementation. *Americas Conference on Information Systems, AMCIS 2000 Proceedings*, 966 - 971. Retrieved from http://aisel.aisnet.org/amcis2000/291K

Symons, C. (2006). *Measuring the Business Value of IT, A Survey of IT Value Methodologies.* Forrester Research, Inc. Retrieved August 28, 2012, from http://www.cornerstone1.com/SAP/SAP_Forrester_Measuring_the_Business_Value_of_IT.pdf

Tavana, M. (2011). *Managing Adaptability*. Intervention, and People in Enterprise Information Systems; doi:10.4018/978-1-60960-529-2

Te'eni, D. (2005). In S. Nielsen & J. Beekhuyzen (Eds.), *Socio-technical aspects of ERP selection and implementation: The central role of communication. In Enterprise Systems in Academia* (pp. 1–21). Hershey, PA: IGP.

Toni, S. M., & Klara, N. (2001). The Impact of Critical Success Factors across the Stages of ERP Implementations. *Proceedings of the 34th Hawaii International Conference on Systems Science*.

Uzoka, F. M. E., Abiola, R. O., & Nyangeresi, R. (2008). Influence of product and organizational constructs on ERP acquisition using an extended technology acceptance model. *International Journal of Enterprise Information Systems*, *4*(2), 67–83. doi:10.4018/jeis.2008040105

Van de Ven, A. H., & Poole, M. S. (2005). Alternative approaches for studying Organizational Change. *Organization Studies*, *26*(9), 1377–1404. doi:10.1177/0170840605056907

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wears, R. L., & Berg, M. (2005). Computer technology and clinical work. *Journal of the American Medical Association*, *293*(10), 1261–1263. doi:10.1001/jama.293.10.1261 PMID:15755949

Whetten, D. A. (1989). What Constitutes a Theoretical Contribution? *Academy of Management Review*, *14*(4), 490–495. doi:10.2307/258554

Whitworth, B. (2009). *The Social Requirements of Technical Systems. In Handbook of Research on Socio-Technical Design and Social Networking Systems* (pp. 1–22). IGI Global; doi:10.4018/978-1-60566-264-0

Williams, J., Williams, M. D., & Morgan, A. (2013). A teleological process theory for managing ERP implementations. *Journal of Enterprise Information Management*, *26*(3), 235–249. doi:10.1108/17410391311325216

Wolfswinkel, J. F., Furtmueller, E., & Wilderom, C. P. (2011). Using grounded theory as a method for rigorously reviewing literature. *European Journal of Information Systems*, *22*(1), 45–55. doi:10.1057/ejis.2011.51

Yeoh, W., Koronios, A., & Gao, J. (2008). Managing the Implementation of Business Intelligence Systems: A Critical Success Factors Framework. *International Journal of Enterprise Information Systems*, *4*(3), 79–94. doi:10.4018/jeis.2008070106

Yusuf, Y., Gunasekaran, A., & Abthorpe, M. S. (2004). Enterprise information systems project implementation: A case study of ERP in Rolls-Royce. *International Journal of Production Economics*, *87*(3), 251–266. doi:10.1016/j.ijpe.2003.10.004

Zhang, L., Lee, M. K., Zhang, Z., & Banerjee, P. (2003, January). Critical success factors of enterprise resource planning systems implementation success in China. In *System Sciences. Proceedings of the 36th Annual Hawaii International Conference on System Sciences* (pp. 1-10). IEEE. 10.1109/HICSS.2003.1174613

KEY TERMS AND DEFINITIONS

Critical Success Factors: Critical Success Factors (CSF) are defined as factors needed to ensure a successful ERP project.

ERP Implementation: The intervention of ERP application system on the social and technical factors of an organization.

Process Perspective: The process perspective posits the necessary actions to be deliberated by decision makers in each phase of the ERP project where actions in each phase are mentioned *a priori*.

SocioTechnical Perspective: SocioTechnical perspective is a synergy of social and technical subsystems of an organization.

Variance Perspective: The process of establishing conditions necessary for the success of a project.

This research was previously published in Enterprise Information Systems and the Digitalization of Business Functions; pages 20-46, copyright year 2017 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 11
Developing a Participatory Approach to Accessible Design

María Inés Laitano
LabSic, Université Paris 13, Villetaneuse, France

ABSTRACT

This article describes how accessibility to ICTs is understood as conformity to standards, which usually ends in designs that do not consider the singularities of people. This article delves into a participatory approach to accessible design, as an alternative to design guided simply by standards. It first defines a relevant network of stakeholders for accessible participatory design, based on the expertise that each of them can provide. It then discusses the issue of consensus among stakeholders, necessary to make design decisions when there are conflicting views. Finally, it addresses the question of non-technological outcomes and methodological concerns of Participatory Design that should inspire the accessible design agenda.

INTRODUCTION

Although accessibility to Information and Communication Technologies (ICTs) has been promoted for more than ten years as a fundamental human right of people with disabilities (United Nations, 2006), as an unprecedented opportunity for communication and autonomy, many communities remain excluded. The reasons for this situation of relegation are many and diverse (economic, technical, cultural, political, geographical, etc.) but a major cause is the standardized design of mainstream ICTs. Standardized or normalized design implies certain norms, like young, white, male, heterosexual, Western, middle-class, non-disabled, and marginalizes individual identities (Lewthwaite, 2014). As postulated by the social model of disability (World Health Organization, 2001), exclusion is generated by the environment in which the person lives, by the normalized design of mainstream technologies, and not by their personal attributes.

In the accessibility arena itself, there is a generalized understanding of accessibility to ICTs as conformity with norms. Several countries granted law status to Web Content Accessibility Guidelines (W3C, 2008), promoting web design projects based exclusively on accessibility standards. These guidelines are lists of verification criteria, designed more to evaluate existing websites than to address new design projects. It was shown empirically, by user test, that accessibility guidelines do not cover all the problems

DOI: 10.4018/978-1-7998-7297-9.ch011

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

encountered by people with disabilities when they browse the Web (Power, Freire, Petrie, & Swallow, 2012; Rømen & Svanæs, 2011). Guidelines define accessibility as a property of the digital content and not as a property of the relationship between the user and the content in a context of use (Cooper, Sloan, Kelly, & Lewthwaite, 2012), as a property of the user experience. The W3C Accessibility Guidelines Working Group, aware of these limitations, is currently working on a next major version for 2020 that hopes to expand the scope beyond content and beyond the Web (Lauriat & Spellman, 2017). One of the goals in this elaboration process is to involve more stakeholders by doing user research with people who use the standard.

This paper delves into a participatory approach to accessible design, as an alternative to design guided simply by standards. Participatory design calls for democratization and stakeholder involvement in the design process, for empower relevant stakeholders rather than being restrict them to a prescribed way of interacting (Fischer, 2002), for emancipate specially "groups of people whose views, opinions and needs might be the most ignored by mainstream society." (Vines, Clarke, Wright, McCarthy, & Olivier, 2013). At least two rationales, one moral and one pragmatic, support participatory design. The first is that the people most directly affected by the design result have the right to judge that result. The pragmatic reason is that directly including users will increase the chances of a successful design result because they are the ones who will need to adopt and to adapt to the design result (Carroll & Rosson, 2007).

The three main goals of the participatory design philosophy—sharing expertise, sharing control and inspiring change (Vines et al., 2013)—are explored in the context of accessible design. The author outlines opinions developed through experience and loosely guided by these three goals. She took part as a researcher/designer in a series of technology design projects for social inclusion carried out in the city of Rosario (Argentina), the majority of them within a public program of accessible tourism.

Thus, the objectives of the article are three. First, to identify who are the relevant stakeholders, based on the expertise needed to design an accessible artifact. Second, to discuss the issue of consensus among stakeholders, necessary to make design decisions when there are conflicting views. Thirdly, to address the question of the outcome of an accessible participatory design project and the outcome aspects that should concern the accessibility research agenda.

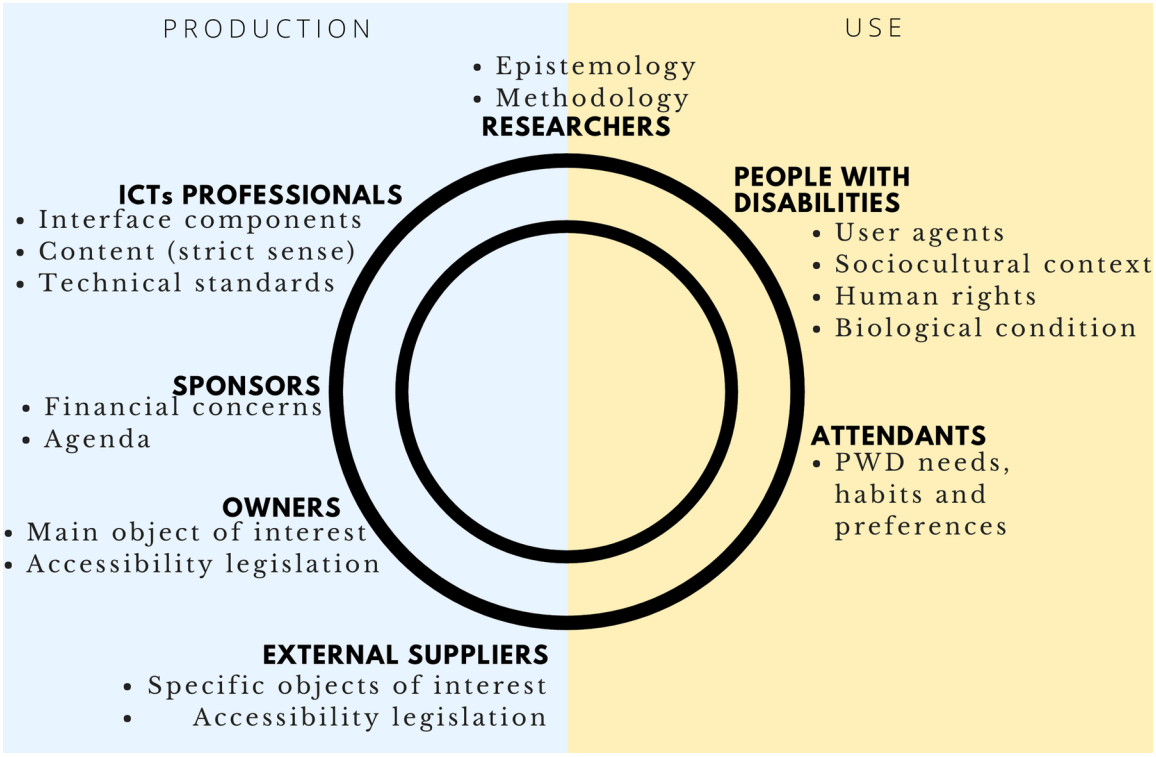
The contributions are not intended to be a formal or reproducible methodology for the accessible design of ICTs. The socio-technical systems "involving humans and technology contain far too much variability to be reproducible in any straightforward way" (Brown, Reeves, & Sherwood, 2011). The proposed suggestions are only intended to motivate and inspire more reflections on accessible participatory design. It is up to each designer or researcher to adapt, via re-signification and non-mechanical dissemination (Thomas, Juarez, & Picabea, 2015), these proposals to other local contexts.

SHARING VIEWS ON ACCESSIBLE DESIGN

Participatory design conceives design as a process of inscribing knowledge in material forms (Karasti, 2014). This knowledge is not owned by a single person but possessed by different stakeholders in an asymmetric and often controversial way (Fischer, 2000). Relevant stakeholders for accessible participatory design are all those people with some knowledge of accessibility, capable of share their points of view and produce new ideas and artifacts. This definition extends the classic triad developers-content-users of the W3C's Web Accessibility Initiative (Chisholm & Henry, 2005) to a wider network conformed by: ICTs professionals, sponsors, owners and external suppliers on the production side; people with

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Stakeholders and their expertise for accessible participatory design (Source: Laitano, 2017)



disabilities and attendants on the use side; as well as researchers. Figure 1 synthesizes the stakeholders' network proposed for accessible participatory design and the expertise contributed by each of them. Names in uppercase define the stakeholders. Expertise of each stakeholder appear in bullets. The light blue background identifies the production side while the orange background identifies the use side.

People with disabilities –or end users– consult and interact with the content through user agents: web browsers, media players and assistive technologies[1]. They have different levels of competence in the use of user agents and configure them in very different ways. For example, an expert screen reader user knows multiple keyboard shortcuts that a novice user may not know. But user agents represent only one –the technological one– of the multiple dimensions that make up the disabled experience (Frauenberger, 2015) and from which people with disabilities can give testimony. There is knowledge derived from biological condition. For instance, within the collective of people with visual impairments, blindness is not the same as low vision nor blind deafness, birth blindness is not the same as acquired blindness. There is knowledge intrinsically cultural. For example, sign language is the language of a deaf culture. Contemporary conceptualizations of disability, which go beyond the dichotomy between the biological model and the social model, give the pattern of multiple knowledge that people with disabilities can contribute to accessible design (Frauenberger, 2015).

Attendants of people with disabilities (family, colleagues, teachers, caregivers and others) are also key informants in accessible participatory design. As outlined in the "Support and relationships" chapter of the International Classification of Functioning, Disability and Health (World Health Organization, 2001), people with disabilities receive practical physical and emotional support from their attendants as

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

well as support in various aspects of their daily activities. Because of this, their attendants have a deep knowledge about the disabled experience, about their needs, their habits and their preferences. Attendants are not only informants but can also play the role of mediators. As mediators they can, for example, take part as interpreters of deaf people whose native language is the sign language.

By delving into the common definition of content[2], it can be seen as the conjunction of three elements belonging to different stakeholder's expertise of the production side: interface components, content (in the strict sense) and objects of interest. The difference between interface and content is a classic distinction in computer science: an interface component is a part of the artifact that is perceived by users as a single control for a distinct function while a content is an information or a sensory experience communicated to users with a certain structure and presentation format (W3C, 2008). Participatory Design has already pointed out that the design of interface components and the design of the content are intertwined. (Fischer & Herrmann, 2011) and this is especially true in accessible design where a barrier in either of the two makes inaccessible the whole. Whether a button does not support operation by keyboard (interface) as if important information is only in non-textual format (content) the entire artifact is inaccessible.

The object of interest is a concept that derives from the Activity Theory applied to the Human Computer Interaction. The interaction between people and technological artifacts occurs in the broader context of a human activity (Rabardel, 1995). People does not interact with technological artifacts but with an object of the world through technology. The technological artifact only mediates the relationship between the human and this object of the world that interests him (Bødker, 2011). For example, when someone looks up an accessible sightseeing tour on the Web, his attention is not placed on the format of the content but on the tour sights and its accessibility features. So, if tour sights are not accessible or if nothing is said about accessibility features, even if the interface and the content are accessible, the technological artifact does not fulfill its mission, the experience as a whole is inaccessible.

Developers –who can be named more generally as ICT professionals because they include designers, QA professionals and others– are experts in the design of interface components and content in the strict sense. They use –and are experts in the use of– authoring tools such as development environments, content management systems, blog applications, etc. and evaluation tools to check the content syntax and accessibility.

In addition, there are "owners" of the design solution, i.e. those who initiate, promote, edit and keep alive the design solution over time (Laitano, 2016). To illustrate, if the Tourist Office turned to the University to design a tourism solution accessible to tourists with disabilities, the Tourist Office fulfills the role of the owners of the design solution and the University fulfills the role of the ICT professionals. Owners are experts in the purpose or main service of the designed artifact that in the example would be the tourist offer of the city and that can be named as main object of interest.

There are also those stakeholders who are referred to in the content but who are not owners, their role is rather that of external suppliers of content. Local hoteliers and gastronomes are external suppliers in the case of a tourism design solution. External providers have knowledge about the specific services they provide (specific objects of interest) and are responsible for their accessibility. Also on the production side there are sponsors, stakeholders who understand the financial aspect of the project and normally control the project's agenda. Sponsors may or may not coincide with owners. In the case of a tourism design solution, the municipal government or the tourism ministry can be the sponsors of the project.

All production stakeholders have –or should have– knowledge about the standards that an accessible design solution will have to respect. As proposed by Kelly et al. (2009), the extent to which artifacts are accessible will be influenced by how all the production stakeholders respond to these external drivers

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

for accessibility which are the standards. Developers know technical standards on digital accessibility, standards that establish how to show audiovisual content, among others. Owners and external providers know the legislation on accessibility and disability that applies to their own service or domain of expertise.

Researchers are also relevant stakeholders for an accessible participatory design project, located in a meta-position that encompasses both production and use (see Figure 1). This does not mean that they control the process from outside but 'inside the loop' (Brown et al., 2011). The knowledge provided by the researchers is above all methodological and epistemological. Methodological because researchers establish ways for shared, communicated and embodied the stakeholders' knowledge (Vines et al., 2013). Epistemological because they observe, analyze and transform a process in which they themselves take part. Recognizing the researcher as part of the design process is recognizing that the designed artifact is also linked to the researcher's culture[3].

LOOKING FOR CONSENSUS AMONG STAKEHOLDERS

Co-design a socio-technological solution is a complex challenge in which multiple points of view can take place. Stakeholders are not homogeneous and the particular characteristics and singularity of participants can lead to very different design process. Different process, run in different ways, can end up with very different outcomes even if the technological artifact that is being built is exactly the same (Brown et al., 2011). Moreover, this suggests that the idea of recruiting representative stakeholders (Newell, Gregor, Morgan, Pullin, & Macaulay, 2011) is quite a while idealistic. Finding the point of consensus is therefore a topic of interest in the Participatory Design literature. Some authors propose a participatory result "as one that shows evidence of democratic ideals by increasing the agency of its users and giving them a voice in matters they did not have before." (Bratteteig & Wagner, 2016). Participatory design insists on the tolerance of different perspectives, on the passionate commitment that brings together the stakeholders, on transform conflict between enemies into constructive controversies among adversaries who have opposing interests but are capable of legitimizing visions different from their own (Björgvinsson, Ehn, & Hillgren, 2010).

In the case of accessible design, controversies appear at multiple levels. Just to mention a few:

- Within the same collective of users: essential features for one user with low vision may not be important for another. Many of them use the browser zoom to read the Web while others navigate with screen reader to avoid visual fatigue. For the former, a good color contrast is essential, while for the latter, a well-written HTML is more important.
- Between different collectives of users: People in the deaf community prefer that the size of the sign language interpreter in a video be very large while people who do not understand sign language will tend to prefer a small size.
- Between ICTs professionals and users: In surveys to screen reader users (WebAIM, 2009), when users are consulted about web images that seek to generate some emotion or sensation, most indicate that they prefer images described by their screen reader. This result is clearly opposed to the accessibility guideline that recommends not describing decorative images and therefore opposed to what any ICTs professional would tend to do.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

How to deal with these conflicting preferences is a subject still little explored in the field of accessible design. Accessibility standards are not normative in terms of participation and involvement of stakeholders, although the Website Accessibility Conformance Evaluation Methodology (W3C, 2014) indicates the intervention of people with disabilities as an *optional* requirement. Scientific works on Participatory Design with people with disabilities developed so far (Brock et al., 2010; Metatla, Bryan-Kinns, Stockman, & Martin, 2015) are more focused on the forms of communication between producers and users (accessible scenarios, accessible prototypes, etc.) and less in the forms of agreement. There is, on the other hand, a widespread idea of design for all or universal design that has implied dangerous implications such as thinking that a design could satisfy the preferences or views of any individual. If it is already difficult enough to find consensus among the members of a participatory design project, "it can become impossible if the characteristics for which one is designing, in terms of physical, sensory, motor and cognitive abilities, to say nothing of culture, knowledge and motivation, are suggested to include those of the whole population" (Newell et al., 2011).

If the disadvantages of the standards-guided design exposed at the beginning of this paper are considered, a path of possible agreement for an accessible participatory design would be to prioritize the voices that come from the experience of stakeholders over the voices that are based on the accessibility standards. In this way, singularities of the people directly involved will be prioritized over the norm, which is ultimately established by people unconnected to the project. Likewise, a path of possible agreement is to take advantage of the creative potential that has bringing different points of view together and trying to create a shared understanding among all stakeholders (Fischer, 2000) to imagine solutions that solve apparently opposite needs. This last idea approaches that of Bødker and Zander (2015) for whom it is about identifying win-win situations. That is, instead of simply respecting the voice of the majority, redouble the creative effort to arrive at solutions that respond to heterogeneous needs.

INSPIRING THE ACCESSIBLE DESIGN AGENDA

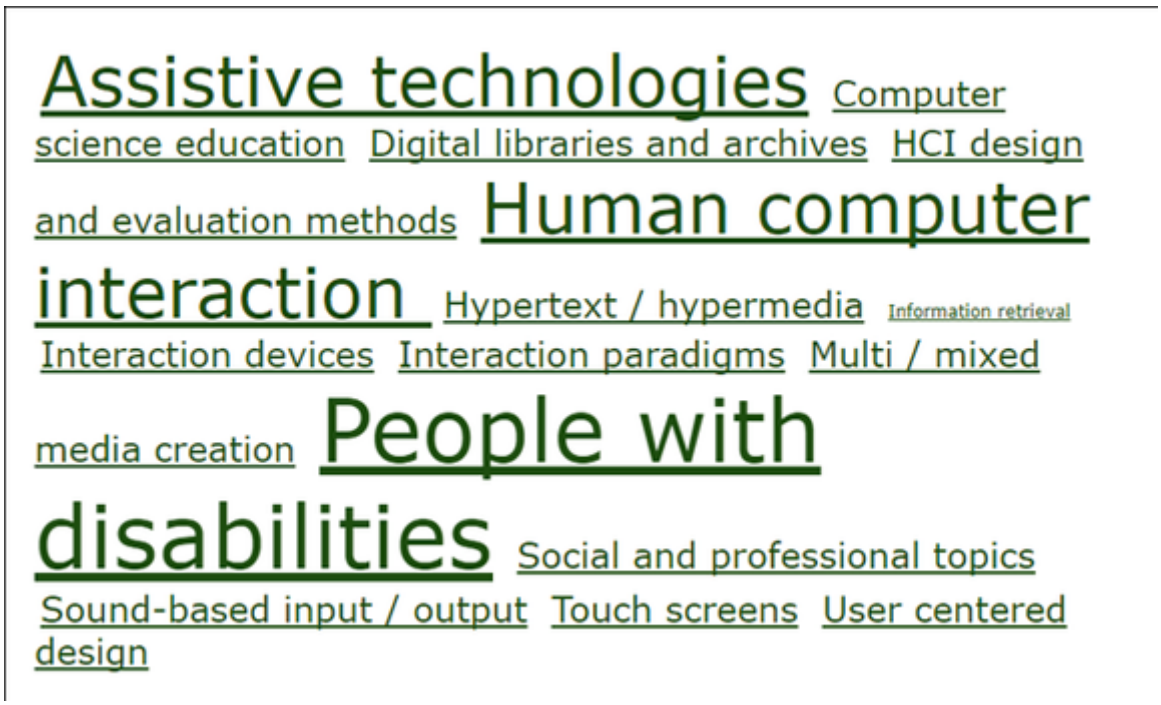
The balance between the technological concern and the methodological concern is another point of discussion in the field of Participatory Design. Participatory Design mainly focuses its efforts on identifying "novel ways of deploying existing technologies in ways that are useful to users" (Dunckley, Camara, Abdelnour-Nocera, & Waema, 2009) and in designing "improvements over existing technologies as they are more sensitive to the needs and desires of specific user groups" (Vines et al., 2013). These reuses and adaptations of existing technologies put the focus on design processes and methods, and are usually accompanied by a lack of interest in the technological research concern. Korsgaard, Klokmose and Bødker (2016) consider that the cause of this technological conservatism is the stability of mainstream technologies and draw attention to the risk for Participatory Design. The perpetuation of operating systems like Windows, Mac, iOS or Android, and applications that has matured for decades (Microsoft Word, Excel, etc.) has led to a standardization of both the design of user interfaces and the training of researchers and practitioners in the field of software design. "If technologies are chosen based on the researchers' (and users') taken-for-grantedness, familiarity and/or convenience, and later result in recommendations for, or, a finished system, it must be implicitly assumed that our current technologies are adequate for local practices." (Korsgaard, Klokmose and Bødker, 2016, p. 73).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The opposite seems to happen in the field of Accessibility. The scientific community has a predilection for the technological research concern, as illustrated by the prominent subjects in the Accessibility and Computing literature (Figure 2): while only two themes make reference to design processes and methods –user centered design, HCI design and evaluation methods–, several topics are related to technologies –assistive technologies, interaction devices, interaction paradigms, sound based I/O, touch screens, etc. Following the same reasoning as before, the inclination for the technological concern may be a consequence of a certain platform instability, of the existence of many and heterogeneous toolkits and platforms. Assistive technologies vary completely from one disability situation to the other as well as within the same disability situation. For instance, assistive technology for visually impairment include screen readers, screen magnifiers, Braille embossers, voice recognition, navigation assistance, wearable technology, among many others. But addressing only the technological aspect also involves a risk, already mentioned above: assuming that a technology can be a universal solution, which can satisfy any subject with a certain disability.

Integrating the methodological concerns of Participatory Design into the accessible design agenda could then lead to a better balance between methodological and technological aspects, to a socio-technical approach of accessible design and to a real socio-technical outcome. Integrating the methodological concerns means starting from the local knowledge of people with disabilities and other stakeholders for questioning the conditions under which technologies are designed and introduced.

Figure 2. Prominent subjects in the Accessibility and Computing literature (Source: Special Interest Group on Accessibility and Computing https://dl.acm.org/sig.cfm?id=SP1530)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Finally, the technological artifact is not the only outcome in a participatory design project. New knowledge and competencies, new collaborations and networks are other possible outcomes of the collaborative work among stakeholders (Bratteteig & Wagner, 2016). The knowledge about the disability experience is usually very asymmetric in an accessible design project, very limited in the case of the production stakeholders. Producers are probably the ones who take the most in terms of new knowledge and competencies. For their part, people with disabilities encounter daily so many barriers in ICTs that they are particularly motivated to exchange in design processes. They accept the challenge because the problems addressed are personally meaningful problems (Fischer, 2002) for them. Mutual learning, exchange and joint work to produce something new generate trust and bonds between stakeholders that endure over time. Accessible design research should value this knowledge as scientific knowledge, should transmit the skills acquired and can take advantage of collaborations and networks in future projects.

CONCLUSION

This paper delves into a participatory approach to accessible design, as an alternative to design guided simply by standards. It analyzes three essential issues of participatory design in relation to accessibility: sharing expertise, sharing power and inspiring change in the accessible design agenda. In the first place, it defines a relevant network of stakeholders for accessible participatory design based on the expertise that each of them can provide. On the production side are the ICTs professionals, the owners, the sponsors and the external suppliers of the design solution. On the use side are the people with disabilities and their attendants. In a meta-position between production and use are the researchers. The article then raises the issue of consensus among stakeholders and proposes two possible scenarios for resolving controversies. The first is to prioritize the voices that come from the experience of stakeholders over the voices that are based on the accessibility standards. The second scenario consists in transforming controversies into creative potential, in redoubling the creative effort to arrive at solutions that respond to heterogeneous needs. Finally, the author exposes two qualities of Participatory Design of which the accessible design agenda could be inspired: to probe more deeply into the methodological concerns and to take advantage of the non-technological outcomes of the process, such as new knowledge, new competencies and new stakeholders' networks.

Bringing together the right stakeholders, prioritizing their knowledge over accessibility standards, attending to the methodology and to the non-technological outcomes of the process are some of the challenges for accessible design. More reflections and more designs in this sense remain to be carried out to take advantage of the communicative and emancipatory potential of ICTs for people with disabilities.

ACKNOWLEDGMENT

The author's research was funded by the Université Paris 13 (France) and the Consejo Nacional de Investigaciones Científicas y Técnicas (Argentina). The design projects that inspired this article were funded by Ministerio de Ciencia, Tecnología e Innovación productiva, Universidad Nacional de Rosario, Universidad Abierta Interamericana, Ente de Turismo Rosario, Secretaría de Turismo de la Municipalidad de Rosario, and supported by many stakeholders from Servicio de Lectura Accesible de la Biblioteca Municipal Argentina "Juan Álvarez", Asociación Rosarina de Deportes para Ciegos, Centro de Rehabili-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tación para Personas con Discapacidad Visual "Luis Braille" Nº 2014, Escuela Especial para Integración en Secundaria Nº 2139, Escuela de Enseñanza Media Nº 338 and Instituto Superior del Profesorado Nº 16 "Bernardo Houssey".

REFERENCES

W3C. (2008). Web Content Accessibility Guidelines (WCAG) 2.0. Retrieved March 10, 2014, from http://www.w3.org/TR/WCAG20/

W3C. (2014). Website Accessibility Conformance Evaluation Methodology (WCAG-EM) 1.0. Retrieved November 19, 2014, from http://www.w3.org/TR/WCAG-EM/

Björgvinsson, E., Ehn, P., & Hillgren, P.-A. (2010). Participatory Design and "Democratizing Innovation." In *Proceedings of the 11th Biennial Participatory Design Conference* (pp. 41–50). New York, NY: ACM. 10.1145/1900441.1900448

Bødker, S. (2011). Use is Everywhere and Changing: Analysis and Design with the Human-artifact Model. In *Proceedings of the 29th Annual European Conference on Cognitive Ergonomics* (pp. 3–10). New York, NY: ACM. 10.1145/2074712.2074714

Bødker, S., & Zander, P.-O. (2015). Participation in Design Between Public Sector and Local Communities. In *Proceedings of the 7th International Conference on Communities and Technologies* (pp. 49–58). New York, NY: ACM. 10.1145/2768545.2768546

Bratteteig, T., & Wagner, I. (2016). What is a Participatory Design Result? In *Proceedings of the 14th Participatory Design Conference: Full Papers* (Vol. 1 pp. 141–150). New York, NY: ACM. 10.1145/2940299.2940316

Brock, A., Vinot, J.-L., Oriola, B., Kammoun, S., Truillet, P., & Jouffrais, C. (2010). Méthodes et outils de conception participative avec des utilisateurs non-voyants. In *Proceedings of the 22nd Conference on l'Interaction Homme-Machine* (pp. 65–72). New York, NY: ACM. 10.1145/1941007.1941017

Brown, B., Reeves, S., & Sherwood, S. (2011). Into the wild: challenges and opportunities for field trial methods. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1657–1666). New York, NY: ACM. 10.1145/1978942.1979185

Carroll, J. M., & Rosson, M. B. (2007). Participatory design in community informatics. *Design Studies*, *28*(3), 243–261. doi:10.1016/j.destud.2007.02.007

Chisholm, W. A., & Henry, S. L. (2005). Interdependent components of web accessibility. In *Proceedings of the International Cross-Disciplinary Workshop on Web Accessibility (W4A)* (pp. 31–37). New York, NY: ACM. 10.1145/1061811.1061818

Cooper, M., Sloan, D., Kelly, B., & Lewthwaite, S. (2012). A Challenge to Web Accessibility Metrics and Guidelines: Putting People and Processes First. In *Proceedings of the International Cross-Disciplinary Conference on Web Accessibility* (pp. 201–204). New York, NY: ACM. 10.1145/2207016.2207028

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Dunckley, L., Camara, S. B., Abdelnour-Nocera, J., & Waema, T. M. (2009). Socio-Technical Issues of Participatory Design in the Developing World. *International Journal of Sociotechnology and Knowledge Development*, *1*(3), 1–14. doi:10.4018/jskd.2009070101

Fischer, G. (2000). Symmetry of ignorance, social creativity, and meta-design. *Knowledge-Based Systems*, *13*(7), 527–537. doi:10.1016/S0950-7051(00)00065-4

Fischer, G. (2002). Beyond "Couch Potatoes": From Consumers to Designers and Active Contributors. *First Monday*, *7*(12). doi:10.5210/fm.v7i12.1010

Fischer, G., & Herrmann, T. (2011). Socio-Technical Systems: A Meta-Design Perspective. *International Journal of Sociotechnology and Knowledge Development*, *3*(1). doi:10.4018/jskd.2011010101

Frauenberger, C. (2015). Disability and Technology: A Critical Realist Perspective. In *Proceedings of the 17th International ACM SIGACCESS Conference on Computers & Accessibility* (pp. 89–96). New York, NY: ACM Press. 10.1145/2700648.2809851

A. Hurst, L. Findlater, & M. R. Morris (Eds.). (2017). *ASSETS '17: Proceedings of the 19th International ACM SIGACCESS Conference on Computers and Accessibility*. New York, NY: ACM.

Karasti, H. (2014). Infrastructuring in Participatory Design. In *Proceedings of the 13th Participatory Design Conference* (Vol. 1, pp. 141–150). New York, NY: ACM. 10.1145/2661435.2661450

Kelly, B., Sloan, D., Brown, S., Seale, J., Lauke, P., Ball, S., & Smith, S. (2009). Accessibility 2.0: Next Steps for Web Accessibility. *Journal of Access Services*, *6*(1–2), 265–294. doi:10.1080/15367960802301028

Korsgaard, H., Klokmose, C. N., & Bødker, S. (2016). Computational Alternatives in Participatory Design: Putting the T Back in Socio-technical Research. In *Proceedings of the 14th Participatory Design Conference* (Vol. 1, pp. 71–79). New York, NY: ACM. 10.1145/2940299.2940314

Laitano, M. I. (2016). e-Accesibilidad: del enfoque centrado en el contenido al enfoque comunicacional. *Scire: representación y organización del conocimiento, 22*(1), 79–85.

Lauriat, S., & Spellman, J. (2017). What Comes After WCAG 2.1? *Presented at the CSUN 2017 Assistive Technology Conference*. Retrieved from goo.gl/3SK8T9

Lewthwaite, S. (2014). Web accessibility standards and disability: Developing critical perspectives on accessibility. *Disability and Rehabilitation*, *36*(16), 1375–1383. doi:10.3109/09638288.2014.938178 PMID:25009950

Metatla, O., Bryan-Kinns, N., Stockman, T., & Martin, F. (2015). Designing with and for people living with visual impairments: Audio-tactile mock-ups, audio diaries and participatory prototyping. *CoDesign*, *11*(1), 35–48. doi:10.1080/15710882.2015.1007877

Morin, E. (2005). *Introduction à la pensée complexe*. Paris: Éditions du Seuil.

Newell, A. F., Gregor, P., Morgan, M., Pullin, G., & Macaulay, C. (2011). User-Sensitive Inclusive Design. *Universal Access in the Information Society*, *10*(3), 235–243. doi:10.100710209-010-0203-y

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Power, C., Freire, A., Petrie, H., & Swallow, D. (2012). Guidelines are only half of the story: accessibility problems encountered by blind users on the Web. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 433–442). New York, NY: ACM. 10.1145/2207676.2207736

Rabardel, P. (1995). *Les hommes et les technologies: approche cognitive des instruments contemporains*. Paris: Armand Colin. Retrieved from https://hal-univ-paris8.archives-ouvertes.fr/file/index/docid/1017462/filename/Hommes_et_technologie_Rabardel1995.pdf

Rømen, D., & Svanæs, D. (2011). Validating WCAG versions 1.0 and 2.0 through usability testing with disabled users. *Universal Access in the Information Society*, *11*(4), 375–385. doi:10.100710209-011-0259-3

Thomas, H., Juarez, P., & Picabea, F. (Eds.). (2015). *Qué son las tecnologías para la inclusión social?* (1st ed.). Bernal, Argentina: Universidad Nacional de Quilmes.

United Nations. (2006). *Convention on the Rights of Persons with Disabilities*. Retrieved from http://www.un.org/disabilities/default.asp?navid=12&pid=150

Vines, J., Clarke, R., Wright, P., McCarthy, J., & Olivier, P. (2013). Configuring Participation: On How We Involve People in Design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 429–438). New York, NY: ACM. 10.1145/2470654.2470716

WebAIM. (2009). Survey of Preferences of Screen Readers Users. Retrieved March 6, 2015, from http://webaim.org/projects/screenreadersurvey/

World Health Organization. (2001). *International classification of functioning, disability, and health: ICF short version*.

ENDNOTES

1. Assistive technologies are specific programs or peripherals that people with disabilities use to improve their interaction with the Web. For example, screen readers normally used by people with blindness are assistive technology.
2. The Web Accessibility Initiative defines the content as "the information that forms Web sites and Web applications: the code and markup that define the structure, presentation, and interaction, as well as text, images, and sounds that convey information to the end-user." (Chisholm & Henry, 2005, p. 32)
3. It is also to inscribe participatory design as a practice of complex thinking and as a second-order epistemology. The concept of the meta-point of view of Morin (2005) is relevant to deepen this aspect.

This research was previously published in the International Journal of Sociotechnology and Knowledge Development (IJSKD), 9(4); pages 1-11, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 12
Structural Change Management for Sustainable SME Development:
Applying Classical Management Tools

Robert M. Molnar
Technical College of Applied Sciences in Zrenjanin, Serbia

ABSTRACT

This chapter addresses several approaches in investigation of the SME life cycles, particularly in respect to the structure, functions and behavior of these businesses. Once SMEs have been established they start to change both their structure and behavior. In fact, it could be stated that SMEs operate in a permanently changing environment. There are a lot of factors which influence these changes and optimizing their management is a great challenge for most SMEs. As a result of these factors and suboptimal SME management practices survival rate of new established SMEs is low. For researchers and practitioners it is therefore crucial to discover how to increase long-term survival chances of SMEs through relevant structural change. In order to contribute to this goal the chapter will consider the conceptual and research framework of the structure and practical management behavior of SMEs in change management processes. The chapter also provides suggestions on how to use practical management tools such as the PEST, SWOT and TOWS matrices and ways of their analysis.

INTRODUCTION

Structural changes inevitably occur with the development of human society, both on a personal and on a global level. These structural changes are being reflected in value systems and put small, flexible organizations in a more favourable position compared to larger ones in terms of adaptability. Market competition between companies also forces small and medium size enterprises (hereinafter: SMEs) to be both innovative and productive. Speed of changes that take place in human society, even in markets, increased the competitive advantage of innovative and flexible companies, so they put at a disadvantage

DOI: 10.4018/978-1-7998-7297-9.ch012

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

those companies which are weighed down by large structures and bureaucracy. With this in mind, perhaps it is not surprising that the share of small enterprises in the total number of companies is in constant increase. In addition to their number, small companies have a significant role in employment generation which is higher when compared with large ones and what is also very important, small companies could be the driving force for local economic development, particularly out of urban areas (Birch, 1981).

However, a small number and scope of their business functions result in the fact that SMEs individually have little impact on their environment and the power to modify it according to their needs. But, for the same reasons SMEs have an ability to react quickly to the changes happening in their environment. Conversely, large enterprises strive to establish stability in their operations, as well as keep up their structure, opening the door for the development of a structured bureaucratic organization. This inevitably hinders their flexibility and innovation which are prerequisites for success in market competition (Molnar, 2010).

In the second half of the twentieth century, large enterprises and multinational companies were the main factor of economic growth and development. However, at the same time in both developed and developing economies, SMEs became an increasingly important economic and social factor. With their innovations and willingness to take a risk, entrepreneurs in these SMEs emerged as a potential force that changes the existing situation and contributes to overall progress. The willingness of societies to support such individuals often predetermined their own overall progress (Penezić & Jakopin, 2002).

Enterprise growth eventually develops and changes its organizational structure and its goals, as well as ways of achieving them. The initial phase in the life cycle of SMEs is often chaotic, uncertain and risky period in their lives (Stanković, 1998). Those companies which survive this period in many cases avoid re-exposure to risks and uncertainties with which they are faced. They sustain their businesses in a smaller framework, not only relating to the number of employees, but also to other business factors. In this way, owners of SMEs themselves become a limiting factor in their own SME life cycle.

Nevertheless, the number and rate of creation of "small" companies among the overall business entities are increasing day by day. SMEs emerge on a daily basis, but they also disappear on a daily basis. Whether this is due to their inability to overcome all the "children's diseases" on their development path or simply the law of the market in overall economic environment remains for further research. This is definitely a question that requires an answer. There are many ways in which small businesses are trying to survive, but modest overall resources that are at their disposal, are certainly one of the limiting factors of their survival and eventual further development.

In terms of ruthless struggle for market survival, the problems faced by SMEs are not just problems of individuals - entrepreneurs and managers. But rather, these problems have a wider social-economic dimension. An SME as an open organizational system is in intensive relationship with the environment, and its dependence on stakeholders is at an extremely high level. Since an SME does not have the power to change the environment, the only strategy is to adjust to it (Molnar, 2010).

As a result, and strongly dependent on success of SME management, numerous statistical evidence shows that less than a half of established SMEs survive for more than five years (EUROSTAT, 2016). Evidence seems more favorable in developed countries mostly due to their entrepreneurial culture level as well as organized systemic support provided by institutions of financial and non-financial SME support (SBA, 2014; Australian Government, 2013). Statistical SME performance data also reveals that failure to secure the survival is one of the most fundamental SME problems as well as opportunities.

For researchers and practitioners it is therefore crucial to discover how to increase long-term survival chances of SMEs. In order to contribute to this goal this chapter will implement the conceptual research framework on the structure and practical behavior of SMEs. Many researches have been conducted in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

area of business failure. Some of them emphasize problems with finances (Hagen, 2009), while others report non-financial problems such as poor marketing, bad business planning, lack of skills, poor leadership as crucial ones (Molnar, 2010; Wagner, 2013). But, somehow *unmet need for structural changes* in an SME has never been listed among most frequent reasons for unsuccessful business or finally for its failure. This is the main research gap and one of the intentions of this chapter is an attempt to go beyond it.

METHODOLOGY IMPLEMENTED

This chapter presents a conceptual framework of structural change management in sustainable SME development. The main result of this chapter is presented as a model of an *SME growth in order to achieve sustainable development*. This model has been developed as a synthesis of previously developed models and concepts in the relevant field that have been analyzed by broad literature research. High level of abstraction has been implemented as well in order to develop the model as it is. The literature sources for this research could be divided in two groups:

1. Primary, where researches in relevant field has been conducted on a broad SME base, and
2. Secondary, where relevant concepts has been developed.

BACKGROUND WITH LITERATURE REVIEW

Once SMEs have been established they start to change both their own structure and behavior. So, it could be highlighted that SMEs operate in permanent changes which originate both internally and externally. There are a lot of factors which influence these changes and optimizing their management is a great challenge for most SMEs.

The life cycle curve determination is one of the important tasks in investigating SME durability (Adižes, 1994). There are behavioral similarities among SMEs behaviour in respect to the position on the life cycle curve. At the same time, management approach and practice in how to achieve business goals has strong inluence on SME future determination in terms of success. Once an SME starts to grow, it undergoes permanent changes. Sound management should be able to deal with problems that arise due to change. Some of them can be foreseen, but some not. In dealing with problems solving different conflicts arises. The causes of conlifct have a complex nature that is as complex as SME business operation itself. But conflicts are expected and have to be carrefully managed in order to keep or turn them into the constructive ones (Adizes, 1992). A proper SME management tries to optimize together different interests of various stakeholders into an SME (partners, management, employees, to mention just a few) with the goals and strategic interest of the SME as a business.

The author would like to point out several other life cycle issues. For example, what is truly the driving force for an SME in its life cycle adventure? Is proper management enough to ensure a bright business future for an SME? One of the very important factors which shouldn't be neglected is *innovation*. It could be described as a specific objective of entrepreneurs to use change as an opportunity for the realization of various production and service activities. Therefore, entrepreneurs look at change as something desirable and healthy. They even look for them and use them as opportunities for practicing a pro-active approach in their everyday business (Drucker, 1991).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Following an SME on its life-cycle "travel" and bearing in mind previous remarks a question arises. Is it possible to develop/change an SME without changing its elements, particularly people within it? This question is tightly related with entrepreneur and SME management structure as well. Learning organization is an imperative in modern management. By an SME development there have been numerous changes undertaken, not just in "material" world but in "psychological" one too. If it is not achieved, that will be a big obstacle for SME future development (Sengi, 2003). According to this theory, there are 5 features of a learning organization:

1. Systems thinking,
2. Shared vision,
3. Challenging of mental models,
4. Team learning, and
5. Personal mastery, all of which are of tremendous importance for SMEs.

Besides the life cycle approach there are other theories the author has used extensively in his SME research (Molnar, 2010). First, the *system approach* which should be implemented in all efforts to achieve long term survival of an SME. The theory suggests that different physical, biological as well as social/organizational and other systems have certain similarities in their behaviors and have some common characteristics on higher levels of abstraction. The fact that an SME is an organizational system means that it performs and behaves on the highest level of complexity among all other known systems such as technical and biological ones (Boulding, 1956). Consequently, SME management efforts include more or less mistakes before a concrete activity even started. The other fact that is also important for this chapter relates to the behavior of a system, where it is not a sum of the behaviour of its parts, but rather it a product of their interactions (Ackoff, 1999). Beside these, any man made system can be classified as purposeful one. Relating to SMEs which are organizational systems, their members are purposeful individuals who intentionally formulate their objectives (Ackoff & Emery, 1972).

The second major theory closest to the author's views is implementation of laws of physics in the organization. This approach was previously called "Organizational Physics" (Sisney, 2013). This comprehensive approach incorporated in itself most of the previously developed approaches/theories, mentioned before with well known laws of physics. In this theory there are classified "Six Laws of Organizational Physics" which deal with an organization performance and can help to improve it. For an entrepreneur or manager, it is crucial to understand implications of each law. The first one, states that "An organization is a complex adaptive system", originates from systems theory and suggests that in every analysis, intervention and reaction, the organization should be considered in its totality. The second law, states that "An organization is subject to the first law of thermodynamics" suggesting that every organization has a finite amount of energy and if it strives to increase then it must obtain it from the outside". The third law states that "An organization is subject to the second law of thermodynamics" where due to entropy every system falls apart over time. So, organization first uses its energy to manage and counter disintegrating forces, and survival could be used to drive integration with its environment. The fourth law, states that "An organization must shape and respond to its environment and act as a whole system, including its parts and sub-parts". This implies that every organization is like a chaotic system which has patterns or forces throughout it. The fifth law states that "An organization is subject to the conditions of its environment" which is the driving principle of evolution suggesting that not the strongest or most intelligent companies will survive but those which are best adapted to the environment. Finally, the sixth law states

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

that "An organization is subject to the laws of motion" putting into correlation Newton's laws of motion (inertia, acceleration and action-reaction) with the principles of organizational change and momentum.

One of the latest researches in the field of organizational change implies that uncertainty may not have an inevitable negative influence on organizational development (Zhang, 2016). In this study, a co-evolutionary model of organizational change has been developed. This model also emphasizes the interaction between institutional-level factors and organizational-level change as bridged by top management perceptions of organizational uncertainty where its dynamics affects organizational change.

Highlights of Types of Change Management

But, what is really the driving force behind the attained structural changes in SMEs? There are some processes which should be properly managed in order to achieve certain levels of change. Changes in an SME could be treated on two levels by two types of management programs (Bourda, 2013):

1. Systematic organization implying a wide change initiative that involves an organization through a wide transformation effort, particularly changes in its structures, and
2. Specific internal change management or change control program that involves providing tools and processes to control daily operational or project - specific changes, including the people side of change.

As a result of highlighted changes in structure, people and relationships, the behavior of SME naturally evolves and changes as well.

It is crucial for managers to identify change, modify or adapt it and consequently use a model for SME transformation to help an SME survive or even develop. There are at least two leading models in change management practice which the author would like to highlight.

One of the first developed and applied change management models for understanding organizational development refers to the three-stage process of change, namely the *Unfreeze–Change–Freeze* stages (Lewin, 1947). This model takes into the consideration psychological aspects of behavior modification in these three different stages. In the *Unfreezing* stage there is low level of resistance to change, mostly because of recognizing and accepting the need for change. It is reasonable to expect uncertainty. In the next stage named *Change* it is necessary to develop new attitudes to encourage behavior necessary for change to occur. In this stage, people and employees need to understand the benefits of change. In the final stage of change, named *Freezing,* processes should stabilize and there is a need for supporting and reinforcing new change conditions. It is important to acknowledge people's efforts that will reinforce their belief in future changes.

The next major model widened the stages that should be taken into consideration when dealing with change management. The eight-stage change model describes change process for managing change in organizations, mostly in large ones (Kotter, 2012), from which SMEs can learn. The eight steps are as follows:

1. **Establishing a Sense of Urgency:** People have to see the need to change;
2. **Creating a Guiding Coalition:** Create a group with authority and credibility to lead the change efforts;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

3. **Developing a Vision and Strategy:** Create a vision and develop strategies with clear aim and way forward;
4. **Communicating the Change Vision:** Promote understanding and commitment in order to accept vision and strategy;
5. **Empowering Broad-Based Action:** Enable people to act and overcome barriers by changing the structures that could undermine the vision and strategy;
6. **Generating Short-Term Wins:** There is a need for visible achievements in order to motivate and ensure further support;
7. **Consolidating Gains and Produce More Change:** Introducing broad range of changes related to systems, structures and policies and maintains change momentum; and
8. **Anchoring New Approaches in the Culture:** Articulate and communicate new values, attitudes and behaviors.

However, besides many change management models developed SMEs have to reckon with a number of forces that resist change and support the status quo within an organization. These forces are both internal and external. An effective change management tries to minimize these forces by satisfying following criteria which affect stakeholders (French, Rayner, Rees, & Rumbles, 2015):

- **Benefit:** The change should have a clear relative advantage for the individuals being asked to change;
- **Compatibility:** The change should be as compatible as possible with the existing values and experiences of the people being asked to change;
- **Complexity:** The change should be no more complex than necessary. It must be as easy as possible to understand and use; and
- **Triability:** The change should be something that people can try on a step-by-step basis and make adjustments throughout the process.

In order to produce changes in people's and SME behavior as well, SME management needs to be very active during change phases in order to implement reinforcement tactics. Verbal reinforcement is a cost free method. For implementation it is important to articulate and permanently repeat desirable behavior that fits into organizational change. As a result, old behaviors become "extinguished" over time, and will be replaced with new (desired) behavior. It is crucial that some sort of reinforcement is necessary for change to take root in the individual. Beside the verbal method, an SME can change its structure and policy in a very formal way, by writing new rules and procedures. In this case, without informal reinforcement, employees in most cases are not going to change quite as easily. So, in organizational changes reinforcement comes in as a vital part of it (Pryor, Taneja, Humphreys, Anderson & Singleton, 2008).

Main Components and Characteristics of Change Management in Sustainable SME Development

As it has been stated previously, SMEs operate in very dynamic environment where uncertainty and particularly changes are among the most important characteristics. Hence, for this chapter, *change* and its management in an SME development is the main theme.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

But, how do changes really affect an SME and organization in general? Any change generates one or more problems because permanent structures and (organizational) system need new parameters and actions in order to keep outputs within planned framework. So, managing changes is a permanent/daily activity performed by managers, and can potentially be one of the business functions in an SME as well as in any other organization. If it is not the case, SME will be negatively affected both externally and internally.

The main components of change management could be identified as: change, problems and solutions/management/problem solving (Adizes, 1992). It is very important to mention that these components create a cycle, so, every solution creates another change, and so on. But, it is very important to underline that initial change, marked as "$change_1$" which created "$problem_1$" after reaction of "$management_1$" causes "$change_2$" which differs from "$change_1$", as it presented below:

$change_1 \rightarrow problem(s)_1 \rightarrow solutions_1/management_1/(problem\ solving_1) \rightarrow change_2 \rightarrow \ldots$

Change can be minor or major problem, affecting less or more important components and structures in an SME. Depending on this, the problem(s) created by change will be minor or complex one(s). Minor problems could be solved and managed immediately, while complex ones need much more time, effort and knowledge.

Conflicts are side products of organizational changes and have to be taken into consideration in the change management process. There are both constructive and destructive conflicts, depending on mutual trust and respect between relevant people within an organization. If, there is mutual respect then people may learn from their differences. Also, people then may work together and decisions made will be better and their implementation will be less questionable (Adizes, 1992).

The next very important issue in change management is timing. In order to find out the most appropriate time to implement changes within an SME, so called push and pull factors have to be taken into consideration. If push factors are dominant then SME is forced to be changed in an opposite way it wants to change. It could be crucial to determine why an SME is implementing changes within it. The reason for change determines the strategy that will be implemented.

In case of huge, strategic changes a strategic plan should be developed or at least a new vision or mission statement. There are some proposed factors which may be considered as triggers for change (Rees & Hall, 2013):

- Challenges of growth, especially global markets;
- Challenges of economic downturns and tougher trading conditions;
- Changes in strategy;
- Technological changes;
- Competitive pressures, including mergers and acquisitions;
- Customer pressure, particularly shifting markets;
- Pressures to learn new organization behavior and skills; and
- Government legislation/initiatives.

Additionally, it is crucial to recognize the signs suggesting that some organizational structure isn't working and needs to be changed. When inertia starts to dominate in majority of business processes of an organization or SME, it is time for structural changes. If management neglects this sign and keeps the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

current structure operational, negative impact on the organization performaces will cause its „death" over time. According to the approach mentioned before (Sisney, 2013) there are five rules of organizational structure in change management process:

1. When the strategy changes, change the structure;
2. Don't allow functions focused on efficiency to control functions focused on effectiveness;
3. Don't allow functions focused on short-range results to control functions focused on long-range development;
4. Balance the need for autonomy with the need for control; and
5. Put the right people in the right functions.

Some authors suggest that change management process could be considered as a project with four parts of its implementation plan (Burton, Obel & Håkonsson, 2015). They are:

1. *What*. The tasks as projects and sub-projects have to be defined;
2. *Who*. There is a need to allocate human resources in order to assign responsibilities;
3. *When*. Decide on milestones and deadlines;
4. *Follow up on milestones*.

More recent researches suggest that organizational infrastructure may have a profound impact on organizational behavior. In process of changing organizational routines there will be influence of not only people's sense-making and behavior but also of the technology and infrastructure with which people interact (Langstrand, 2016).

However, bearing in mind the objective of this chapter which emphasizes sustainable SME development the most desirable change which should be implemented is related to the SME structures and its functions that develop new organizational systems ensuring a higher level and rate of SME survival.

A CONCEPTUAL FRAMEWORK OF STRUCTURAL CHANGE MANAGEMENT IN SUSTAINABLE SME DEVELOPMENT

From the very beginning of its operation every organizational system seems to be forever in reorganization (Drucker & Maciaiello, 2008). There are many reasons for that but spontaneous development of disorder, frictions and underperformance are most important ones that force an organization to change its own structure. It has to be noted that good organization structure doesn't guarantee good performance. But, in opposite, an inappropriate organization structure impedes performance and seriously affects survival of an organization and an SME as well.

As noted earlier, SMEs, like living beings, have their life cycle with characteristic phases they pass through. All of these phases have their own behavioral patterns and need a specific structure for SME operations. Therefore, structures in different phases differ and need to change as SME behavior as well. However, unlike living beings, SMEs, at least theoretically, could escape death as a final step in their life cycle. This is achievable only if the SME management practices proper approach to changes (Adižes, 1994).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

By researching SME life cycle phases, it is possible to find some answers relating to SME survival and development. For example, emotional potential and other personal characteristics of the entrepreneurs are very important internal factors in early stage of structuring SMEs. But, good personal characteristics are not enough as a potential to structure successful SMEs in later stages of their development. Obviously, some needs in the market environment could be met by satisfying the demand for SME goods and services. If the needs are more intensive and offer is more attractive then SMEs have a higher potential to create added value. This potential is based on active intelectual potential and knowledge potential as one of the resources in SMEs. Knowledge potential is a multidimensional one because it is related to the product (knowing WHAT to produce), to the technology (HOW to produce) and finally to the organizational system (production management). But, this chapter will show that this resource is still not enough to create a functional SME capable for sustainable development. In addition, several other resources can't be neglected in optimizing the SME management system: machinery, supplies, finance, human capital are among the most important. Maintaining the potential of all of these resources at a certain potential level is a precondition of SMEs ***short–term survival.*** These resources can't be renewed by themselves, so „somebody" should take care of that. In early stage it is an entrepreneur but later on when the SME spreads out he/she is forced to involve others into the SME, and then its structure optimization actually starts (Černiček & Molnar, 1998). When the first cycle of an SME is completed it has three group of functions:

1. Functions for continuity assurance;
2. Functions for operative management; and
3. The servicing functions.

The SME which incorporated in itself all of these group of functions could be marked as $\boldsymbol{S_{s\text{-}t}}$**.** All of these groups have some specific functions inside of them and have certain relations between themselves.

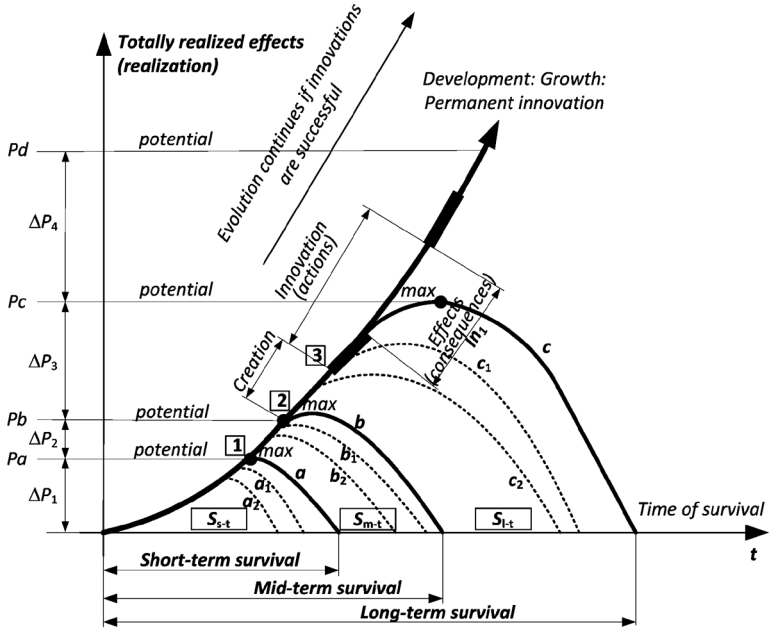
An SME evolution, from short-term to long-term survival is followed by some significant changes in its functional structure. This change, as a result, causes other ones, like quality and quantity of resources managed, and particularly SME behaviors expressed internally and externally as well. Relevant for all structures is that every of them is flexible, adaptable and changable at the beggining, but with time they become more inflexible and rigid. So, there is also a moment when none of the structures can respond to changes which happened externally and are not able to perform their main role. This is the final moment when SME has to implement change management in order to create appropriate changes within it. If it is not case, then the SME starts to get organizationally old. There are numerous factors which contribute to SME aging such as changes in individual and social needs, life cycle of the needs, development of science and technology, scarcity of natural resources and growing competition.

During its existance an SME permanently solves problems caused by changes and creates some effects. Figure 1 visualizes effects of an SME growth in order to achieve its sustainable development.

The curves presented in Figure 1 are a synthesis of all internal and external factors that affect an SME. Only one curve, the thickest one, represents successful change management. So, very few SMEs are capable to create the thickest curve in their life cycle. Most of them, turn aside of it with unsucsessful tries in order to realize own potential which is due to poor change management. However, as Figure 1 also suggests, innovation lies behind all successful SME development, not just in products or services but also in structures and management as well[1].

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. SME growth in the function of sustainable development
Source: *Adapted by author from Černiček & Molnar, 2000, p.232*



The most dominant feature of SME life cycle is its functional structure development. Every level of it, allows effectiveness up to a certain level (potential). When an SME evolves untill the level of short-term survival, then realized effects permenently increse until point 1 and after that SME starts to decrese its realized effectiveness. Maximum potential of this structure is denoted as ΔP_1, which is same as total potential denoted as P_a. When SME exploits available potential then it reaches a curve marked as „*a*", and if it is not the case then curves „a_1" and „a_2" are reached and are obviously behind curve „*a*" (See Figure 1).

There are four basic functions which assure SMEs continuity/short-term survival, such as: financial, sales, manufacturing (technical) and procurement functions (Černiček & Molnar, 1998). These functions properly interrelated should enable the reproduction cycle in an SME. If some of them fail then SME existance is seriously endangered. However, a question arises about the period of time in which this functional structure is able to ensure SME survival. It strongly depends on potential generated between the SME supply and demand created on the market. Finally, it is limited by the product life cycle which could be reached only by most successful firms. All potentials created this way definitelly vanish at the end of the product life cycle in any case. But, if an SME didn't create new potential it vanishes too.

When an SME reaches potential for longer survival, then realized effects increse until point 2 and after that SME starts to decrese its realized effects. Maximum potential of this structure is P_b, which is higher then P_a for ΔP_2, that originates from newly evolved part of the structure. This part of the structure should focus mostly on new products and/or services, meaning their quality and quantity in general and their market penetration. Additionaly, permanent development of products and/or services should be assured as well, which implies changes in management structure too. If SME exploits available potential then this is observable on a curve marked as „*b*", if it is not the case then curves „b_1" and „b_2" have been created behind curve „*b*".

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

For those SMEs untouched by negative statistics associated with „life expectancy", during the first „survival" phase, new potential can be created. This is only possible if SME develops new specialised functions, namely, the *SME passes through new structural changes*. Besides financial resources needed for creating the new system it is necessary to choose a certain segment of market environment with new potential. This is followed by creating attractive offers, development of SME processes which will realize the offer and finally the organizational system development with potential to realize all these factors. The research suggests that this system could be a system for *integrative management and development* and it has its own interrelated functions as well as functions previously developed (Zgodavova & Bober, 2012). As such it assures *mid-term survival* of an SME. The SME which successfully incorporates in itself all of these functions is an optimal mid–term SME and could be denoted as $\boldsymbol{S_{m\text{-}t}}$**.** However, numerous researches on business failures suggests that SME managers neglect or just not able to recognize importance of structural changes of organization they run (Hagen, 2009; Molnar, 2010; Wagner, 2013).

In a situation of strategic development, continuous and accelerated growth could be experienced by an SME due to approaching point 3. Maximum potential of this structure is P_c, which is higher then P_b for the difference denoted as ΔP_3, that originates from newly evolved part of the organizational structure. If SME exploits available potential that is observed on a curve marked as „*c*", and if it is not the case then curves „c_1" and „c_2", have been created which are behind curve „*c*".

In the third phase of SME structure development there are numerous sub-systems incorporated which realize SME potential on the market as well as numerous sub-systems which develop new potential. All of them are in different stages of their life cycle or in different stages of future development of their potential. The main challenge for the SME new functional structure is to measure its own potential and choose the optimal option(s) in combining already developed systems. The new functions developed in this phase are: *strategic management function* and *strategic management servicing function*. The SME which incorporated in itself these functions as well as those developed in previous phases have sustainability potential and could be marked as $\boldsymbol{S_{l\text{-}t}}$. Dominant characteristic of this kind of SMEs is its ***long-term existence***. When SME achieved its highest, strategic level, then it is able to successfully fight against „aging" in order to stay flexible, vital and „young", applying real-time replacememt of its inadequate sub-systems, components and structures with new ones. At this level of survival, an SME has very strong ties with its environment, particularly with the market, and it is quite well integrated with it. On the other hand, this SME developed its own structure in way that it is capable to innovate itself. If an SME (or any other organization) is capable to innovate itself then new potential has been created, such as ΔP_3 and so on[2]. All of these innovations suggest that in first step it is necessary to innovate the system for strategic management in which an SME realizes innovations later on. Every successfuly realized systemic innovation creates new potential for an SME.

After all of these statements, at least one question arises: How long can an SME be vital, flexible and „young"? The answer is very simple, but hard to implement in practice and it is: until SME change management is capable successfuly solving the strategic tasks.

The concept presented above leans on the basic princple of organizational structure that form follows function. Aditionally, there is an approach that describes what really gives an organization its „shape" and controls how it performs (Sisney, 2013). Those are the three main aspects:

1. The functions it performs;
2. The location of each function; and
3. The authority of each function within its domain.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

First two of three aspects are completely in line with the concept presented by the author in Figure 1. The "authority" aspect isn't embraced by this research.

This section of the chapter conveys to the readers that every SME or organization in general, is a unique organizational system with its systemic characteristics such as: environment, inputs-outputs, components, processes/functions, structures and behaviors. Because of that, every SME has to have its own strategy of structural change management in its sustainable development which is addressed in the next section.

OPPORTUNITIES AND STRATEGIES OF STRUCTURAL CHANGE MANAGEMENT IN SUSTAINABLE SME DEVELOPMENT

Once opportunities within SME environment have been taken into the consideration then a situational analysis should be implemented. One of the most often used instruments of the situational analysis is PEST analysis which deals with political, economic, social and technological factors from the environment or the so called external drivers. There are also variations, or broader PEST analyses which include other external factors that affect an SME, such as legal and environmental ones when PEST is transformed into PESTLE analysis, as well as STEEPLED where ethical and demographic factors should be added (Rothaermel, 2012). Commonly, PEST analysis starts with a 2x2 matrix as illustrated in Table 1. In case, a PESTLE or a STEEPLED analysis is being performed, then the matrix changes its structure according to the numbers of external factors analysed.

Table 1. Toolbox for a PEST Matrix

Political factors	**Economic factors**
• Factor 1 • Factor 2 ...	• Factor 1 • Factor 2 ...
Social factors	**Technological factors**
• Factor 1 • Factor 2 ...	• Factor 1 • Factor 2 ...

Source: Compiled by author on the grounds of own research.

After fulfilling the PEST matrix, or some of its numerous variations, it is necessary to carry out an evaluation of specific factors. This can be carried out by using an instrument illustrated by Table 2.

There are differences among the identified factors or drivers in their impact on an SME. Because of that, they could be ranked on the basis of their importance. This can be done in several ways, such as by introducing a three-star scale. In this way, an economic factor, for example, "Levels of government spending" (which is estimated to have a major impact on the subject of analysis in Table 1), could be marked as "Levels of government spending ***". On the other hand, some factor with a lower impact could be marked as for example "Intellectual property *".

In the SME *short-term survival period* external factors analysed in PEST matrix have major influence on its future potential. For example, if "Intellectual property" issue has been neglected it surely

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Toolbox for evaluation of PEST factors

PEST	Factor	Opportunity (Intensity)	Threat (Intensity)
Political factors	• Factor 1 • Factor 2 ...		
Economic factors	• Factor 1 • Factor 2 ...		
Social factors	• Factor 1 • Factor 2 ...		
Technological factors	• Factor 1 • Factor 2 ...		

Source: Compiled by author on the grounds of own research.

will negatively affect an SME in the future, when large companies "borrow" its idea or innovation and start a large scale production under own name.

In order to prepare a relevant strategy for optimizing structural change management in sustainable SME development it should be implemented with another instrument of strategic planning which is SWOT analysis. This instrument combines external factors which affect an SME with internal ones. Internal factors are treated as *Strengths* and *Weaknesses* (Fine, 2009). Analysing internal factors, mostly resources of an SME, are evaluated. This can be done by analyzing each factor individually (expert approach) or using some of the methods such as: Brainstorming, Brainwalking, surveys and others. These approaches could be implemented in PEST analysis as well. The external factors/drivers identified and evaluated in PEST analysis could be used in SWOT analysis as *Opportunities* and *Threats*, depending on the character of their influence.

In the process of SWOT analysis, numerous visions are being considered. One should be selected which best illustrates the real situation. In the case of only one vision being considered in the process of SWOT analysis, it is being confronted with reality and may be redefined.

Commonly, SWOT analysis starts with a matrix 2x2 as it is illustrated by Table 3.

Table 3. Toolbox for a SWOT matrix

Strengths	Weaknesses
• Factor 1 • Factor 2 ...	• Factor 1 • Factor 2 ...
Opportunities	**Threats**
• Factor 1 • Factor 2 ...	• Factor 1 • Factor 2 ...

Source: Compiled by author on the grounds of own research.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Strengths are all SME resources which create positive external and internal influences.

Weaknesses are primarily all SME resources that can't achieve the intended SME goals, because of their quality, but also because of their quantity.

Opportunities are all external resources that are identified in the environment that can be used in order to improve an SME structure or behaviour. The quality and quantity of these resources can't be influenced by an SME, but they can take advantage of them.

Threats for an SME are all systems, phenomena and events in the environment that exert or may exert a negative influence.

It is important to note that SWOT analysis does not boil down to a fulfilled matrix as shown by Table 3, but also the activities which follow it. After completion of the SWOT matrix it is necessary to identify key factors among those listed in *strengths* and *weaknesses* and propose actions which could improve an SME resource as well as its position in the environment. The proposed actions should lean on *opportunities* from environment and should also take into consideration *threats* that could negatively interfere in actions as well as on SME as an organisational system. For example, if "Lack of skills" has been identified as a weakness of an SME, and there is an opportunity in the environment identified as "Government subsidies for capacity building in business sector" then SME management could propose an action such as "Documentation submission for governmental subsidies in the business sector". Because of the lack of resources that an SME manages it is crucial to identify actions with their costs which will produce maximum positive effects for an SME as a whole. This process of selection of key factors with actions proposal is the quest for a strategy creation.

SWOT analysis becomes more powerful when after a certain time it is being repeated and actions proposed and undertaken made change resources and the SME as a whole. Then, the effects of the actions undertaken can be measured in more realistic way. For example, if proposed action "Documentation submission for governmental subsidies in business sector" has been undertaken, in next SWOT matrix a weakness previously identified as "Lack of skills" could simply vanish. This means that undertaken action resulted positively on the weakness identified previously. More preferably, this weakness could be converted into the strength "Highly skilled employees" if the action undertaken had deeper impact on weaker resource.

It should be noted that, in addition to internal factors which were the subject of actions, there are also those which could be neglected during time and in this way are being converted from strengths to weaknesses. This is often the case with equipment as well as with skilled people. Also, environmental factors could significantly change over a period of time due to some broader social or natural processes, and can be analyzed. Their impact on internal factors can be more or less significant.

Unlike "ordinary" SWOT analysis, the so-called "advanced" SWOT analysis evaluates identified factors listed in the SWOT matrix and prioritizes them in relation to their impact on the subject of SWOT analysis as well as SME (David, 2009). For this purpose, previously presented SWOT matrix has been modified, while the numbers in following Table 4 being are fictitious for easier explanation.

In the Table 4, where internal characteristics have been analysed, the reader should pay attention to three columns on the right side.

- In the column "Importance", the *significance* of the specific internal factor has been assessed. Every strength and weakness has been assessed by numbers in range of 0,01 (insignificant) to 1,00 (most significant). The sum of all assessed factors has to be equal to 1,00.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Toolbox for an advanced SWOT matrix

	Importance	Rank	Result
Strengths			
• Factor 1 • Factor 2 ...	0,04 0,30 ...	1 2 ...	0,04 0,60 ...
Weaknesses			
• Factor 1 • Factor 2 ...	0,06 0,01 ...	2 1 ...	0,12 0,01 ...
	Importance	**Possibility**	**Result**
Opportunities			
• Factor 1 • Factor 2 ...	0,03 0,01 ...	1 2 ...	0,03 0,02 ...
Threats			
• Factor 1 • Factor 2 ...	0,03 0,15 ...	1 2 ...	0,03 0,30 ...

Source: Compiled by author on the grounds of own research.

- Column "Rank" is determined in the range of 1 (minor) to 3 (main) in order to indicate the strength or weakness for the subject of analysis, and SME as well.
- Column "Result" represents the product of two columns "Importance" and "Rank". It allows prioritization of strengths and weaknesses. An SME has to rely on the most important strengths (the highest score) and should try to convert weaknesses into strengths or to defend its weak points.

In the lower part of Table 4, the external factors should be assessed, with a little modification compared to the internal ones.

- Column "Importance" shows the extent to which external factors can influence the object of analysis. Every opportunity and threat has been assessed by numbers in range of 0,01 (insignificant) to 1,00 (most significant). The sum of all assessed factors has to be equal to 1,00.
- Column "Probability" is determined by the likelihood of outside influence and is expressed by whole numbers in certain range (e.g. 1 to 3, which corresponds to the values of "small", "medium" and "large").
- Column "Result" represents the product of two columns "Importance" and "Probability". It allows the prioritization of opportunities and threats. It must rely on the most important external factors (the highest score), and ignore those who are unlikely to affect SME.

SWOT analysis could show its major relevance in the later period of an SME survival, particularly in the *mid-term survival period*. Actually, at the beginning of this period, when first signs of inertia in business processes have been recognized, it is high time to investigate internal characteristics of SME and put them in correlation with the external ones.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Unlike to PEST and SWOT analysis where the main task is to identify external and internal factors that affect an organisational system such as SME, the TOWS analysis deals with 4 different strategies that the subject of analysis could implement. Methodology of TOWS analysis suggests that external factors should be identified first, and after that internal ones. The results given then should be compared among themselves in order to find the best strategy for the subject of analysis and SME.

The TOWS analysis tries to give answers to the following questions:

- **Comparing Strengths and Opportunities**: How can existing strengths assist in capitalizing opportunities?
- **Comparing Strengths and Threats**: How can existing strengths assist in identifying and avoidance of existing and potential threats?
- **Comparing Weaknesses and Chances**: How existing weaknesses could be overcome using opportunities from the environment?
- **Comparing Weaknesses and Threats**: How could be reduced these weaknesses and to avoided existing and potential threats on the best way?

Answers to these questions are obtained by direct comparison of the factors identified in the TOWS matrix and are the concrete strategy for the subject of analysis, namely (Weihrich, 1982):

1. **MAXI-MAXI. Strategy of Strengths and Opportunities (SO):** Every organization would like to be in position to implement this strategy. However, just some of them are in a position to choose this strategy. For some organisations the option could be, previously convert main weaknesses into the strengths and after that implement this strategy, using the opportunities that come from the environment.
2. **MAXI-mini. Strategy of Strengths and Threats (ST):** In this case, it is relatively easy to counteract threats from the environment, because SME has significant strengths. However, depending on the specific situation, care should be taken about how to use own strengths, which should be usually used with a dose of restraint and discretion.
3. **mini -MAXI. Strategy of Weaknesses and Opportunities (WO):** This strategy seeks to minimize the weaknesses and maximize opportunities. It hides potentially attractive options. In case, that there have been identified some attractive opportunities in the environment but weaknesses are to significant, then should be worked on overcoming own weaknesses and then take advantage from the opportunities.
4. **mini-mini. Strategy Weaknesses and Threats (WT):** This strategy bears potentially high risks. Weaknesses from inside and threats from the outside should be minimized. The situation is unenviable and leads to a real battle for survival.

Table 5 shows position of each main strategy in TOWS matrix.

There are numerous challenges how to maximize strengths, utilize available opportunities, and address threats and weaknesses by turning them into opportunities.

The TOWS analysis could show its major relevance particularly at the beginning of *long-term survival period*, when some strategic decisions have to made. If strategy, roughly articulated by the TOWS analysis becomes right, SME could count on survival in a long term perspective.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Example of a TOWS matrix

Subject of Analysis (SME)	**Strengths**	**Weaknesses**
	• Factor 1 (Experienced engineers' staff) • Factor 2 (Well equipped R&D sector) • ...	• Factor 1 (Declining profitability) • Factor 2 (Basic production equipment is out of date) • ...
Opportunities • Factor 1 (Government subsidies related to SME sector) • Factor 2 (Growing market for SME products) • ...	**MAXI-MAXI (SO)**	**mini –MAXI (WO)**
Threats • Factor 1 (Rising transportation costs) • Factor 2 (Increasing foreign competition) • ...	**MAXI-mini (ST)**	**mini-mini (WT)**

Source: Adapted by author from Weihrich (1982, p. 63.)

It is relevant to mention that organizational structure follows strategy, not oppositely. Good organizational structure is just a means for achieving the objectives and goals of an SME (Drucker & Maciaiello, 2008).

However, even the best strategy developed for structural change management in SME sustainable development will face[3] with resistance to change. Only the strategy developed that foresees resistance to change, individual and/or group ones, which is implemented by managers who are able to overcome these internal processes could be characterized as promising

FUTURE RESEARCH DIRECTIONS

Many authors, theorists and practitioners too, have developed their own or upgraded existing models which deal with change management. But the fact is that majority of them have limited space of implementation, mostly because of SME complexity, dynamic and turbulent changes in environment.

Future researches in this field may focus on quantification of parameters given by the author in Figure 1, particularly on measurement of SME potential needed for its transition from short-term to mid-term survival as well as from mid-term to long term survival which may happen later on if an SME is a successful one. After these quantifications and mathematical computations the next level in developing the concept presented in this chapter could be a computer simulation which will show, based on quantified parameters, where an SME is in its life cycle depicted in Figure 1.

Change management as a function within SME needs highly educated and skilled staff and managers. Their education and training, in order to be capable in the future to deal with change management issues, should be one of the subjects of future researches too.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In addition, empirical researches should be undertaken, particularly in the field of human resource management aimed at recruitment, training and conditions for employees within an SME who will ultimately be its driving change force as innovators and managers.

CONCLUSION

This chapter dealt with structural changes in SME emphasizing change management as a tool for implementing changes within an organizational system.

In summarizing this chapter it can be pointed out that there are three distinct phases from high entrepreneurial drive until a fully fledged developed SME. In the first one, continuity of SME survival has to be achieved. In the second one, this existence potentially lasts and finally in the third phase long-term existence conditions have to be assured. Each of these phases has been completed by certain functional structure with clearly defined functions. From start-up to maturity, in each phase, the management system of an SME is being developed as a driving force of its development.

The conclusions based on presented material could be summarized as bellow:

- SMEs without strategic and development capabilities are able to survive for only a few years;
- There are three different levels of functional management and other structures in the SME life cycle. Each of them supports a certain kind of behavior and capabilities;
- SMEs with short-term existence potential could only develop the first level of functional structure;
- SMEs with mid-term existence potential are able to develop the first and the second level of functional structure;
- SMEs with all three levels of functional structures have potential to achieve long-term existence.

SMEs which strive to achieve long-term survival must have innovative potential in every phase of their growth. Otherwise they become ordinary economic entities with lesser chances for long-term survival.

Consequently, SME managers who react rapidly on both external and internal factors could be successful. Indeed, those SME managers who are able to anticipate the future and prepare their SMEs for new circumstances are really successful. It may also be concluded that SMEs which do not survive are those who fail to anticipate the future or even adapt to changes that affect them both externally and internally.

Change management should lean on results of environmental assesment implementing instrruments of strategic planing such as PEST, SWOT and TOWS analyses. After that, an SME oriented for sustainable development will be able to produce a viable strategy, taking into consideration all resources it manages. The strategy should include certain criteria for measuring success of an SME which are related to its sustainable development.

Finally, every SME can enhance its chance for a long business life involving both survival and development if it develops and optimizes its own strategic capabilities. It can be reasoned out that structural change management in sustainable SME development results is in the function of long-term survival as a strategic goal for an SME.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Ackoff, R. L. (1999). *Ackoff's Best: His Classic Writings on Management*. New York, NY: John Wiley & Sons Inc.

Ackoff, R. L., & Emery, F. E. (1972). *On Purposeful Systems*. Chicago: Aldine-Atherton.

Adizes, I. (1992). *Mastering Change: The Power of Mutual Trust and Respect*. Santa Barbara, CA: Adizes Institute.

Adižes, I. (1994). *Životni ciklusi preduzeća*. Beograd, Serbia: Agora – Prometej.

Australian Government: Department of Industry Innovation, Science, Research and Tertiary Education. (2013). *Australian Small Business: Key Statistics and Analysis – December 2012*. Retrieved May 14th 2016, from Australian Treasure web site: http://www.treasury.gov.au/ ~/media/Treasury/Publications %20and%20Media/Publications/ 2012/Australian%20 Small%20Business%20- %20Key%20Statistics%20 and%20Analysis/downloads/PDF/ AustralianSmallBusinessKey StatisticsAndAnalysis.ashx

Birch, D. L. (1981). Who Creates Jobs? *The Public Interest*, *65*, 3–14.

Boulding, K. E. (1956). General Systems Theory - The Skeleton of Science. *Management Science*, *2*(3), 197–208. doi:10.1287/mnsc.2.3.197

Burton, R. M., Obel, B., & Håkonsson, D. D. (2015). *Organizational Design: A Step-by-Step Approach* (3rd ed.). Cambridge University Press.

Černiček, I., & Molnar, R. (1988). Razvoj profitnih potencijala preduzetničkih organizacija. In I. Černiček & R. Molnar (Eds.), Razvoj preduzetništva - šansa za progress (pp. 25-43). Zrenjanin, Serbia: Tehnički fakultet "Mihajlo Pupin".

Černiček, I., & Molnar, R. (2000). Razvoj organizacije. In I. Černiček & B. Marić (Eds.), *Reinženjering proizvodno-poslovnih procesa* (pp. 203-256). Belgrade: Fakultet za preduzetni menadžment Novi Sad, Univerziteta "Braća Karić".

David, F. R. (2009). *Strategic Management: Concepts and Cases*. Upper Saddle River, NJ: FT Prentice Hall.

Drucker, P. F. (1991). *Inovacije i preduzetništvo: Praksa i principi*. Beograd, Serbia: Privredni pregled.

Drucker, P. F., & Maciaiello, J. A. (2008). *Management* (Revised ed.). HarperCollins e-books. Retrieved August 1st 2016, from Youth Portal web site: http://youth-portal.com/wp-content/uploads/2014/10/Peter-F-Drucker-Management-Rev-Ed.pdf

EUROSTAT. (2016). *Business demography statistics - Enterprise Survival Rate*. Retrieved May 13th 2016, from Eurostat web site: http://ec.europa.eu/eurostat/statistics-explained/index.php/ Business_ demography _statistics

Fine, G. L. (2009). *The SWOT Analysis: Using your Strength to overcome Weaknesses, Using Opportunities to overcome Threats*. Kick It. LLC. Retrieved February 15th 2013, from Lawrence Fine web site: http://lawrencefine.com/ downloads/SWOT%20-%20PDF.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

French, R., Rayner, Ch., Rees, G., & Rumbles, S. (2015). *Organizational Behaviour* (3rd ed.). New York, NY: John Wiley & Sons.

Hagen, J. (2009). Top 12 Reasons Why Businesses Fail. In E. Koester (Ed.), *What Every Engineer Should Know About Starting a High-Tech Business Venture*. Boca Raton, FL: Taylor & Francis Group.

Kotter, J. (2012). *Leading Change*. Boston, MA: Harvard Business Review Press.

Langstrand, J. (2016). The missing link in systems thinking: The impact of infrastructure on organizational change. *International Journal of Quality and Service Sciences*, *8*(2), 197–208. doi:10.1108/IJQSS-09-2015-0061

Lewin, K. Z. (1947). Frontiers in Group Dynamics: Concept, Method and Reality in Social Science; Social Equilibria and Social Change. *Human Relations*, *1*(1), 36. doi:10.1177/001872674700100103

Mc Bourda, F. (2013). *Change Management Theories and Methodologies* (White paper). Retrieved May 15th 2016, from Tata Consultancy Services web site: http://www.tcs.com/ SiteCollectionDocuments/White%20Papers/EntSol-Whitepaper-Change-Management-Theories-Methodologies-0213-1.pdf

Molnar, R. (2010). *Razvoj sistemske nefinansijske podrške malim i srednjim preduzećima i preduzetništvu u Srbiji* (Unpublished doctoral dissertation). Available from Library at the University of Novi Sad. Serbia.

Penezić, N. & Jakopin, E. (2002). *Analiza razvoja malih i srednjih preduzeća i preduzetništva u Srbiji*. Beograd: Republički zavod za razvoj i Republička agencija za razvoj malih i srednjih preduzeća i preduzetništva.

Pryor, M. G., Taneja, S., Humphreys, J., Anderson, D., & Singleton, L. (2008). Challenges Facing Change Management: Theories and Research. *Delhi Business Review*, *9*(1), 1–20.

Rees, G., & Hall, D. (2013). Managing Change. In G. Rees & R. French (Eds.), *Leading, Managing and Developing People* (pp. 101–126). CIPD.

Rothaermel, F. T. (2012). *Strategic Management: Concepts and Cases*. New York, NY: McGraw-Hill/Irwin.

SBA. (2014). *Frequently Asked Questions: What is the Survival Rate for New Businesses?* Retrieved May 13th 2016, from U.S. Small Business Administration web site: https://www.sba.gov/sites/default/files/ FAQ_March_ 2014_0.pdf

Sengi, P. (2003). *Peta disciplina: Umeće i praksa organizacije koja uči*. Novi Sad, Serbia: Adizes MC.

Sisney, L. (2013). *Organizational Physics: The Science of Growing a Business*. Raleigh, NC: Lulu Press.

Stanković, F. (1998). Potencijali i upravljanje rastom u MSP. In I. Černiček & R. Molnar (Eds.), Razvoj preduzetništva - šansa za progress (pp. 44-52). Zrenjanin, Serbia. Tehnički fakultet "Mihajlo Pupin".

Wagner, E. T. (2013). *Five Reasons 8 Out Of 10 Businesses Fail*. Retrieved July 24th 2016 from Forbes web site: http://www.forbes.com/sites/ericwagner/2013/09/12/five-reasons-8-out-of-10-businesses-fail/#741626b05e3c

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Weihrich, H. (1982). The TOWS matrix: A tool for situational analysis. *Long Range Planning*, *15*(2), 54–66. doi:10.1016/0024-6301(82)90120-0

Zgodavova, K., & Bober, P. (2012). An Innovative Approach To the Integrated Management System Development: SIMPRO-IMS Web Based Environment. Quality Innovation Prosperity, 16(2), 59-70.

Zhang, X. (2016). Co-evolution between institutional environments and organizational change: The mediating effects of managers uncertainty. *Journal of Organizational Change Management*, *29*(3), 381–403. doi:10.1108/JOCM-12-2014-0218

ADDITIONAL READING

Basile, A., & Faraci, R. (2015). Aligning management model and business model in the management innovation perspective: The role of managerial dynamic capabilities in the organizational change. *Journal of Organizational Change Management*, *28*(1), 43–58. doi:10.1108/JOCM-10-2013-0199

Brunninge, O., Nordqvist, M., & Wiklund, J. (2007). Corporate Governance and Strategic Change in SMEs: The Effects of Ownership, Board Composition and Top Management Teams. *Small Business Economics*, *29*(3), 295–308. doi:10.100711187-006-9021-2

Černiček, I., Nadasdi F., Chaezy, S. & Molnar, R. (2003). *TVM - Total Value Management: Integralno upravljanje vrednostima*. Novi Sad, Serbia: Domla-Publishing.

Cole, G. A. (1994). *Strategic Management: Theory and practice*. London: DP Publications.

Grant, R. M. (2010). *Contemporary Strategy Analysis*. New York, NY: John Wiley & Sons.

Hammer, M., & Champy, J. (1993). *Reengineering the Corporation: A Manifesto for Business Revolution*. New York: Harper Collins.

Hisrich, R. D., Peters, M., & Shepherd, D. (2009). *Entrepreneurship* (8th ed.). New York, NY: McGraw-Hill/Irwin.

Lindgren, M., & Bandhold, H. (2003). *Scenario Planning – The link between future and strategy*. New York: Palgrave Macmillian.

Lowy, A. (2015). The six dilemmas of strategy execution. *Strategy and Leadership*, *43*(6), 18–24. doi:10.1108/SL-07-2015-0062

Luo, W., Song, L. J., Gebert, D. R., Zhang, K., & Feng, Y. (2016). How does leader communication style promote employees commitment at times of change? *Journal of Organizational Change Management*, *29*(2), 242–262. doi:10.1108/JOCM-11-2014-0204

Mellert, L. D., Scherbaum, Ch., Oliveira, J., & Wilke, B. (2015). Examining the relationship between organizational change and financial loss. *Journal of Organizational Change Management*, *28*(1), 59–71. doi:10.1108/JOCM-11-2013-0236

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mintzberg, H. (1987). The Strategy Concept I: Five Ps For Strategy. *California Management Review, 30*(1), Fall/1987, p. 11-24. doi:10.2307/41165263

Nadasdi, F., & Csernicsek, I. (2000). The Total Value Management Approach. *Value World*, *23*(2), 11–13.

Pollack, J., & Algeo, C. (2016). Project managers and change managers contribution to success. *International Journal of Managing Projects in Business*, *9*(2), 451–465. doi:10.1108/IJMPB-09-2015-0085

Porter, M. (1979). How Competitive Forces Shape Strategy. *Harvard Business Review*, *57*(2), 137–145. PMID:18271320

Schoemaker, P. J. H. (1995, Winter). Scenario Planning: A Tool for Strategic Thinking. *Sloan Management Review*, *36*(2), 25–40.

Trondal, J. (2015). Ambiguities in organizations and the routines of behavior and change. *The International Journal of Organizational Analysis*, *23*(1), 123–141. doi:10.1108/IJOA-04-2013-0654

Udo-Imeh, P. T., Edet, W. E., & Anani, R. B. (2012). Portfolio Analysis Models: A Review. *European Journal of Business and Management*, *4*(18), 101–121.

Valentin, E. K. (2001). SWOT analysis from a resource-based view. *Journal of Marketing Theory and Practice*, *9*(2), 54–68. doi:10.1080/10696679.2001.11501891

Yeo, R. K., & Marquardt, M. J. (2015). Think before you act: Organizing structures of action in technology-induced change. *Journal of Organizational Change Management*, *28*(4), 511–528. doi:10.1108/JOCM-12-2013-0247

KEY TERMS AND DEFINITIONS

Change Management: A systematic approach to dealing with change both from the perspective of an organization and the individual as well.

Entrepreneur: An active subject in the entrepreneurship process. He/she creates something new that differs from other goods available on the market creating new value.

Entrepreneurship: A social phenomenon where somebody (entrepreneur) moves available resources from low productivity sectors to the high productivity ones, bearing risk and expecting a profit for those efforts.

Innovation: A means that enriches a resource with new capacities for wealth creation.

Management: A business function which deals with processes of planning, organizing, commanding, coordinating and controlling.

SME (Small and Medium Sized Enterprise): An economic entity defined by legal documents which differ from country to country. The three main criteria used to define an SME are number of employees, annual turnover and average value of assets.

SME Development: Every SME as an organizational system has its life cycle and passing through it SME changes its elements, structures and behavior.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Systems Theory: An independent scientific discipline that contributes to the development of scientific research and science in general. Instead of analytical and linear methods, its focus is on the totality, on global characteristics, structures and behavior of the researched system.

ENDNOTES

1 Editors' note: See chapter 17, and compare with the concept and principles of open innovation.

2 Editors' note: For the more mathematically minded, the rate of change denoted as ΔP_n is a process of finding the derived function. The derivative of the function, $\Delta P/\Delta t$, is the limit (if it exists) of this expression as Δt approaches zero.

3 Editors' note: A further and comprehensive discussion on sustainability is given in chapter 13.

This research was previously published in Optimal Management Strategies in Small and Medium Enterprises; pages 348-369, copyright year 2017 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 13
Design Science Research to Produce Instrumental Knowledge for Evidence-Based Practice in OCD

Joan Ernst van Aken
Design Science Research institute, The Netherlands

ABSTRACT

Evidence-based practice (EBP) is a promising approach to improve professional action. EBP is the use of the best available knowledge in professional problem-solving, in particular the best available knowledge produced by research. EBP has much promise for organizational change and development (OCD). However, for successful EBP, one needs a well-developed knowledge base of instrumental knowledge (i.e., knowledge-to-act). Unfortunately, academic OCD research is strong in developing conceptual knowledge (i.e., knowledge-to-understand) but rather weak in instrumental knowledge. In this chapter, design science research (DSR) is discussed: a research strategy to develop instrumental knowledge in the form of designs for effective interventions, processes, or systems to improve present practices. These designs are developed through experiential learning by executing a number of problem-solving projects in the messy "swamp of practice," often executed in partnerships with professionals. Embedded-in-action theories can be powerful inputs for EBP, thus improving the practice of OCD.

INTRODUCTION

Planned organizational change and in particular large scale planned organizational change and development (OCD) is a difficult to manage process. These processes do not always meet expectations (see e.g. Beer & Nohria, 2000; Stanford, 2016; chapter 1 of this book). Many feel that managers and OCD-professionals should be able to do better. Evidence-Based Practice (EBP) is a powerful and proven approach to improve professional actions in many disciplines. Its development started in Medicine as Evidence-Based Medicine (Hamer & Collinson 1999; Sackett et al., 1996; Trinder & Reynolds 2000).

DOI: 10.4018/978-1-7998-7297-9.ch013

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Subsequently this approach has been transferred successfully to other disciplines in the social sciences, such as education, social policy and criminal justice under the name of Evidence-Based Practice (Davies, Nutley & Smith, 2000; Young et al. 2002). In the meantime, it has also been recognized as a promising approach in management (Briner, Denyer & Rousseau, 2009; Rousseau, 2012).

Essentially EBP means the conscientious use of the best available knowledge in professional problem-solving, particularly the best available knowledge produced by research (Sackett et al., 1996). An important contribution of using the EBP-approach is to compensate the bias, always present in personal professional experience, by complementing this experience with valid up to date knowledge produced by research. The key input for EBP is 'knowledge-to-act' to be used in solving field problems. In this chapter I use the distinction, made by Pelz (1978), between instrumental and conceptual knowledge; instrumental knowledge is 'knowledge-to-act', whereas conceptual knowledge is 'knowledge-to-understand'. Academic management research is strong in developing conceptual knowledge, but, unfortunately, rather weak in developing instrumental knowledge. The objective of this chapter is to discuss design science research (DSR), a discipline-independent research strategy aiming to develop instrumental knowledge to be used in EBP.

DSR is a family of research strategies, showing some variations across the various disciplines where it is used. But all family members share the objective of developing designs for interventions, and processes or systems to be used to improve present practices. In this chapter I will discuss DSR for OCD. In DSR for OCD, effective designs are developed, often in partnerships with professionals, on the basis of experiential learning through a number of problem-solving projects in the messy 'swamp of practice'.

In the next section EBP and its key input of instrumental knowledge will be discussed. Section 3 gives an account of three important barriers facing management researchers (including OCD-researchers), desiring to develop instrumental knowledge. These are paradigmatic convictions, institutional pressures and methodological problems. In section 4 I discuss systematic experiential learning as an effective approach for dealing with these methodological problems.

The academic literature may be weak in presenting instrumental knowledge, but there is a lot of instrumental knowledge for OCD to be found in the non-academic management literature on planned change (see e.g. Cameron & Green, 2015; Gibbons, 2015; Grenny et al., 2013; Kotter, 2012). It is a type of literature looked down on by many management researchers, often because of the limited evidence given to support its recommendations. However, this literature can give an idea of the character of instrumental knowledge relevant for the 'swamp of practice.' Section 5 is a plea to develop evidence-based versions of non-academic management literature using the DSR-strategy. Then, finally, section 6 gives an account of DSR for OCD and section 7 a number of OCD-issues relating to research using the DSR strategy plus some pointers on how to do this. Section 8 gives conclusions.

INSTRUMENTAL KNOWLEDGE AS KEY INPUT FOR EBP

In discussions of EBP with change agents often one gets the impression that they tend to consider EBP as a hype or as a strange idea devised by some academics. However, EBP is rather to be regarded as a millennia old core demand to *any* professional (see on professionals e.g. Freidson, 1973, Klegon, 1978; Schön, 1983). The core process of professionals, like medical doctors, engineers and lawyers, is knowledge-intensive problem-solving in their domain of expertise. The additional 'knowledge-intensive' aspect of such occupational roles distinguishes the professional from the craftsman. The founding fathers of EBP

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in medicine defined this approach as 'the conscientious, explicit, and judicious use of the current best evidence in making decisions about the care of individual patients' (Sackett, 1996, p71). This is a very natural demand; clients (patients in medicine) expect no less than that the professional services they get are *always* based on the best available knowledge (which includes the expectation that these services are in line with the current insights of the profession).

Furthermore, one can say that every professional education is a training in EBP: at professional school one acquires the valid and relevant knowledge of one's field of expertise and subsequently is given 'clinical training' to learn to use this knowledge from the 'high ground of theory' in the 'swamp of practice'. This metaphor, coined by Schön (1983), distinguishing the high ground and the swamp, nicely illustrates the challenges of EBP: using knowledge from the well-organized and firm high ground in the messy and slippery swamp.

As is well-known, there are four sources of knowledge to be used in EBP (see e.g. Rycroft-Malone, 2004): one's own professional experience, knowledge on the client's problems (in one's field of expertise), knowledge of the client's preferences with respect to the kind of solutions to be designed, and last but not least, valid generic knowledge on the kind of problem to be addressed produced by research. The EBP-movement, starting in the 1990s in medicine (Sacket et al. 1996), aimed to promote the use of the fourth source to compensate for the bias of personal experience, without, however, downplaying its importance (as well as not downplaying the importance of the other two).

Both conceptual and instrumental knowledge are important for professionals. Conceptual knowledge plays a central role in the education of professionals: it is used to teach students to understand their profession and the type of issues and problems they have to deal with. However, using an EBP-approach to professional problem-solving particularly needs instrumental knowledge. Instrumental knowledge can be defined as knowledge that can be used in a specific and direct way to design interventions, processes or systems producing desired outcomes in the real world. This type of knowledge provides answers to the question of what one can *do* to improve present reality. Insight into (usually context-dependent) action-outcome relations is the key element of instrumental knowledge. For instance, EBP in medicine involves the use of conceptual knowledge on the nature and causes of e.g. cholera or heart failures. But even more important for effective EBP is instrumental knowledge, i.e. knowledge on how to act. In medicine instrumental knowledge refers to knowledge on alternative treatments, like e.g. treatments for cholera or heart failure and on the expected effectiveness of these various treatments. Instrumental knowledge in OCD for instance is knowledge on how to deal with conflicts between departments or how, after a merger, to deal with cultural differences between the constituents of the new company.

BARRIERS TO DEVELOPING GENERIC INSTRUMENTAL KNOWLEDGE FOR OCD

There are several barriers impeding the development of instrumental knowledge for OCD (and in other management fields) by academic research. These include paradigmatic convictions on the mission and nature of research, institutional pressures and methodological problems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Paradigmatic Convictions

Drawing on ideas of Kuhn (1962) and Lakatos (1991), a research paradigm can be described as a set of convictions on the type of research questions to be answered, the acceptable research methods to use, the acceptable kinds of evidence to use in justifying these answers and the nature of the research products pursued. Main stream management research, including OCD research, is based on the paradigm of *explanatory research*, the iconic example of which is physics. Many researchers consider research in physics as the mother of *all* academic research. When using this research paradigm, the mission of research is to describe and explain the past from the perspective of a detached observer. Research according to this approach is a quest for truth. As in physics, one prefers objective observations (e.g. by using surveys) and logical deduction of conclusions from observations. The iconic research product is the quantitative variance model, explaining some phenomenon based on some explanatory variables (like the laws of Newton explain attraction power in terms of mass and distance).

Design science research uses another research paradigm. The idea to distinguish between explanatory and design science paradigms draws on Simon's *The Sciences of the Artificial* (Simon, 1969; 1996)[1]. This seminal book celebrates the power of design in transcending the present by designing what can be, enabling the preferred. The mission of research, on the basis of the design paradigm is to develop instrumental knowledge to address field problems, i.e. problems on material or social reality that, according to stakeholders, need to be addressed. Its research products are interventions or solutions, often presented in terms of process models. In the design science paradigm research is a quest for effectiveness, the effectiveness of these interventions and solutions. Explanations are primarily based on logical deductions from observations, while designs primarily are based on abduction, a creative leap (abduction) from observations, analyses and requirements to a design (see Pierce, 1923, on the logic of abduction or e.g. Samuels, 2000).

Paradigmatic convictions can be an important barrier for developing instrumental knowledge. Researchers, educated in the tradition of the explanatory research paradigm, tend to dismiss the development of instrumental knowledge as something for practitioners, and not as a respectable objective for academic research. This disdain may be related to a belief that it is not possible to develop instrumental knowledge in a rigorous way. This is true so long as one believes that physics is the mother of *all* rigorous research.

The permanency of the dominance of the explanatory paradigm may be understood by considering the history of social science research, combined with the history of management research. These two histories can be analyzed using Volkan's theory of transgenerational trauma (Volkan, 2001). A transgenerational trauma is a very traumatic experience of a group of people, passed along from generation to generation and in this way becoming a defining component of the group identity. Examples are the destruction of the second Temple of the Jews in 70 CE and the (lost) battle of Kosovo in 1389 by the Serbians. These examples show the power and permanence of transgenerational trauma's.

The transgenerational trauma for the social sciences originated on July 3, 1946, when the US-Senate voted to exclude the social sciences from the new National Science Foundation on grounds that their 'scientific merits' were unclear, thus depriving these disciplines from federal funding (Lyons, 1969, p 126). Only much later, after demonstrating the 'scientific merits' of social science research to Vannevar Bush, the 'father' of the Foundation, did the social sciences get access to NSF-funding (Stokes, 1997). This demonstration of merits was realized by using quantitative 'objective' measurements and statistics to build quantitative causal models on the basis of these measurements. Quantitative explanatory research still tends to be regarded as the highest form of social science research.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The transgenerational trauma of management research was caused by the publication of the Ford and Carnegie Foundation reports on American Business Schools (Gordon & Howell, 1959; Pierson & Others, 1959). These reports castigated business schools, because these were like trade schools, too much practice oriented and not enough research minded. In present terms, one might – justly – say that the business schools did not train their students in EBP. Many of the then present teachers, often experienced managers, were fired (a traumatic experience) and replaced by experienced social scientists, bringing along their own traumatic experience. Paradigmatic convictions concerning the importance of quantitative research and a focus on explanation rather than improvement might be traced back to these traumatic experiences. The double traumatic experiences are facts, the impact of them on present attitudes are, of course, a matter of debate.

Institutional Pressures

Reward systems for research discourage the development of instrumental knowledge for various reasons. The dominance of the explanatory paradigm is a major cause in this. This can include the idea that instrumental knowledge (or normative or prescriptive knowledge) does not belong to the mission of academic research (see the paradigmatic convictions above) or that it cannot be done in a methodologically rigorous way. Ideas like these induce the present scarcity of instrumental knowledge in the academic management literature.

Methodological Problems

In former days instrumental knowledge was also called normative or prescriptive knowledge. This is a relic of the past in which management research was a quest after the Holy Grail of the best way of organizing. The (often only implicit) idea was that researchers could *prescribe* best practices to practitioners, like medical doctors do, once they had discovered this best way. Many decades ago this quest was (rightly) abandoned by academic management researchers as being impossible, and with this the idea of prescribing actions based on research. Along with these new insights, the still advocated prescriptions in the non-academic management literature were dismissed by academia because of the limited evidence given for them. Regrettably, no alternatives for the low evidence non-academic management literature were developed, possibly because of the methodological problem in developing instrumental knowledge for the social domain.

Instrumental knowledge is knowledge on how to realize desired outcomes. So, developing such knowledge is dealing with a desired, under determined future, as opposed to explaining a fixed past. Gathering evidence on statements concerning the under determined future is the key methodological problem in research aiming at instrumental knowledge.

The core scientific claim of instrumental knowledge is that the proposed intervention will produce the desired outcomes. The core issue in gathering evidence for this claim refers to the *prediction* of outcomes of interventions. The gold standard for gathering evidence on these predictions is field-testing. If one has, for instance, developed a new design for car brakes or a new design for securing a car park one can use field-testing to assess its effectiveness.

In principle this gathering of evidence through field-testing is relatively unproblematic in the material domain but is demanding in the social domain. In the material domain, field-testing can be as limited as a single trial. Field-testing does not pose specific methodological problems different from those encoun-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tered in the development of valid explanations on the past. This is because in the material domain there are *invariant, universal, determining mechanisms*, making that the near future equals the recent past. These mechanisms are constant over time, do not vary over context and they also determine individual behavior. A machine developed, assembled and tested in Stockholm will work in just the same way next week in Amsterdam. These mechanisms shall be called strong ones. They make that the results of field tests on one instantiation of a given research product can be generalized to other times and places.

In the intangible, fluid and indeterminate social domain, where human agency and human relations play a key role, relations between interventions and outcomes are under determined. Certain interventions in organizational change may be effective in some cases, but less so in others. Even within cases some interventions may be effective today, but not tomorrow. It is therefore a challenge to establish effectivity claims in the social domain. In this domain there are no universal, invariant mechanisms that determine *individual* behavior. Therefore, the prediction of outcomes in the social domain is difficult: the evaluation of a single application of a designed intervention cannot simply be generalized to other times and places. This is the core methodological problem of DSR in the social domain. It is due to the influence of human agency and the fact that human agency is strongly context-dependent, as it is contingent on the network of social relations within which it operates.

Although 'social mechanisms' or 'generative mechanisms' do exist (Davis, 2006: Pajunen, 2008: Hedström & Ylikoski, 2010; Pawson & Tilley, 1997), they are neither invariant nor universal, and do not determine *individual* behavior. As Numagami (1998) says, there cannot be invariant laws in the social domain. Such mechanisms will be called weak mechanisms in this chapter.

Nevertheless, social mechanisms are strong enough to produce regularities and patterns in social behavior. In other words, they permit the existence of context-dependent-outcome relations, provided that a certain amount of uncertainty is allowed. Knowledge of these relations enables purposeful action to realize desired outcomes in the social domain. These relations are different in nature from the determining action-outcome relations in the material domain.

DEVELOPING INSTRUMENTAL KNOWLEDGE BY EXPERIENTIAL LEARNING

Social mechanisms allow the prediction (within certain ranges) of the behavior of others in response to one's own behavior. In fact, the ability to predict social behavior is an almost universal human competence, without which purposeful social behavior would be impossible. This competence is developed by personal social experiential learning, that is, learning from personal experience (Kolb, 1984). It is subsequently applied through case-based reasoning in which the present setting is compared (typically subconscious) with similar prior experiences and a line of action is designed based on the outcomes of these previous actions. Hence, this mode of learning is limited by the scope of one's personal experience, beyond which one is much less able to predict the behavior of others, as may be seen when acting in an alien culture.

Personal experiential social learning is typically the basis of teaching in trade schools. Teachers explain how the craft should be exercised, implying that their students just need to imitate their behavior to be successful. However, experiential learning can also be done in a rigorous scholarly mode: *systematic, methodical and transparent experiential social learning.* Through this research strategy one can learn what the outcomes of certain types of actions in various social settings can be.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

When doing research as experiential learning, researchers learn through cross-case analyses of sets of rigorous in-depth case-studies in dealing with a type of field problem. These case studies provide detailed descriptions and analyses of the problem, its context, and the actions and outcomes involved, giving insight into these elements and their interrelations. 'Thick' descriptions, as opposed to the more reductionist models used in quantitative research, are needed to turn these case-studies into real social experiences. Effective interventions are designed, based on cross-case analyses and subsequent field-testing.

INSTRUMENTAL KNOWLEDGE IN NON-ACADEMIC MANAGEMENT LITERATURE

There is little instrumental knowledge to be found in the academic management literature. However, the non-academic management literature, sometimes patronizingly called 'Heathrow literature' (Burrell, 1989), gives a lot of instrumental knowledge on how to deal with management and organizational problems. This literature can give an impression of how instrumental knowledge for management might look like.

Non-academic management literature is largely written by experienced managers or management consultants (some of them called 'management gurus', nomen est omen), based on their *personal* experiential learning (e.g. Fayol, 1984; Drucker, 1993). In the medical domain this type of knowledge is called clinical knowledge. Although in this discipline clinical knowledge is regarded as knowledge with a low position in the hierarchy of 'best evidence' (because of the inevitable bias in personal experience), it is abundantly used as input for text books and guidelines. It is also used as input for EBP in medical practice, following the adage to use *the best available* evidence. For many complex or rare medical problems clinical evidence is the best available instrumental knowledge, so this knowledge can be used in EBP. Similarly, as there is not much instrumental knowledge on OCD, in many cases the best available evidence is provided by non-academic management literature, based on (biased) personal experience. This means that management literature can be used in EBP for OCD by professional change agents, provided, of course, that one always is aware of the weak evidence on the effectiveness of the promoted action strategies and, maybe even more importantly, aware of a possible bias caused by personal interests in making the knowledge in question credible. These weaknesses are to be compensated by the conscientious use of one of the four inputs to EBP (see above), i.e. one's own personal professional experience: what can I, as an experienced professional, believe from these accounts?

However, a much more effective approach for the OCD-discipline is to develop a rich knowledge base of validated instrumental knowledge, compensated for by the various sources of bias, as an alternative for (or maybe just complementing) the instrumental knowledge provided by the non-academic management literature.

DESIGN SCIENCE RESEARCH FOR OCD

Design science research (DSR) is a research strategy, not a research method. Research methods are instructions for gathering or analyzing data. However, DSR is not an approach for gathering and analyzing data, but is, as any strategy, defined by its objectives and the main lines of action to realize these objectives[2]. DSR is driven by field problems. Field problems are situations in reality that, according to their stakeholders, can or should be improved. The objective of DSR is to develop generic instrumental

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

knowledge, knowledge-to-act, to deal with types of field problems such as performance problems in certain operational systems or cost problems in product development by SMEs or less than successful organizational change programs. DSR aims at developing instrumental knowledge to improve present practices.

More precisely, the objective of a DSR-project is to develop a generic design of an intervention, process or system to address a given type of field problem. This generic design is then to be used as input for EBP (see e.g. Van Aken & Romme, 2012). In EBP professionals use this generic design to design a context-specific version of it when dealing with an instantiation of the type of field problem for which the generic design has been developed. The main line of action for developing these generic designs is learning from several problem-solving projects on a type of field problem in the messy 'swamp of practice'.

DSR differs from other research strategies in its objective to improve (by applying effective designs), as opposed to more conventional research strategies, which have the objective to understand by describing and explaining. However, in DSR the methods for data gathering and analysis can be – but may not need to be - conventional.

The development of design science research is inspired by Herbert Simon's *The Sciences of the Artificial* (Simon, 1969;1996). Nowadays the DSR strategy for addressing field problems is used in a number of management disciplines, like Information Systems (see e.g. Hevner, March & Park, 2004; Wieringa, 2014), Operations Management (see e.g. Holmström, Ketokivi & Hameri 2009: Van Aken, Chandrasekaran & Halman, 2016; Kaipia et al., 2017), Management and Organization (see e.g. Boland & Collopy, 2004, Van Aken, 2004, Bate, 2007), and Accounting (Labro & Tuomela, 2003). The operationalization of DSR research strategies shows some variations across these disciplines. Therefore, one may regard DSR as a family of research strategies. Nevertheless, these strategies share a focus on developing designs to be applied to improve present practices.

In DSR for OCD designs for effective interventions, processes or systems are developed through learning from several comparable problem-solving projects in the 'swamp of practice'. These projects are not executed by researchers in detached expert roles, but as 'engaged scholars' (Van de Ven, 2007). Professional-researcher partnerships are a powerful way to organize design science research projects. In OCD, researchers contribute their expertise in OCD interventions and processes, but operate in problem-solving in close partnership with the professionals in the 'local' context, which can result in co-production of knowledge.

The designs are developed through experiential learning in a number of cycles of designing, implementing, and subsequent learning from the outcomes. However, as Stouten et al. (2018) remark, 'experiential learning in a management discipline is more difficult than, say, learning to play a musical instrument'. Playing a musical instrument is a discrete and repeatable activity, the outcome of which can be immediately known. Experiential learning in management, on the other hand, is learning from protracted divergent processes, the outcomes of which are only clear after a delay. Therefore, the problem-solving projects from which one wants to learn need to be comparable and the causal chain linking intervention and outcome should be fairly short. Projects trying to establish effective practices to create a long-term, complex outcome, like an excellent company (see e.g. *In Search of Excellence*, Peters & Waterman, 1982), are seldom successful.

Designs are made 'transferable' by learning from problem-solving projects that are comparable with respect to the type of context and the type of field problem. Conscientious cross-case analyses give insight in the effectiveness of the design and of the context-dependency of it. Insight in the context-dependency of a design can be used for its contextualization in a new but comparable context. These insights make

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the design transferable, which for instrumental knowledge development is the equivalent of the concept of generalization in explanatory research.

The outcomes of the various applications of the design produce input to the body of evidence to be used in validating the design. Claims with respect to the effectiveness of a design can never be proven like in mathematics and in physics but are to be supported by an as strong as possible body of evidence.

A design on itself has only limited practical value. It must be embedded in an *action theory*. With 'action theory' I do not mean theory describing and understanding human actions (like in Parsons, Shils & Smelser, 1965), but rather theory like action theory as used in Argyris and Schön (1974). They discuss the competence of professionals as being based on their ability to develop theories (action theories) on what to do in new situations. A design can be embedded in an action theory by using the so called CIMO-logic (Denyer, Transfield & Van Aken, 2008). This logic gives the following key elements of an action theory:

- The problem-in-***C***ontext for which the design has been made
- The essence of the ***I***ntervention
- The ***O***utcomes one may expect from using this intervention in the given context (both desired and possibly less desired collateral outcomes) and finally, but most importantly,
- The ***M***echanisms producing these outcomes in the given context.

So, presenting an action theory in a DSR-publication can consist of an account of a validated and transferable design, embedded in an argument, giving the problem-in-Context to be addressed, the Intervention (the application of the design), the Outcomes to be expected and an understanding of why this intervention produces in this context these outcomes (the Mechanisms).

A simple example (taken from Pawson & Tilley, 1997, p 78-82) may illustrate this CIMO-logic.

*The problem-in-***C***ontext is thefts from cars, parked in a carpark. The* **I***ntervention is the introduction of a closed-circuit television (CCTV) system, the* **M***echanisms producing the desired* **O***utcome of less theft are deterrence of criminals, allocation of personnel to suspicious situations and less careless behavior of parkers.*

The action theory presented in a DSR-publication is expected to be applied as input of EBP (which uses it in problem solving together with the three other sources of knowledge for EBP). Application of action theory in a new situation involves the contextualization of it. The insights in the context-dependency of the effectiveness of the action theory are a key input for this contextualization.

See further Van Aken, Chandrasekaran and Halman (2016) for information on how to conduct DSR.

DESIGN SCIENCE RESEARCH FOR FIELD PROBLEMS IN OCD

There are many problems in OCD that can fruitfully be addressed through DSR, producing instrumental knowledge, subsequently to be applied through EBP. For instance, the design objectives (the DSR counterpart of the research question in explanatory research) of DSR-projects in OCD can be like the following.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Design change processes which can effectively be used for inherent painful changes. Not painful because of irresponsive or disrespectful interventions by the change agents (resulting in avoidable pain), but painful because of e.g. layoffs or significant loss of status or remuneration by the recipients of change. Common interventions like explaining the reasons for this change or participative approaches only show even more to them the pain they may have to endure. Change agents may even have to deal with resistance to change by internal or external coalitions against the change, built by the recipients of change.
- Design action strategies that can be used for situations in which the principal is part of the problem: the change agent expects that the change process will fail so long as this person is in charge, or, at least, so long as this person does not change fundamentally his/her behavior. An interesting part of this type of problem is the grey area where the client seems to be ineffective, but not 'ineffective enough' to justify removal. The issue, then, is how to deal with his/her limitations.
- Design change processes to use when the objective of the change seems to be clear, but in reality, is not. It may be that the problem mess in question is so large, or so complicated, or comprises so many urgent issues that the client cannot or does not want to choose what components of the problem mess to address and defines an unrealistic large set of objectives for the change process. Or the client has defined a clear objective, but this objective only addresses a symptom and not the underlying root cause of the disappointing performance. Or the client has some generic idea to be introduced (like 'lean' or self-organization) but does not fully understand its implications.

Design science research is driven by (types of) field problems. The usual research design is to conduct several rigorous problem-solving case-studies on a type of field problem in organizations that share the interest of the researchers in this type of field problem. These case studies are used to develop action theories for dealing with this field problem based on the learning that takes place. Researchers involve as much as possible the 'local' stakeholders in the production of knowledge but keep firm control of the project to produce sound instrumental knowledge, as well as an as strong as possible body of evidence to validate this knowledge. These case-studies can be made in retrospective mode, analyzing in CIMO-terms what has been done in the past to deal with the problem and learning from the outcomes of these actions. They can also be executed in prospective mode, solving with the partner organizations instantiations of the field problem and again learning from them. Case studies in retrospective mode have the advantage that it may be easier to find enough comparable projects to learn from; but they have the disadvantage that much detailed knowledge has evaporated in the meantime. The prospective project may produce more insightful and innovative designs because the actual course of a past project may hide many possible alternative courses; in hindsight, occurred outcomes may give an impression of being unavoidable outcomes.

The results of these problem-solving projects can be published in academic journals where reviewers and editors do not harbor prejudices against instrumental knowledge. But DSR should also serve the professional OCD-community; so, publications in professional journals are also important (even if the university reward system does not reward this).

DSR can also be executed in a real professional-researcher partnership by using the following research design (which is a design I presently use in The Netherlands together with management consultants and the Ooa, the Dutch Order of Management Consultants). In this design, researchers relinquish to some extent control over the project and with this part of the rigor in gathering evidence to validate its results. The research is executed through a series of workshops on a certain field problem. In each workshop a

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

small number (say five to seven) of researchers and professionals analyze and develop action theories using past projects dealing with the field problem in question. At least one of the professionals must have been an actor in the project to be analyzed to develop really deep insights through questions and answers. The group makes an integral analysis of the project: the client organization, the agreed problem-definition for the assignment (plus the possible shifts in it during the execution of the project), its context and history. Subsequently the group zooms in on the actions which the various actors in the project have used in dealing with the problem. The CIMO-logic is a powerful instrument to analyze these actions. First, tentative in-case action theories are developed based on what has worked, or what has not or has worked less; later these are made generic/transferable on the basis of cross-case analyses of cases.

The more limited rigor of these series of workshops can make it difficult to publish the results in academic journals. However, publications in professional journals can produce important contributions to the development of the OCD-profession. This is important and will continue to be so for as long as universities put only limited effort in the development of instrumental knowledge.

The development of psychotherapy might be an example for the OCD-community. Over the past decades this discipline has dramatically improved the effectiveness of its therapies. These improvements are largely realized by developing and field-testing new approaches to psychotherapy by professionals and by sharing their experiential knowledge with other professionals through professional publications, study meetings and conferences. Apart from important contributions by research on drugs, the role of university research in these important developments has been limited. As in OCD, it is difficult if not impossible in psychotherapy to develop effective instrumental knowledge by traditional academic research methods. Hence, the professionals have taken the lead in improving the effectiveness of their therapies by developing, testing and sharing experiential knowledge. It is an example that the OCD-community might follow[3].

Of all the types of field problems in OCD to address through DSR, the most interesting and important one may be the failed change process. Failing change processes are a major reason to promote EBP and to publish this book (see chapter 1). Failed change processes are discussed in non-academic management literature, usually presenting little evidence for their conclusions. They are also amply discussed in the academic literature, providing more evidence for its findings but often giving few specifics and/or giving not much instrumental knowledge to be used to avoid failure. DSR can add insights to this literature on failing change processes.

There are several interesting issues and research questions of direct relevance for DSR-for-EBP-in-OCD, including the following four.

- What *is* failure of an organizational change process?
- What causes can failure have and how to limit their impact?
- What can be the contributions of the various stakeholders to failure and how to deal with these to avoid failure?
- How to adapt a running change process in response to changing circumstances and impending failure?

There are many more interesting and important issues with respect to failure of organizational change processes that require being explored; these four are presented to give an impression of the type of research questions and design objectives one can have for this subject area.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The basic set-up for developing fine grained insights in failed OCD-projects and effective action theories can be similar to the retrospective analysis of the OCD-project discussed above. For the failed-project program the first issue is to get a deep and detailed insight into the very concept and causes of failing organizational change processes. Virtually no change process realizes its objectives as stated at its start. This is not only impossible, but also undesirable. For a very limited change to be realized in a few weeks or months it may be possible to meet these beforehand stated objectives. But for large scale change processes taking a year or extending over several years, this is impossible. Large scale organizational change is to be realized in a setting of constant flux: clients, competitors, regulating agencies, all produce changing challenges to the organization-in-change, as do internal changes triggered by outside changes as well as internal ones (changing insights and in particular, changing key actors). Clinging to original objectives can produce disaster, so one must adapt the objectives of the change processes. Therefore, not meeting initial objectives cannot be a good indication of failure for large scale change processes. So, research can produce nuanced understanding of failed organizational change processes and, with this, possible action theories to deal with impending failure (or, alternatively, to secure a soft landing of the project). Research can focus, for example, on the following issues

- How can we define failure of change processes? Is it useful to differentiate in success and failure on various dimensions of success/failure?
- Is it useful to develop a typology of failed change processes, maybe based on the causes of failure, or on the degree or nature of failure?
- What is the role of the various stakeholders in rating the finished process as failed or successful (there might be important differences of opinion among the various stakeholders and recipients of change in their valuation of the results of the change)?
- What are the consequences of failing? Successful change may be a matter of life or death for an organization. How do the various stakeholders deal with the consequences of failure?

These questions (and other ones) on failure are interesting enough to be answered from the perspective of academic interest. However, in the context of DSR-for-EBP-in-OCD the professional relevance is even more important. This leads to certain nuances in the research. For instance: What is the professional relevance of a definition of failure. Can we define failure in a way that professionals can use it to see failure coming and to design action theories to avoid it (to change the original change strategy, which now seems to lead to failure) or to design a 'soft landing'?

The second issue to explore is the detailed analysis of the most common causes of failure. This involves not only the identification of these common causes, but also more detailed how a cause impacts the change process and what change agents can do to counteract this impact. A main cause can be the role and behavior of the principal of the change process. Chapter 1 suggests that misunderstanding by managers of the complexities of large scale organizational change is a major cause of failure. This may well be, but the next step is to investigate how such misunderstandings impact their behavior, as well as analyzing possible strategies by professional change agents to deal with such misunderstandings. Another problem can be the fact that managers typically have other agendas next to realizing the present change process. These may range from personal concerns regarding their own position and the position of the department they run, to concerns beyond the present change process such as what to do after the change or concerns due to becoming aware of new threats and opportunities. They may not always share such

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

additional concerns with others, including the professional change agents supporting the present change process, which then can look to them like misunderstanding of complexities.

This brings us to the third issue, the roles that the various stakeholders in the change process can play in failure. These stakeholders include various internal persons and parties (among whom, of course, are the recipients of change) as well as external parties like shareholders, trade unions, regulating agencies and, last but not least, the media. Each type of stakeholder may need a different strategy to deal with it, which is especially important in times of stress caused by a critical stage in the change process or an impending failure. Professionals can learn a lot from the experience of colleagues in dealing with these issues, analyzed and presented in an objective and insightful way through DSR.

Finally, and possibly the most important issue in avoiding failure (also important in every change process), is how to adapt the change process *and* its objectives to changing circumstances as already mentioned in the discussion of the first issue. Typically, organizational change processes can be characterized as punctuated equilibrium processes (see e.g. Gersick, 1991, for the punctuated equilibrium model). Organizations are constantly developing and changing through learning processes and though the influence of changing environments. But from time to time these (largely spontaneous) adaptation processes are no longer sufficient, thus causing influential stakeholders to initiate a planned change process. After successfully concluding this process, the organization is again in the equilibrium of spontaneous adaptations.

Many descriptions of planned change processes give the impression that these are, or should be, processes separated from the ongoing daily operating processes, starting with unfreezing and subsequently managed as a project with well-defined objectives like a project for building a bridge. The change project then may be regarded as one to be managed according to the standard project management criteria of quality, cost and time. Towards the end of the project the organization has to be 'refreezed'.

Some say that organizational change is like changing the tires of a driven car. Organization change is to be introduced while the organization is in constant flux, the daily operations have to go on and customers need to remain satisfied. And, even more importantly, if the duration of the project is more than some months, its environment, its objectives and maybe even major actors and stakeholders start to shift. Hence, a major issue to explore by fine-grained DSR for OCD is to observe and analyze how change agents deal with these challenges and how in particular this is done (or not done) in failed projects.

Possibly a key factor in successful adaptation of a running change project to changes is that the change agents have intimate knowledge of the problems the change is to solve and the business strategy the change needs to support. The best way to get this intimate knowledge may be to involve the change agents, if only as observers, in the design of the change and of the business strategy the change must support. Adaptation of the project to external changes is very difficult for change agents who are only involved in the project after its objectives and the relevant business strategy have been defined. Thus, one could analyze in various failed change projects how involving change agents in strategy and design can support effective adaptations (or how a lack of involvement may impede successful adaptation).

This discussion of DSR-research on failed change processes illustrates the fine-grained interest of DSR in actual practices in order to be able to improve them. This interest is much more detailed than often is the case in academic research from the perspective of the detached observer. A general understanding of situations and processes may all he/she wishes to develop. As partner of professionals, sharing their perspective of the actor, a DSR-researcher is not satisfied with generalities.

DSR on change projects and failed change projects produces as starting material a set of narratives on these projects, as objectively as possible observed and described. This material then is analyzed to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

find patterns and regularities and to develop possible action theories to deal with the various key issues in OCD, subsequently to be field-tested.

The reader may think that this looks much like management literature. *It does*. But the differences include

- That evidence is given for the conclusions and action theories, enabling the professional reader and journal editors to judge their validity and relevance
- That action theories are presented, using CIMO-logic to understand their effectiveness and particularly the mechanisms producing the desired results
- That insight is given in the context-dependency of the effectiveness of the action theories instead of the often one-size-fits-all approach used in non-academic management literature
- That these action theories are to be used as input for EBP, so as one of the inputs for the design of context-specific change plans and change organizations, not as recipes to be followed as given
- That, as academic research, the extant literature is well-used and, finally,
- That these results are not written from the perspective of one person, aiming to 'sell' his/her road to success, but from the more objective perspective of the OCD-discipline as a whole.

So DSR-publications may be regarded as valid and objective 'management literature', or as the academic version of this non-academic management literature.

CONCLUSION

This book is published on the premise that the conscientious use of the best available evidence will contribute to a much higher level of effectiveness of OCD processes than presently is realized. This chapter is written on the belief that this is a challenge to both academia and the community of professional change agents. Design science research can produce valid and relevant instrumental knowledge to be used as input to EBP-in-OCD. Developing professional-research partnerships is a sound way to execute such DSR. It may be even more important to include this idea of partnership in the mission of management research, like it is in all other professional schools including engineering schools and medical schools. If so, the relevance of management research for management practice will be the key objective of research, which consequently makes research also relevant for teaching to aspiring professionals and for EBP.

REFERENCES

Anderson, P. J. J., Blatt, R., Grant, A. M., Marquis, Ch., Neumann, E. J., Sonenshein, S., & Sutcliffe, K. (2006). Understanding mechanisms in organizational research: Reflections from a collective journey. *Journal of Management Inquiry*, *15*(2), 102–113. doi:10.1177/1056492605280231

Argyris, Ch., & Schön, D. A. (1974). *Theory in practice: increasing professional effectiveness*. Oxford, UK: Jossey-Bass.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bate, P. (2007). Editorial to the Special Issue: Bringing the design sciences to organization development and change management. *The Journal of Applied Behavioral Science*, *43*(1), 8–11. doi:10.1177/0021886307299885

Beer, M., & Nohria, N. (2000). Cracking the code of change. *Harvard Business Review*, *78*, 133–141. PMID:11183975

Boland, R., & Collopy, F. (Eds.). (2004). Managing as designing. Stanford, CA: Stanford University Press.

Briner, R. B., Denyer, D., & Rousseau, D. M. (2009). Evidence-based management: Concept clean up time? *The Academy of Management Perspectives*, *23*(1), 19–32. doi:10.5465/amp.23.4.19

Burrell, G. (1989). The absent center: The neglect of philosophy in Anglo-American management theory. *Human Systems Management*, *8*(4), 307–312. doi:10.3233/HSM-1989-8408

Cameron, E., & Green, M. (2015). *Making Sense of Change Management: A Complete Guide to the Models, Tools and techniques of organizational Change* (4th ed.). London: Kogan Page Publishers.

Chandler, A. (1962). *Strategy and Structure: Chapters in the history of industrial enterprise*. New York: Doubleday.

Cross, N. (2001). Designerly ways of knowing: Design discipline versus design science. *Design Issues*, *17*(3), 49–55. doi:10.1162/074793601750357196

Davies, H., Nutley, S., & Smith, P. (Eds.). (2000). *What works? Evidence-based policy and practice in public services*. Bristol, UK: Policy Press.

Davis, G.F. (2006). Mechanisms and the theory of organizations. *Journal of Management Inquiry, 15*(2), 114-118. doi:1177/1056492605280238

Denyer, D., Tranfield, D., & Van Aken, J. E. (2008). Developing design propositions through research synthesis. *Organization Studies*, *29*(3), 393–413. doi:10.1177/0170840607088020

Drucker, P. F. (1993). *The practice of management*. New York, NY: Taylor & Francis.

Fayol, H. (1984). General and industrial management. New York, NY: IEEE-Publications. (original French version 1916)

Freidson, E. (Ed.). (1973). *Professionals and their prospects*. Beverly Hills, CA: Sage.

Gersick, C. J. G. (1991). Revolutionary change theories: A multilevel exploration of the punctuated paradigm. *Academy of Management Review*, *16*(1), 10–36. doi:10.5465/amr.1991.4278988

Gibbons, P. (2015). *The science of successful organizational change: How leaders set strategy, change behavior and create an agile culture*. London, UK: Pearson Education.

Gordon, R. A., & Howell, J. H. (1959). *Higher education for business*. New York, NY: Columbia University Press.

Grenny, J., Patterson, K., Maxfield, D., McMillan, R., & Switzer, A. (2013). *Influencer, the new science of leading change*. New York, NY: McGraw-Hill.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gross, N. (2009). A pragmatist theory of social mechanisms. *American Sociological Review*, *74*(3), 358–379. doi:10.1177/000312240907400302

Hamer, S., & Collinson, G. (1999). *Achieving evidence-based practice: A handbook for practitioners*. Edinburgh, UK: Baillicre Tindall.

Hedström, O., & Ylikoski, P. (2010). Causal mechanisms in the social sciences. *Annual Review of Sociology*, *36*(1), 49–67. doi:10.1146/annurev.soc.012809.102632

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *Management Information Systems Quarterly*, *28*(1), 75–105. doi:10.2307/25148625

Holmström, J., Ketokivi, M., & Hameri, A.-P. (2009). Bridging practice and theory: A design science approach. *Design Sciences*, *40*(1), 65–86.

Kaipia, R., Holmström, J., Smaros, J., & Rajala, R. (2017). Information sharing for sales and operations planning: Contextualized solutions and mechanisms. *Journal of Operations Management*, *52*, 15–29. doi:10.1016/j.jom.2017.04.001

Klegon, D. G. (1978). The sociology of professions: An emerging perspective. *Sociology of Work and Occupations*, *5*(3), 259–283. doi:10.1177/073088847800500301

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

Kotter, J. D. (2012). *Leading Change* (1st edition 1996). Cambridge, MA: Harvard Business Press.

Kuhn, T. S. (1962). *The structure of scientific revolution*. Chicago, OH: The University of Chicago Press.

Labro, E., & Tuomela, T.-S. (2003). On bringing more action into management accounting research. *European Accounting Review*, *12*(3), 409–442. doi:10.1080/0963818032000083559

Lakatos, A. (1991) Falsification and the methodology of scientific research programs. In I. Lakatos & A. Musgrave (Eds.), Criticism and the growth of knowledge (pp. 170-196). Cambridge, UK: Cambridge University Press.

Leake, D. B. (1996). *Case-based reasoning: Experiences, lessons, and future directions*. Menlo Park, CA: American Association for Artificial Intelligence.

Liddell Hart, B. H. (1967). *Strategy* (2nd ed.). London, UK: Faber.

Lyons, G. M. (1969). *The uneasy partnership: Social science and the federal government in the twentieth century*. New York, NY: Russell Sage Foundation.

Pajunen, K. (2008). The nature of organizational mechanisms. *Organization Studies*, *29*(11), 1449–1468. doi:10.1177/0170840607096384

Pandza, K., & Thorpe, R. (2010). Management as design, but what kind of design? An appraisal of the design science analogy for management. *British Journal of Management*, *21*(1), 171–186. doi:10.1111/j.1467-8551.2008.00623.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Parsons, T., Shils, E. A., & Smelser, N. J. (1965). *Toward a general theory on action*. London, UK: Transaction Publishers.

Pawson, R., & Tilley, N. (1997). *Realistic evaluation*. London, UK: Sage.

Peirce, C. S. (1923). *Chance, love and logic: Philosophical essays*. London, UK: Kegan Paul.

Pelz, D. S. (1978). Some expanded perspectives on the use of social science in public policy. In M. Yinger & S. J. Cutler (Eds.), *Major social issues: A multidisciplinary view* (pp. 346–357). New York, NY: Free Press.

Peters, T. L., & Waterman, R. H. (1982). *In search of excellence*. New York, NY: Harper & Row.

Pierson, F.C. (1959). *The education of American business men. A study of university-college programs in business administration*. New York, NY: McGraw-Hill.

Rousseau, D. M. (Ed.). (2012). *The Oxford handbook of evidence-based management*. Oxford, UK: Oxford University Press. doi:10.1093/oxfordhb/9780199763986.001.0001

Rycroft-Malone, J. (2004). The PARIHS framework – A framework for guiding the implementation of evidence-based practice. *Journal of Nursing Care Quality*, *19*(4), 297–304. doi:10.1097/00001786-200410000-00002 PMID:15535533

Sackett, D. L., Rosenberg, W. M. C., Gray, J. A., Haynes, R. B., & Richardson, W. S. (1996). Evidence-based medicine: What it is and isn't. *British Medical Journal*, *132*(7023), 71–72. doi:10.1136/bmj.312.7023.71 PMID:8555924

Samuels, W. J. (2000). Signs, pragmatism and abduction: The tragedy, irony and promise of Charles Sanders Peirce. *Journal of Economic Issues*, *34*(1), 207–217. doi:10.1080/00213624.2000.11506254

Schön, D. A. (1983). *The reflective practitioner*. London, UK: Temple Smith.

Simon, H. A. (1996). *The sciences of the artificial* (3rd ed.). Cambridge, MA: The MIT Press.

Stanford, J. (2016). Breaking the cycle of failed change management. *ATD at Work*, (161).

Stokes, D. (2011). *Pasteur's quadrant: Basic science and technological innovation*. New York, NY: Brooking Institution Press.

Stouten, J., Rousseau, D.M., & De Cremer, D. (2018). Successful organizational change: Integrating the management practice and scholarly literature. *Academy of Management Annals, 12*(2), 752-788. Doi/doi:10.5465/annals.2016.0095

Trinder, L., & Reynolds, S. (2000). *Evidence-based practice: A clinical approach*. Oxford, UK: Blackwell Science. doi:10.1002/9780470699003

Van Aken, J. E. (2004). Management research on the basis of the design paradigm: The quest for field-tested and grounded technological rules. *Journal of Management Studies*, *41*(2), 219–246. doi:10.1111/j.1467-6486.2004.00430.x

Van Aken, J. E., Chandrasekaran, A., & Halman, J. I. M. (2016). Conducting and publishing design science research. *Journal of Operations Management*, *47-48*, 1–8. doi:10.1016/j.jom.2016.06.004

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Van Aken, J. E., & Romme, A. G. L. (2012). A design science approach to evidence-based management. In D. M. Rousseau (Ed.), *The Oxford handbook of evidence-based management* (pp. 43–57). Oxford, UK: Oxford University Press.

Van de Ven, A. H. (2007). *Engaged scholarship: A guide for organization and social research*. Oxford, UK: Oxford University Press.

Volkan, V. D. (2001). Transgenerational transmissions and chosen traumas: An aspect of large-group identity. *Group Analysis*, *34*(1), 79–97. doi:10.1177/05333160122077730

Wieringa, R. J. (2014). *Design science methodology for information systems and software engineering*. Berlin, Germany: Springer Verlag. doi:10.1007/978-3-662-43839-8

Young, K., Ashby, D., Boaz, A., & Grayson, L. (2002). Social science and the evidence-based policy movement. *Social Policy and Society*, *1*(3), 215–224. doi:10.1017/S1474746402003068

ENDNOTES

1. Interestingly enough Simon did not distinguish the explanatory and design science paradigms. He stayed firmly within the explanatory paradigm, while recognizing the differences in the origination of natural and artificial things (Pandza and Thorpe, 2009). His own research was research *on* design to be used by observers to understand, as opposed to research *for* design to be used by professionals to improve their work (see Cross, 2001, for this distinction). It was his celebration of the power of design to create the preferred, that inspired people like me to develop DSR for the social domain (within engineering DSR has always been the main stream research strategy).
2. There are many definitions of strategy, but their key elements always include objectives and lines of action to achieve these objectives. A well-known definition in the military domain is given in Liddell Hart (1967, p 321): strategy is the art of distributing and applying military means to fulfil the ends of policy. In the business domain a well-known definition is given in Chandler (1962): Strategy is the determination of the basic long-term goals of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals.
3. This account of the impressive development of psychotherapy is not always recognized by professional psychotherapists. Only on second sight, discussing the contributions of great men and women in the discipline and the various important approaches in therapy, does one recognize that the growth of the discipline is largely based on developing and sharing experiential knowledge by and among professionals. This reluctance is understandable. Many outsiders to the discipline still have the—mistaken—idea that the effectiveness of psychotherapy is not proven, so academic respectability is important.

This research was previously published in Evidence-Based Initiatives for Organizational Change and Development; pages 93-110, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 14
Integration of ICTs in Radio Programs (II-RP) for Environmental Awareness for Peasant Farmers of Rural Zambia

Tracy Chisanga
Copperbelt University, Zambia

Jameson Mbale
Copperbelt University, Zambia

ABSTRACT

The radio was the most and only reliable media capable of disseminating remedial information for methods of curing and preventing the outbreak of animal and crop diseases. However, this mode of media faced the challenges of majority of peasant farmers not owning radios, and as a result, they did not access such services. In addition, the distance among the peasant farmers hindered people sharing such resources. Nevertheless, the mushrooming owning of mobile phones by the majority of peasant farmers made information sharing possible. It was in view of that that the integration of ICTs on radio programs, in this work abbreviated as II-RP, was envisaged to disseminate remedial information to peasant farmers in remote areas of Zambia. The II-RP, a mobile built system, allowed farmers and agriculture officers to share the awareness information and sensitization of methods of farming.

INTRODUCTION

The Integration of ICT's on Radio Programmes, in this work abbreviated as II-RP is envisaged to disseminate remedial information to peasant farmers in remote areas of Zambia. Such information is vital to alert farmers and to quickly apply necessary technology for preventive measures. The II-RP architecture

DOI: 10.4018/978-1-7998-7297-9.ch014

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is demonstrated in Figure 1 and it has the following functional components: SMS Service Provider, Mass Media, NAIS Core, Commuter, and Wireless.

Currently the Radio, Television, Newspaper and Newsletter are media channels used by National Agriculture Information Service (NAIS) to disseminate information to farmers. The Radio is the mostly used media channel to disseminate information to framers. Existing wireless cellular networks that have been installed by Mobile Service Providers are utilized by the Mobile System. The major mobile service providers in Zambia are Airtel, Mobile Telecommunications (MTN) and Zambia Telecommunications (ZAMTEL).

Statement of the Problem

The major problems that affect the rural farming industry are as follows: first the outbreak of animal and crop diseases; second, the plague of insects that cause a lot of damage to the crops; third, lack of farming skills; and fourth, lack of information on the rainfall patterns. From these outlined problems, the peasant farmers do not have remedial and preventive information to combat such hazardous circumstances. They have very little means of communicating to the National Agriculture Information Service (NAIS), an organization which has farming experts such as the District and Provincial Agriculture Information Officers (DAIO/PAIO, respectively). These trained officers are employed to give peasant farmers valuable information across all kinds of farming activities. However, the major communication means which is through radio is not very effective to reach out majority of the rural community who cannot utilize such facilities due to inadequate radio frequencies and coverage. Only a few remote areas can access radio coverage and be able to listen to the agriculture programmes where farmers are educated on how to manage animal husbandry, and crop growing. In this way, farmers do respond by filling-in the forms to give there reports, in form of feedback, about the problems they are experiencing them. Thereafter they send these reports to NAIS through Post Office and it takes weeks or some months to reach the intended offices. The whole communication process becomes cumbersome as this in-turn the feedback from NAIS reaches the farmers after a long time. However, these days, the Internet Service Providers (ISPs) have installed towers even across some rural sectors. In that way they have provided adequate mobile coverage to the rural community. In addition, the majority of the rural community own mobile phones. This is supported by Furuholt and Matotay (2011) who pointed out that these days even the poorest peasant farmers own mobile phones. Therefore, developing an agriculture mobile application would be beneficial as many peasant farmers are going access the system for they own mobile phones. Such applications can be integrated into radio systems that would aid an effective communication to the NAIS workforce. It is in view of this, the Integration of ICT's on Radio Programmes (II-RP) was envisaged to build a mobile system which would be available and accessible to remote peasant farmers. As discussed earlier, this was necessitated by the fact that the Government had installed mobile networks coverage in most parts of remote areas. In that way the II-RP would integrate the mobile and radio technologies to develop a system which would be accessed with those on remote areas.

The Objectives of the II-RP

The II_RP model was developed in accordance with the following objectives:

- Design and build the II_RP functional system.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- To determine how best ICTs can be used to enhance information dissemination to farmers.
- To explore all the possible ways ICTs can be used to attain at least ninety percent (90%) feedback from farmers.
- To give farmers an ICT platform that will encourage them to come together and share information.
- Design and develop mobile programmes for the II-RP system.
- Train peasant farmers on how to operate the II-RP system.

Research Questions

This wok tends to answer the following research question. How can Information and Communication Technology (ICT) be used for effective communication between NAIS and the farmers so as to increase their production and productivity? The research question is further subdivided into three parts as:

- What role can ICT play to enhance information dissemination to farmers in Rural areas?
- What mobile technologies are required for the effective feedback communication of information to NAIS?
- What use can mobile technology be in improving information exchange among farmers?

Significance of the Study

The II-RP would enhance information dissemination to farmers in remote rural communities. It would also solve the problem of information feedback communication between peasant farmers and NAIS. In addition, the II-RP would provide an ICT platform which could encourage farmers to come together and share information and improve their farming methods.

BACKGROUND

This section provides key concepts giving the overall background on the Integration of ICT's on Radio Programmes for fomenting social change to peasant farmers of rural Zambia. The section highlights the importance of agriculture health awareness campaigns through various media to disseminate remedial information to farming methods and hazardous livestock and crop epidemic diseases.

Agriculture Health Awareness

The concept of agriculture health awareness posed a threat to the Zambian peasant farmers living in the remote rural setup. The outbreak of epidemic diseases caused a lot of damage to the crop and livestock. The poor peasant farmers are caught unaware to such outbreaks and have no knowledge and solution to neither prevent nor cure such deadly diseases.

Animal Diseases

The outbreak of epidemic diseases has killed a lot of livestock especially in the rural farms. According to Muma et al., (2013) and Mweene et al., (1996), they identified some of notorious animal diseases

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

such as the foot and mouth, rabies, bovine tuberculosis and brucellosis. Whereas, Muma et al., (2013) and Mweene et al., (1996) emphasised that animals die in large numbers from the listed diseases. In fact from the discussed information, the peasant farmers have no vital information on how to control such an epidemic. They do not have knowledge of the useful drug to cure such diseases. Lack of agriculture health awareness as discussed earlier, has put a peasant farmer in a helpless situation of failing to prevent the diseases from spreading and affecting their livestock.

Crop Diseases

In the South African region insects and pests had been attacking and destroying crops. According to Zambia Agriculture Research Institute Report (2013), identified the following insects that attacked crops: aphids (aphididae), army –worm (spodoptera sp.), caterpillars, bean fly or bean stem maggot (ophiomyia phaseoli), beetles, yellow transverse bands, bugs, cutworms (agritos sp.), grass hoppers (acridoidea), leaf hoppers (cicadellidae jassidae), mites (tetranychidae), spider mites, nematodes or eel worms (meloidogyne sp., heterodera sp., phatylenchus sp.), stem- or stalk borers (busseola fusca, sesamia, calamistris, chilo partellus), thrips (thripidae), and white fly (bemisia tabaci). There are also dangerous viruses that have attacked crops. Kaitisha (2003) described the cassava mosaic virus which cause cassava mosaic disease (CMD), the maize streak virus which cause maize streak disease, the maize dwarf mosaic virus which affect both maize and sorghum and bean common mosaic virus which affect beans.

Rainfall Patterns

In recent years, there are some gradual climatic change which has drastically affected rainfall patterns. In some years the rainfall starts very late and stops early causing some dry spell in other areas of the country. This has affected the peasant farmers who could have purchased enough farm inputs in form of seed maize, and planted large portion of hectors but the germinated maize withered. All this loss is because the peasant farmers could not get the information from the Meteorological Station(s) who aired on the Radio Programme that they won't be enough rainfall in that particular rain season. In some cases, there is too much rainfall at the end of season and end damage the crop which had reached maturity. All this is because the farmers did not have information to alert them plant either early or late maturity seed maize.

National Agriculture Information Service (NAIS)

To alleviate the above identified agriculture health problems, the Zambian Government introduced and setup the National Agriculture Information Service (NAIS), a Department of the Ministry of Agriculture and Livestock. The NAIS is responsible for dissemination of remedial agricultural information through the mass media to relevant parties, mostly the peasant farmers from remote areas. The Department is in constant communication with farmers to provide information about better farming methods, expected rainfall patterns, crop and animal diseases and warning of disease outbreak. Despite of such efforts, the sentience information never reached majority of the farmers as they leave in remote areas where the radio facilities are not accessible. Many peasant farmers could not afford to buy radios, and the distant among themselves deprived them to reach the homes of others who have such facilities.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Media Channels

NAIS is using Media Channels to disseminate information and reach out the remote areas. Some of the widely used Media Channels are the Radio, Television, Newspaper and Newsletter. From these media, the Radio Stations 1 and 2 are the most commonly used channels to disseminate information to peasant farmers. The Radio Station 1 relays agriculture programmes transmitted at least in all major Zambian languages that include: Chitonga, chilozi, Chikaonde, Chiluvale, Chibemba, and Chinyanja. In this way, the local people are confidently able to listen from the languages they are conversant with, that are their mother tongue. Hence the majority if not all, are able to listen and participate in the programme by giving the feedback which will be discussed in the later Sections. Whilst, Radio 2 transmits farming programmes in English, which is an official language for Zambia. However, majority of peasant farmers has a problem with this channel, for they do not understand English. Only those from commercial farms make use of this channel as many of then attained education and some of them are Agricultural Managers.

In view of the above, the Radio media does not reach the majority of the peasant farmers. Even those who manage to listen do not have effective technology that would enable give an instance feedback to reach out the NAIS.

Information Communication Technologies (ICTs)

Information Communication Technologies (ICTs) does not only refer to Computers, it also includes radios, television, mobile phones, tablets, smart phones, scanners, printers, projectors, routers, switches, hubs, bridges, but to name a few. Developing a mobile application would make majority of peasant farmers have access to such a system. This is so because these days many people from the rural communities own at least one or two mobile phones. Hence, integrating ICTs with or into radio application would easy accessibility of information to unreachable remote areas. Acquiring Android phones these days is no longer a problem as these gadgets are all over the markets at an affordable price. Since technology has also expanded, the question would be to engage IT industry to develop Mobile Programming systems that will be integrated with radio programmes. This is possible because the mobile service providers such Airtel, Mobile Telecommunications (MTN) and Zambia Telecommunications (ZAMTEL) have extended their infrastructure to some near rural sectors. As such there is at least enough network coverage in many remote areas.

Agriculture Information Officers

The District and Provincial Agriculture Information Officers (DAIO/PAIO, respectively) are the trained personnel who have various skills in farming methods. The DAIO are stationed in each district in a province and they are responsible for overseeing the Radio Framer's groups that have been created in that area. Since NAIS has no established electronic media channels to relay information to Radio Farmer Groups, the DAIO act as the medium. They monitor and provide information to farmers and at the same time get information from farmers and submit it to PAIO. The PAIO is responsible for coordinating the work in the province and monitoring the operation of the DAIO. They are also responsible for relaying information collected from farmers by the DAIO to the Central Office in Lusaka. The Senior/Chief Agriculture Information Officer oversees all the operations in the country.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

LITERATURE REVIEW

In recent years the organization has made efforts in trying to integrate mobile SMS technology in information dissemination.

NAISSMS: Platform

During the 85th Agricultural and Commercial Show, NAIS show cased a mobile phone based platform which it developed. According to the Report (National Agriculture Information Service, 2013), the application was to allow farmers to ask questions and get answers in all the seven local languages including English.

How it worked: In the message pad farmers were required to type the following:

```
NAIS, language code, and type the question, then
Send to
3009
```

NAIS Technical personnel (personal communication, January 13, 2016), reviewed that the mobile phone-based platform was hosted by Zambia Telecommunication (ZAMTEL) and Zambia Information and Communication Technology Authority (ZICTA) was involved for the Domain. Farmers owning a mobile phone with any Sim Card from any mobile service provider in Zambia were able to send in questions but for a fee. However the application was not fully utilized and has not been successful. The cost of running it proved to be too much for NAIS. To run the application required the yearly payment for the code (3009) to ZICTA and ZAMTEL for hosting. Furthermore, all responses to questions sent in required an operator to always be present. If the operator was out of the office meant that the messages won't be attended to. To make matters worse it never had a notification subsystem to inform the operator that they are pending messages when they were out of the office. Also the operators were overwhelmed as the application lacked the automation of well know solutions to well know problems.

Text to Change (TTC)

TTC is a program that was launched at NAIS Exhibition from July 30th to August 4th 2014 (National Agriculture Information Service, 2014). It is a text messaging platform called Vusion that has been designed by TTC Mobile which is interactive, scalable, flexible, cost-effective and easy-to-use (TTC Mobile, 2016).

The operation of TTC was based on the Push-and-pull of information service for farmers (National Agriculture Information Service, 2014). Push messages included alerts, announcements and tips of good farming practices. Pull messages gave farmers the ability to ask pressing questions. To ask a question, farmers were required to send the language keyword with their question to 8448. ENG for English, BEM for Bemba, NYA for Nyanja, TON for Tonga, LOZ for Lozi, LUN for Lunda, LUV for Luvale, and KAO for Kaonde.

NAIS Technical personnel (personal communication, January 13, 2016), reviewed that the program was based on cloud computing and utilized google services which meant access to the SMS Dashboard required the operators to have a smart phone and internet connection. With the current internet connec-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tion speeds in the country this proved to be a challenge. Furthermore, NAIS never had full control of the application; the access privileges were limited. Sadly the program only lasted for a year (2014-2015).

Existing Similar Systems

SMS Trade/Market Information System

The SMS market and trade information system was developed in 2006 by Zambia National Farmers' Union (ZNFU). The platform serves as a price discovery type of tool built to help farmers access actionable up-to-date market prices on their own, within their vicinity, and allows them to have a better negotiating position (Pandor, 2014). The system gives a farmer access to comparative market data and the best price for their produce without going through the daunting task of going out of their way to look for a market.

This price information system is linked to a website and is only available on the Airtel network. To access the service all the farmer needs is the most basic simple cell phone. According to (Pandor, 2014), to find out the market price of a commodity, all one needs to do is type the first four letters of the commodity and send to 4455.For example, to find the current price for wheat, you type 'whea' and send to 4455.Once the SMS is sent, within seconds, the system will reply to inform the farmer of who is buying and at what price they are buying. The cost of an SMS is 50 ngwee.

Commodity prices that are accessible on the platform are: maize, soybeans, sunflower, sorghum, cassava, beans, rice, jatropha, popcorn, honey, groundnuts, wheat, beef, sheep, goats and bran.

According to Tibone Moyo (ZNFU'S Market Information Economist), every week the platform is updated with the latest prices. There are 160 companies from milling companies to traders who are registered with the service as of 2014. The registered companies are called to find out how much they are buying a particular commodity for in that week or if there is a change in the price they are offering (Pandor, 2014).

As can be seen the Application focuses on providing a platform for farmers and buyers to meet and do business at a competitive price. Furthermore the service is only available on the Airtel network which means farmers subscribed to other networks don't have access. The cost of a SMS is also higher than the ordinary charge (which is about K0.25 – K0.30/text message).

The application does not provide information on how to grow crops, keep livestock or address the problems that farmers encounter daily. The proposed system focuses on helping farmers grow better crops and keep health livestock animals.

iCow

iCow is an Agriculture information platform accessed primarily via mobile phone that delivers information and different services to farmers (Su Kahumbu. S, 2012). It was developed in Kenya by Green Dreams TECH Ltd and was lunch in June 2011 (USAID, 2011). During a presentation on Mobile tech spreads seeds of information to farmers, Su Kahumbu (2013) stated that iCow is more like a pipeline in which on one end are farmers and the other end are the agriculture stakeholders (Government, NGO's, Research Institutions, Vets, Input providers, Processors etc). She further explained that iCow is not only used to deliver information and services to farmers, but also help agriculture stakeholders to evaluate their projects and increase their efficiency using information that is coming back from farmers. iCow features include:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1. **Cow Calendar:** Farmers register their cows and their insemination date by SMS short code, and then receive periodic SMS prompts timed with vital days during the gestation period (USAID, 2011). Information sent to farmers include; when the cow is due to come on heat, when to serve it, when to see if in fact it is pregnant and when to stop milking it.
2. **Linkage to Experts:** This service enables farmers to locate the nearest veterinarian or artificial insemination specialist via SMS or through the iCow website. A farmer simply sends vet to iCow short code and then receives an SMS with the telephone numbers of the vets or the artificial inseminators.
3. **Information:** The service sends weekly SMS messages to subscribers with information and tips on breeding, nutrition, milk production efficiency, and other best dairy practices (USAID, 2011).
4. **iCow Soko:** iCow established iCow Soko in August 2011, which enables farmers to trade livestock and livestock byproducts via mobile phone (USAID, 2011). iCow Soko enables consumers purchase their livestock and livestock by products directly from their producers, enabling a healthier agri ecosystem all round (icow, 2015).
5. **iCow Sauti**.

According to Su Kahumbu (2011), the area of focus for icow is providing Livestock information therefore its implementation by NAIS would not be beneficial to all Zambian farmers. Zambian peasant farmers need a system that is not only able to provide information concerning livestock but also growing of different crops. They need to be equipped with the knowledge of growing different crops and how to prevent some crop/livestock diseases if possible. Furthermore, they need a system that is accessible at any time and is not restricted to any mobile service provider.

Thailand: 1677 Farmer Information Highway

Is a Corporate Social Responsibility (CSR) project by telecom operator Telenor. Subscribers receive free information on market trends, commercial crops (rice, vegetable and fruit), livestock and fisheries, important news updates and warnings on weather conditions through their mobile phones (mAgriculture, 2010). 4-6 messages per day are forwarded to subscribers. The content format has been upgraded in phase II of the project and includes MMS and Video Clip, no longer SMS only ("using mobile to improve farming skills", 2010). The project is also linked to Happy Radio of the Telenor group and a farmers_help center, where subscribers network with successful farmers and experts.

As it can be observed, 1677 Farmer Information Highway is a project undertaken with the aim of providing adequate and timely information to farmers. The project attracts much attention as it seems to have much of the features desired by NAIS. However, the cost of implementation and operation are very high. To fully operate the System, the government of Thailand contributes to the cost of the service (mAgriculture, 2010). NAIS cannot afford to implement this system as early seen; it has failed to fund the NAISSMS –Platform and Text To Change (TTC).

Avaaj Otalo

Avaaj Otalo (literally, "voice stop") is a system for farmers to access relevant and timely agricultural information over the phone (Patel et al., 2010). The system was designed in 2008 through collaboration between IBM India Research Laboratory and Development Support Center (DSC), an NGO in Gujarat

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(mAgriculture, 2010). By dialing a phone number and navigating through simple audio prompts, farmers can record questions, review and respond to others, or access content published by agricultural experts and institutions. In addition to the Q&A forum, Avaaj Otalo includes an announcements board of headline-like snippets updated regularly by DSC staff, and a radio archive to listen to past episodes of DSC's popular weekly radio program (Avaaj Otalo, 2010).

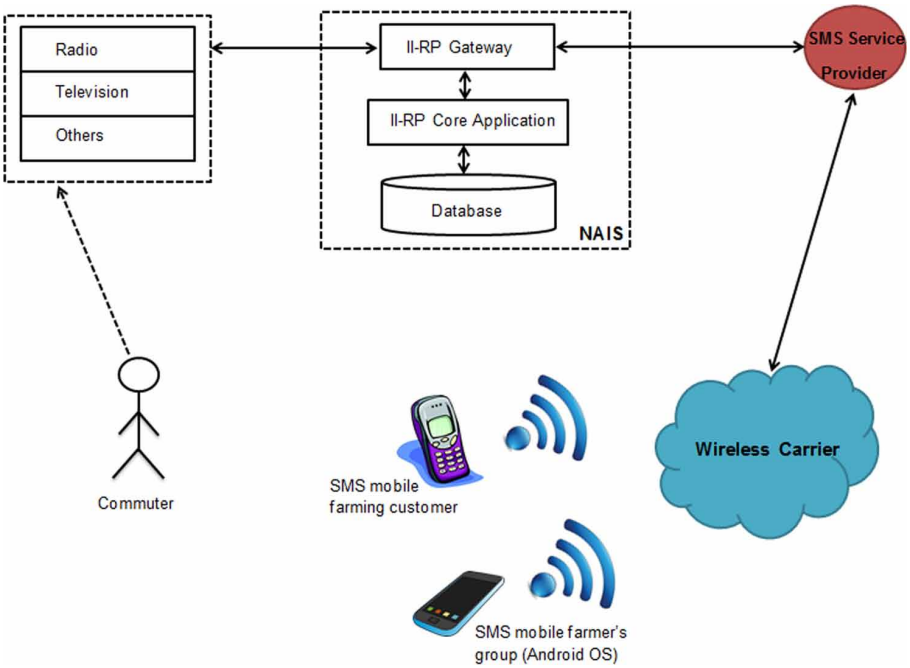
The system has mostly utilized audio technology which requires heavy investment in state of the art mobile communication technology which currently cannot be implemented by NAIS due to financial constraints. Furthermore, if ever NAIS managed to implement such a system the peasant farmers cannot afford to access its services. This would mean that all operational cost will be handled by the organization. The proposed Mobile Application system is feasible as access to the services costs farmers the same amount they spent on an ordinary text message and has no mobile service provider restrictions.

In conclusion, there are many mobile applications available and each has its own area of focus. Mobile systems that are affordable lack the services that the organization needs and Mobile systems that seem to have the desired services are very expensive for the organization to implement. The best solution is to develop a system that considers the cost of operation on the organization's part and farmer's financial ability to access the services. The proposed system meets these demands.

THE II-RP ARCHITECTURE

The II-RP architecture is presented in Figure 1. The architecture has the following functional components: Mass Media, NAIS Core, SMS Service Provider, Commuter and Wireless Carrier. The system is developed using Java programming language.

Figure 1. II-RP architecture



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The farmers, in the architecture referred to as Commuters form groups. The groups listen in to the programmes run by NAIS through the Radio and sends feedback through mobile phones/Tablets running Android operating system distributed to them by NAIS. The mobile phones/tablets have an application and offline database installed. The application contains a form that farmers fill in after a meeting or listening to a Radio Programme and sends it to NAIS, this replaces the Dialogue Forms which farmers fill in and mail it through the Zambia Post Office. The database contains information that is helpful to farmers such as where to buy medicine for crops and animals, vets contacts and a list of members with their contacts. This is to reduce the load on the main system and lower cost for farmers. The mobile phones/tablets are also used to access other services provided by NAIS via SMS. Services provided by NAIS are available to any farmer with a mobile phone via SMS except the above explained Feedback System which is only available to the mobile phones/tablet distributed by NAIS. The cost for the text message is the same as an ordinary SMS.

NAIS maintains a central database which contains a pool of information. Staff personal information and their responsibilities, Clients and their relationship to NAIS and Partners with their involvement are stored in database tables respectively. Information about the media channels used in information dissemination is stored for easy access and collaboration.

The database also contains personal details of registered farmers, all known crop diseases and their cure, marketing information, Livestock information and Livestock expert contact details of Vets and artificial insemination officers. Marketing information includes; where to buy seeds, fertilizer, insecticide, pesticide, etc. livestock information includes; different animal diseases and their cure, animal dibbing and De-worming, etc.

The Application is built from scratch. Its interface with the stakeholders is through the II-RP Gateway. The Application monitors in-coming messages; any received SMS is placed in the assigned table and displayed on the screen. Messages are retrieved from the table in the order they arrived and processed. If a reply is needed, the required information is retrieved from the database or provided by the operator then wrapped up in a Text message (SMS) and sent to the farmer through the II-RP Gateway. The II-RP Gateway is a device that connects NAIS to the general public. A 4G Mobile Broadband Modem is to be used for small scale implementation. For full scale implementation, a SMS gateway is to be used.

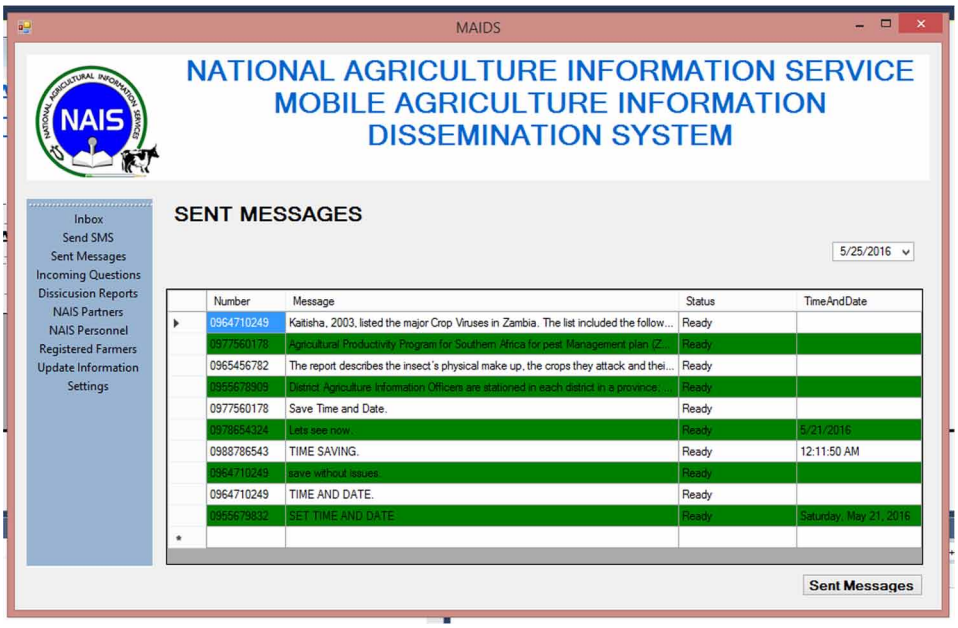
ENVISAGED OR PLANNED MOBILE APPLICATION

The Mobile Application has many modules/subsystems. Among these include the basic components that are expected in a mobile application such as the Send Message subsystem and the Inbox subsystem. These two subsystems have been programmed to store any message sent or received to permanent storage (Database) for the purpose of aiding in identifying the problems that farmers are facing most and for future reference.

The Send Message module allows Agriculture Information Officers to send SMS messages to a single farmer or group. Incoming questions are immediately displayed as demonstrated in Figure 2 and the operator attends to them. However, not all queries are attended by an operator. All the enquires sent by farmers except for the messages proceeded with the short code word "question" are automatically served by the application. When a message is received, it is broken down and the application searches for the requested information in the database. When found it is wrapped up in a text message and sent to the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. The II-RP interface



farmer. The ability to serve queries without an officer is what makes this application ideal for the organization because it saves time and lessens the number of officers required to attend to farmers' enquires.

Other subsystems include Discussion Report, Farmer Registration, Information Update, which stores data into the database, Agriculture Information Officers component, Organization's Partners and the Media Channels used by the organization.

The Discussion Report component focuses on the collection of feedback from farmers. After farmers listen to a programme aired on the Radio, they fill in a discussion report form on the Android phones and this information also as discussed above is wrapped up into a text message which is sent as SMS to the Mobile Application. The information received is stored in the database and accessed at any time. Once the farmer's groups send the message, all the processing that follows is handled by the system.

The registration process of farmers is served by the Farmer Registration subsystem. Farmers send a text message proceeded with the short code word "Register" to the Mobile Application and the subsystem automatically extracts the farmer's number, name and district name supplied in the text message and saves this information to the database. It further informs the farmer if the registration is successful or not.

Information pertaining to animal and crop diseases/pests, their causes, cure and prevention is managed by the updating subsystem. Other information managed by this subsystem are; rainfall patterns, growing weather condition for different crops and crop/livestock experts contact details.

DISCUSSIONS AND FINDINGS

In this section, data analysis methods, study results and a discussion of the findings have been presented. Findings from this study indicate that most media channels used to disseminate information are not very effective. Their effectiveness is slight around half with the exception of the use of radio. The feedback

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

channels used to receive feedback are not effective. This confirms that NAIS has difficulties in collecting feedback from farmers as was stated in the problem statement. The findings also confirm that NAIS would welcome the development of a mobile information system as it will not only give farmers the platform to communicate with the organization but also will enable NAIS to disseminate information in a timely manner.

During the process of data collection, a questionnaire was prepared and addressed to two categories of the targeted sample size, that was, Provincial/Senior and District Agriculture Information officers. Out of the 20 questionnaires distributed only 15 were returned indicated 75% response rate. Lusaka and the Copperbelt provinces made the sample size. From Lusaka Province six questionnaires were returned and from Copperbelt Province nine questionnaires were returned. Copperbelt included the following districts: Mpongwe, Lufyamama, Luanshya, Kalulushi, Ndola and Kitwe. From this sample, five (5) questionnaires were not answered nor returned representing twenty-five percent (25%) non-response rate. This non-response rate was because the respondents were busy with other commitments.

The questionnaire comprised of three (3) sections and data generated was presented as follows:

- Media channels used to disseminate information, their effectiveness and challenges.
- Feedback channels used, their effectiveness and challenges.
- The need for a mobile information system and its perceived benefits.

Descriptive statistical analysis was used to analyze the data that was collected from the questionnaires. Not all respondents answered all of the questions therefore numbers reported correspond to the total number of respondents who answered the individual questions.

Media Channels Used to Disseminate Information

Figure 3 shows the media channels used in disseminating information to farmers. The mostly used media channel to disseminate information was the Radio, followed by the Times of Zambia Newspaper. Television and Newsletters were also used but their usage was mostly in urban and pre-urban areas. Newsletters were only used to produce information for a specified period of time.

The II-RP Effectiveness of the Media Channels

Table 1 shows the effectiveness of the media channels presented in Figure 3. Users perceived the use of the radio as the most effective media channel (about 80%). Although the newspaper is highly used its effectiveness is low (about 51%). Newsletters are the least effective (45%). This could be because limited number of copies are produced and in a few languages.

Challenges in Disseminating Information of II-RP

Table 2 provided the challenges that were faced by NAIS in disseminating information. The major challenge was the lack of financial and communication resources. The challenge of farmers initiating communication varies significantly between urban, peri-urban and rural areas. In urban and pre-urban areas farmers were able to access NAIS offices easily through personal phone calls and SMS. However, farmers in rural areas only rely on the dialogue form/ discussion report for relaying information to NAIS. Although it appeared to be least of the challenges, it is a major challenge faced by farmers in rural areas.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Media channels used to disseminate information

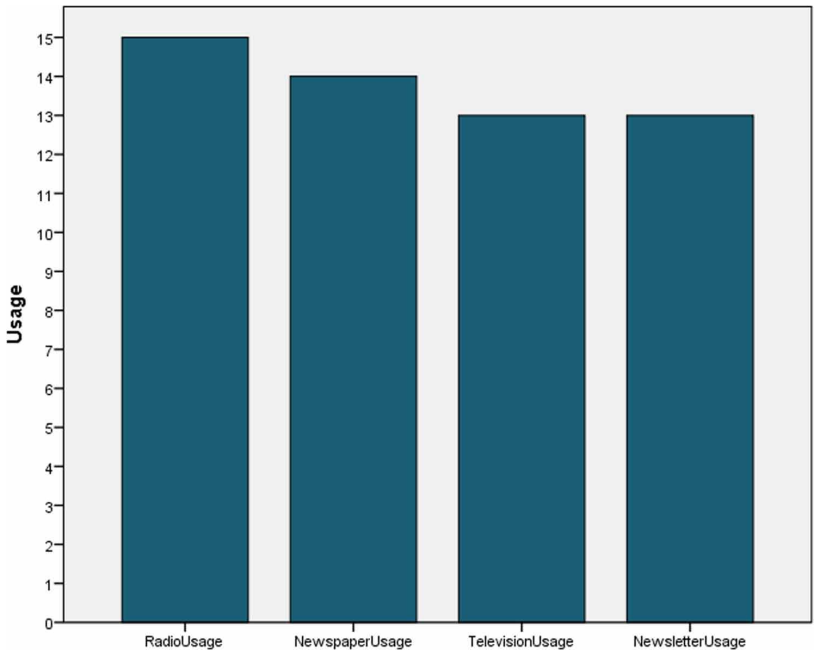


Table 1. Effectiveness of the media channels

		RadioEffectiveness	NewspaperEffectiveness	TelevisionEffectiveness	NewsletterEffectiveness
N	Valid	15	14	13	13
	Missing	0	1	2	2
Mean		79.3%	50.7%	67.7%	45.4%
Median		80.0%	50.0%	70.0%	50.0%

Table 2. Challenges in disseminating information

		Feedback Challenge	Farmers Initiating Communication	No Direct Link between Farmer and NAIS	Lack Of Resources	Access To Radio
N	Valid	13	12	6	14	9
	Missing	2	3	9	1	6
Mean		48.1%	45.4%	50.0%	68.6%	47.8%
Median		40.0%	45.0%	50.0%	70.0%	50.0%

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Feedback Channels Used

Figure 4 shows the media channels used in getting feedback from farmers. The most commonly used feedback channel is dialogue forms/discussion reports. Phone calls and short message service (SMS) are also used. However, these phone calls and SMSs are not addressed to an established system but to personal lines.

Figure 4. Feedback media channels

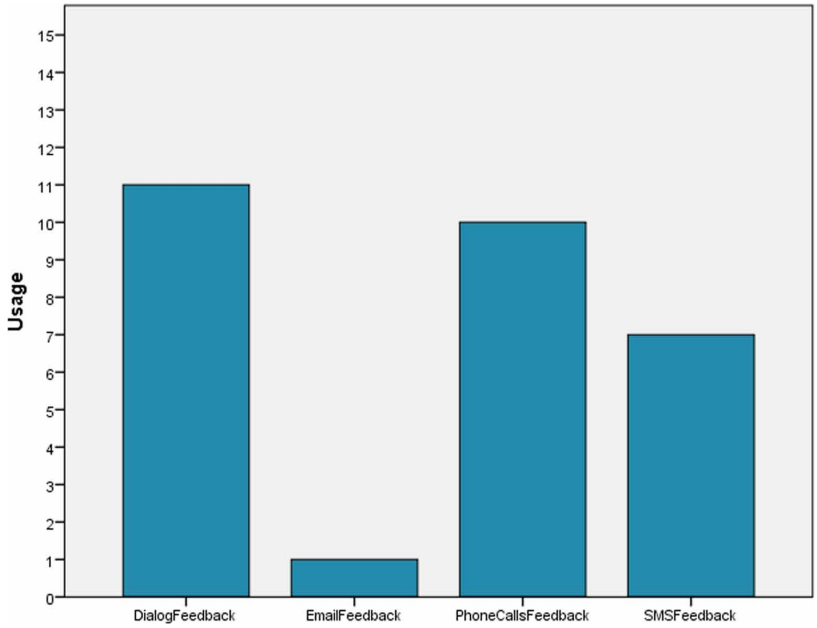


Figure 5 shows the effectiveness of Dialog Form/ Discussion Report in getting feedback. As stated earlier, this is the main feedback channel which is supposed to be used. This is evident in Figure 4 (that is, 11 respondents out of 15 are using this channel). As it can be seen from the chart, a slight majority of users mostly from rural areas feel this channel is highly effective as it is the only channel available to them. However, if we consider the numbers of those who feel that the channel has a low effectiveness with those who do not use the channel, it is clearly evident that this channel has not provided the organisation with the response needed.

Email Effectiveness Figure 6 shows how effective the email channel is in getting feedback. It is clear that farmers do not use this channel. A few who use this channel feel its effectiveness is low.

Phone call effectiveness Figure 7 shows the effectiveness of phone calls. Slightly above half of those who are using this channel feel it is highly effective. An equal number of people are not using this channel. This is because, there is no established phone system to respond to farmers' enquiries as stated earlier.

SMS Effectiveness Figure 8 shows the effectiveness of this channel. As it can be seen from the table, the SMS technology is underutilised as only about half of the respondents are using it. This is because the organisation has not established a formal SMS system. The fact that about half of the respondents are using the channel is evidence enough to indicate the willingness of farmers to use the technology.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Dialog form/ discussion report effectiveness

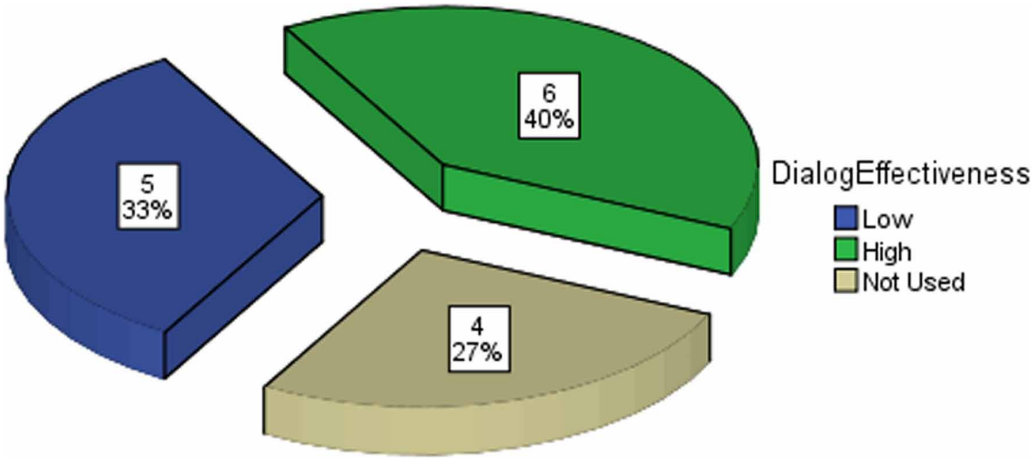


Figure 6. Email effectiveness

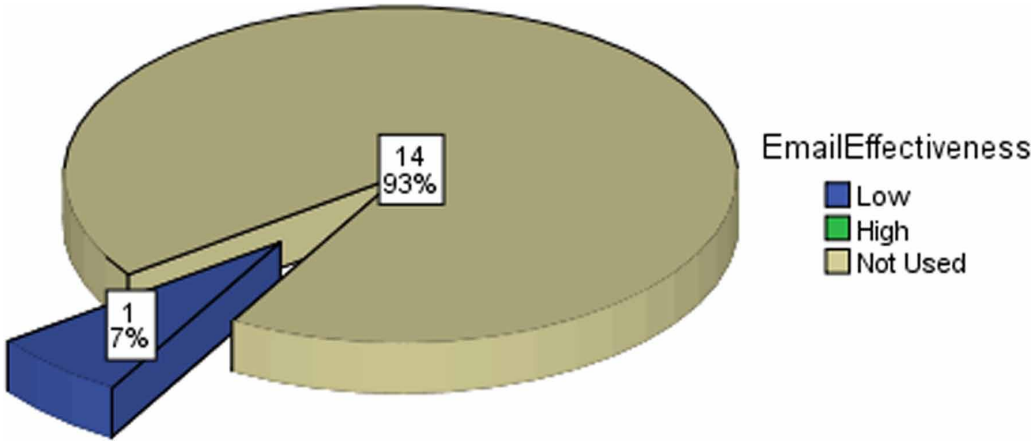
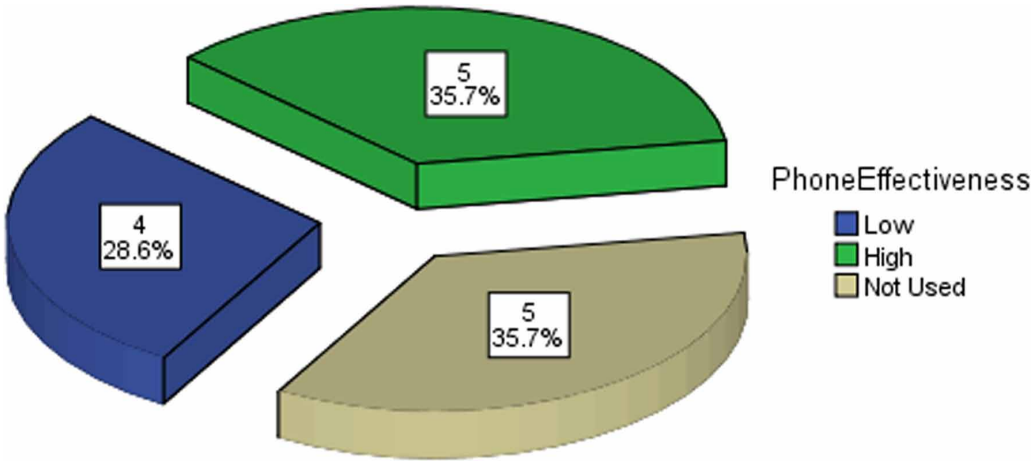
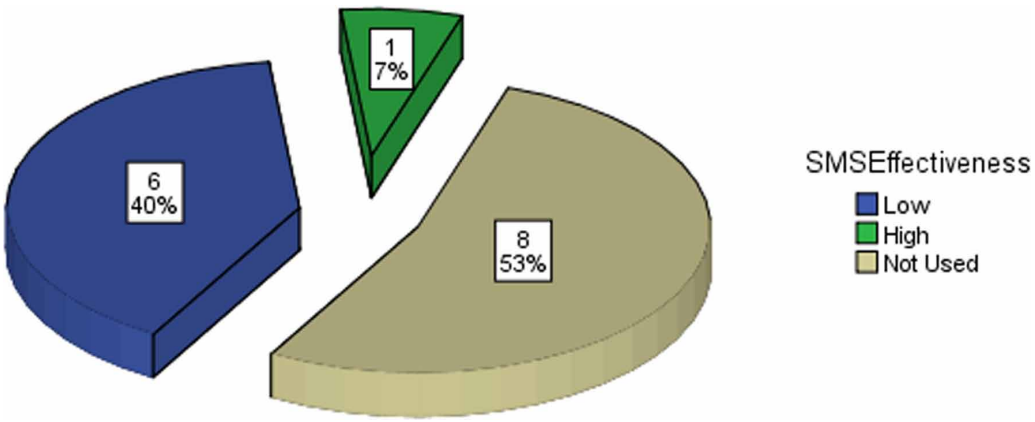


Figure 7. Phone call effectiveness



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 8. SMS effectiveness



Challenges With Feedback Channels Used

The respondents outlined the challenges faced by the organization with the feedback channels that are currently in use. The challenge that stood out was the difficulties in getting rapid responses from the primary audience (the small-scale farmers). They stated that response is not effective and the dialogue forms/discussion reports do not even reach the office most of the time. This was attributed to the location of the farmers and transportation. On the organization's part, the respondents reviewed that there are no resources and the funding they receive is inadequate. With inadequate funding the organization faces the challenge of providing dialogue forms/discussion reports to farmers as getting stationery is also a challenge. Furthermore, because of limited resources it is difficulty for District Information Officers to carry out their field work. All this has led to communication breakdown.

District Information Officers operating in rural areas stated that they are poor Radio signal or reception and poor mobile network. This makes it difficult for farmers to listen in to radio programmes. Furthermore, they pointed out that airtime may not be readily available and maybe out of reach to some people. So even if the officer gives them his/her mobile number, the farmers rarely communicate.

On social grounds, the respondents complained on the farmers being rigid sometimes. They stated that some farmers have a negative attitude towards them and the help the organization tries to offer.

The Need for a II-RP Mobile Information System

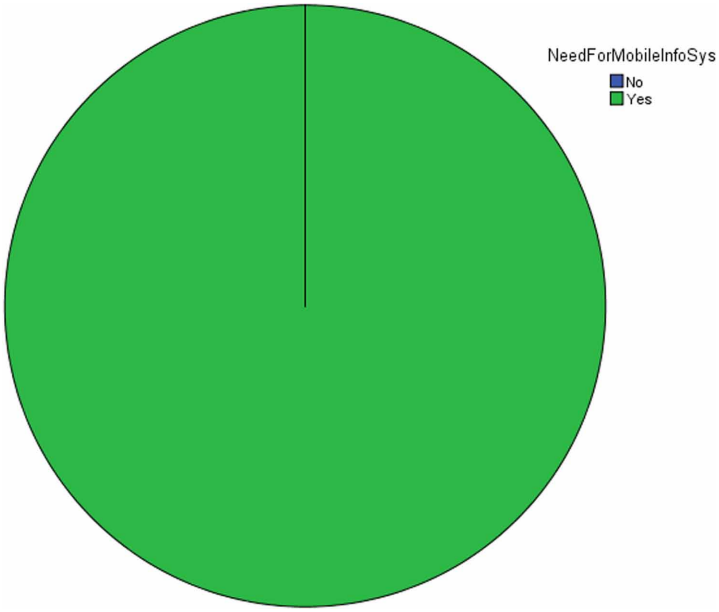
Figure 9 clearly shows that NAIS officers identify the need for a mobile information system which will help them to be in touch with the farmers.

The following are the perceived benefits by the respondents:

- A Mobile system would be helpful as it will mean going closer to the farmer's location. It will enable direct contact with the farmer and so enhance participation, reach hard to reach areas and feedback will be instant. This will help in the monitoring of radio farmer forums.
- Fast response to farmer's questions and concerns thus making them aware about new farming trends.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 9. Need for a mobile information system



- Since most farmers have cellphones, it will be easy for them to access the agriculture information on their phones.
- Timely feedback would resolve urgent response challenge. Most farmers listen to radio as individuals and the culture of using the Post box is low and mail takes so long to reach recipients.
- Through the use of the SMS Toll free especially on factors that are critical to the sector such as outbreak of diseases/pests and serious weather changes affecting their agriculture activities, a mobile system will be very helpful to both the farmers and the organization.
- Most farmers have mobile phones despite poor Network. Farmers are able to communicate with fellow farmers on issues affecting them. A Mobile System will further encourage them to share information.

CONCLUSION AND RECOMMENDATIONS

From the districts that were sampled, 93% of the respondents stated that the radio is the most effective media channel used to disseminate information to farmers as it covers a large portion of the country. Findings from this study also indicated that most media channels used to disseminate information were not very effective. Their effectiveness was slight around fifty percent with the exception of the use of radio. Never the less, all respondents, representing a 100% feedback (Figure 9) reviewed that the use of a Mobile System to disseminate information would be far much better as it will not only give farmers the platform to communicate with the organization but also enable the organization to disseminate information in a timely manner.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The Dialogue Form/ Discussion Report was the most used feedback channel as 73% of the sample size stated so. However, its effectiveness was rated at 40%. The other feedback channels used were also not effective. This confirmed that the organization had difficulties in collecting feedback from farmers.

The challenges encountered in disseminating information and collecting feedback were common among the sampled districts. Respondents agreed that the implementation of the Mobile Agriculture Information Dissemination System will help to overcome almost all the challenges they faced.

It was evident that the Mobile Application would be of great help to both the peasant farmers and the organization. With the system, the farmers would be able to enquire on any issues affecting their crops or livestock and get immediate feedback. This would not only make them the initiators of communication but will give them full access to the System as there are no time restrictions. As stated early, parts of the Mobile Application are automated to respond to enquires without a human operator.

On the organization's side, the system will not only enable it to disseminate information to farmers on time but will also reduce the cost of operation. The resources that are used in printing dialogue forms/ Discussion Reports will be eliminated, Communication costs will be reduced and fuel expenses will also reduce as the movements taken by Agriculture Information Officers will be brought to a minimum.

District Agriculture Information Officers together with the Senior/Provincial Officers will be trained on how to use the system at the same appointed time. District Agriculture Information Officers in turn will train the peasant farmers in the Farmer's Groups that have been established. Furthermore, the Mobile Application has a component that provides information to farmers on the short code words to use when enquiring on specific issues.

Recommendations

In order for NAIS to effectively train its Officers and farmers there is a need to open training centres in rural areas. This would encourage farmers to participate and remove the negative attitude some farmers have about seeking help from other parties. It would also give a chance to Agriculture Information Officers to gain key interest in the affairs of the farmers as they would not only train them but give them a platform to air out their views and concerns.

Currently, Android phones are provided only to Farmer's groups. Each group uses this phone to send updates (views) to NAIS on the programmes that are aired. Farmers not part of any group and too poor to afford a phone need to be provided with one, if possible have one given to them as a loan. This would ensure that every farmer in the Country has access to the Mobile Application and participate in the programmes that are aired on the Radio.

REFERENCES

Furuholt, B., & Matotay, E. (2011). The developmental contribution from mobile phones across the agricultural value chain in rural Africa. *The Electronic Journal on Information Systems in Developing Countries*, 48.

icow. (2015). *iCow Soko-Enabling farmers use technology to bridge the landscape divide*. Retrieved 23 May, 2016, from http://icow.co.ke/iCow Soko-Enabling farmers use technology to bridge the landscape divide.htm

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kaitisha, G. (2003). Some virus diseases of crop plants in Zambia. In*Plant Virology in Sub-Saharan Africa: Proceedings of a Conference Organized by IITA*. International Institute of Tropical Agriculture.

mAgriculture. (2010). *Mobile Applications in Agriculture*. Syngenta Foundation. Retrieved from http://www.syngentafoundation.org

Muma, J., Syakalima, M., Munyeme, M., Zulu, V., Simuunza, M., & Kurata, M. (2013). Bovine Tuberculosis and Brucellosis in Traditionally Managed Livestock in Selected Districts of Southern Province of Zambia. *Veterinary Medicine International*. PMID:23862096

Mwacalimba, K., Mumba, C., & Munyeme, M. (2013). Cost benefit analysis of tuberculosis control in wildlife–livestock interface areas of Southern Zambia. *Preventive Veterinary Medicine*, *110*(2), 274–279. doi:10.1016/j.prevetmed.2012.10.020 PMID:23206544

Mweene, A. S., Pandey, G. S., Sinyangwe, P., Nambota, A., Samui, K., & Kida, H. (1996). Viral diseases of livestock in Zambia. *The Japanese Journal of Veterinary Research*, *44*(2), 89–105. PMID:8870389

National Agriculture Information Service. (2013). *Shaping Tomorrow's World, Effective Use of ICT, 85th Agriculture and Commercial show Presentation*. Author.

National Agriculture Information Service. (2014). *Breaking New Grounds through Enabling Quick Information Dissemination to Farmers using SMS Technology*. Author.

OtaloA. (2010). Retrieved from http://hci.stanford.edu/research/otalo/

Pandor, Z. (2014). *Promoting Agriculture ZNFU'S SMS Market & Trade Information Service (A Blessing to Farmers)*. Retrieved 23 May, 2016, from www.ruralpovertyportal.org

Patel, N. (2010). Avaaj Otalo-A Field Study of an Interactive Voice Forum for Small Farmers in Rural India. *CM Conference on Human Factors in Computing Systems (CHI 2010)*, 10.

Su Kahumbu, S. (2012, June 5). *Su Kahumbu Stephanou: iCow – a mobile app transforms farmers' lives in Kenya* [Video file]. Retrieved from http://www.youtube.com/ icow_a_mobile_app_transforms farmers_lives _in_Kenya

Su Kahumbu, S. (2013). *Su Kahumbu Stephanou: Mobile tech spreads seeds of information to farmers* [Video file]. Retrieved from http://www.youtube.com/mobile_tech-spreads-seeds_of_information_to_farmers

Systems, H. L. (2013). *SMS Gateway Device HG-7000*. Retrieved 27 January, 2016, from http://www.hyperms.com/products/sms-gateways/sms-gateway-device.html

TTC Mobile. (2016). *Text Messaging Platform (Vusion).* Retrieved 27 January, 2016, from http://ttcmobile.com/services/

USAID. (2011, November). *iCOW*. Retrieved 23 May, 2016, from http://measict.weebly.com/uploads/3/2/4/3/3243215/icow-aginfo-mobilephone-kenya.pdf

Using mobile to improve farming methods. (2010). Retrieved from http://telenor.com/en/corporate-responsibility/initiatives-worldwide/using-mobile-to-improve-farming-skills

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Zambia Agriculture Research Institute. (2013). *Agricultural Productivity Program for Southern Africa (Pest Management Plan (PMP)*. Ministry of Agriculture and Livestock, Zambia Agriculture Research Institute.

KEY TERMS AND DEFINITIONS

Channel: A physical transmission medium such as a wire, or a logical connection over a multiplexed medium such as a radio channel.

Gateway: Point of exit or a network point which interfaces with another network that uses different protocols.

Media: The collective communication outlets or tools that are used to store and deliver information or data.

Meteorological Station(s): The site where instruments for conducting meteorological observations on the ground are installed.

Mobile Phone: A wireless handheld device that allows users to make calls and send text messages, among other features. Today's mobile phones, however, are packed with many additional features, such as web browsers, games, cameras, video players, and even navigational systems.

Mobile Programming: Developing applications using handheld devices such as cellular phones.

Radio: The technology of using radio waves to carry information, such as sound, by systematically modulating some property of electromagnetic energy waves transmitted through space, such as their amplitude, frequency, phase, or pulse width.

SMS: Small message system.

This research was previously published in Environmental Awareness and the Role of Social Media; pages 15-42, copyright year 2019 by Engineering Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 15
The Conceptual Framework for The Examination of a Successful Digital Entrepreneurship in 21st Century

Bilal Ahmad Ali Al-khateeb
Al Imam Mohammad Ibn Saud Islamic University, Saudi Arabia

ABSTRACT

There is still lack of a clear conceptual framework to examine a successful digital entrepreneurship within the developing and emerging contexts despite calls by previous scholars. Also, recent studies shown that majority of the digital enterprises studies available today are mostly from the Western world. Thus, there are only few studies on digital enterprises studies emanating from the developing and emerging countries in the Middle-East and Africa continents. Based on the evidence from the literature, this paper provides an overview of digital entrepreneurship, identifies key variables that determine a successful digital entrepreneurship and then provides a conceptual model to guide the understanding of a successful digital entrepreneurship development within the context of developing and emerging economies. The paper offered some implications for digital entrepreneurs, policy makers and some other people in the business of digital entrepreneurship in Saudi Arabia.

INTRODUCTION

There have been several attempts by both practitioners and academics to link entrepreneurship to the digital world. However, prior to this time, both empirical and practical evidence suggest the rise of a new category of entrepreneurship, that is, the concept of digital entrepreneurship which is believed to be an emerging trend.

DOI: 10.4018/978-1-7998-7297-9.ch015

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Digital entrepreneurship affects every task, activity and process within a company (Conigliaro, 2017). Therefore, companies must disrupt their own traditional business model before competitors do. In essence, the time to build a digital company is now. Digital transformation is not only about changing technology but also about changing the way companies do business, and no company is left out of this.

The importance of digital entrepreneurship cannot be undermined. For instance, it attracts talent all over the world. It increases employee's productivity, satisfaction, retention, engagement and improves communication within the organization and equally reduces operating costs for the organization. It equally promotes digital marketing by helping companies to collect valuable information about customers and competitors, particularly in real time. In doing so, it becomes an engine for economic development and growth. Thus, digitalization of the economy is the fundamental mechanism of innovation, competition and growth in today's world, which in turn requires a process of adaptation and transformation. According to Nambisan (2016) and Nambisan (2017) digital entrepreneurship helps in transforming the nature of uncertainty inherent in entrepreneurial processes and outcomes, as well as the ways of dealing with such uncertainty.

Despite the many benefits of digital entrepreneurship as highlighted above, and with the recent increase in the number of digital entrepreneurs across the globe, particularly in the Western world, the academic approach to digital entrepreneurship in the 21st century still needs to be explored. Unfortunately, it is yet to be explored and accorded the needed attention and also treated as one of the areas of entrepreneurship study. Additionally, Ngoasong (2017) recently acknowledged that majority of the digital enterprises studies available today are mostly from the Western world. The author argued that the nature of online reach has made this possible for them. The above suggests that there are few studies on digital enterprises studies emanating from the developing and emerging countries, particularly those from the Middle-East and Africa continent.

Practically, digital entrepreneurship seems strong, but the outlook seems theoretically weak in terms of model development. Thus, digital entrepreneurship appears to lack clear models to advance its understanding, particularly in developing countries such as Middle-East and Africa. Also, it appears that the early writers on digital entrepreneurship sound more of practical than academic, and therefore, may not have found a need for models to advance the knowledge in digital entrepreneurship domain. It is on the basis of this that authors such as Archer, Hull, Soukup, Mayer, Athanasiou, Sevdalis & Darzi (2017) and Nambisan (2016) clamored for theoretical frameworks to guide the understanding of digital entrepreneurship and the relevant factors that affect it. The study noted that only limited efforts have been made by previous studies to provide theories and theoretical framework for the examination of digital entrepreneurship. However, some attempts have been made by few to provide theoretical models. On the contrary, these attempts appear to be ineffective as the key variables were not considered, while on the other hand, majority of the frameworks are perceived to be Western based. For example, the theoretical model provided by Ngoasong (2017) seems to have neglected the relevant factors that actually determine successful digital entrepreneurship as the study only focused on digital entrepreneurial competencies, institutional context, local context and technological context, without consideration to variables such as digital knowledge-based, digital business environment, digital skill, digital mindset and digital infrastructure. Also, Giones & Brem (2017) model is only concerned itself with digital technology entrepreneurship. In 2016, Leong, Pan & Liu (2016) advanced another model which they called digital entrepreneurship of born digital and grown digital firms but failed to include the key variables highlighted above. Authors such as Aldrich (2014); Forrester (2017); Nambisan (2016); Ngoasong (2017) claimed that variables such as digital infrastructures, digital knowledge-based, digital business environment, digital skill and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

digital mindset, cannot be ignored in an attempt to develop successful digital entrepreneurship. In view of this unfolding reality which forms the basis for this study, this paper provides an overview of digital entrepreneurship, identify key variables that determine a successful digital entrepreneurship and then provide a conceptual framework to guide the understanding of successful digital entrepreneurship development in the 21st century.

CONCEPTUALIZATION OF DIGITAL ENTREPRENEURSHIP

Attempts to describe digital entrepreneurship have led to many contributions from different authors and researchers. While some of the descriptions are contextual, others are general in nature. For example, Davidson & Vaast (2010) described digital entrepreneurship as the practice of pursuing "new venture opportunities through new media and internet technologies. They noted that digital entrepreneurship is like, or related to, the traditional entrepreneurship which tends to pursue entrepreneurial opportunities by creating new enterprises or commercializing products and services. On the other hand, digital entrepreneurship is different from traditional entrepreneurship because some or all of the entrepreneurial ventures take place digitally, instead of traditional formats. Therefore, one can describe digital entrepreneurship is that type of entrepreneurship which manifests in existing businesses through the introduction of new digital technologies, or through the novel use of technologies that change business models or revolutionize products or services (Prodanov, 2018; Tumbas, Berente, Seidel & Brocke, 2015). However, Santana (2017) states that the most acceptable definition of digital entrepreneurship across the world should be that which covers all new enterprises and existing companies, that have been "transformed" or converted, and that create economic and social value through digital technologies. These firms are distinguished by high intensity in the use of new digital technologies, (particularly solutions for the social sphere, big data, mobile phone technology and cloud technology), for the purpose of enhancing business operations, inventing new business models, improving business intelligence and dealing with clients and partners. It depends on five pillars namely; digital knowledge based and ICT market; digital business friendly environment, access to finance, digital skills and e-leadership; and an entrepreneurial culture (Santana, 2017). Also, digital entrepreneurship is conceptualized as the embracing of new ventures and the transformation of existing businesses by creating and using novel digital technologies (Zhao & Collier, 2016).

Consequently, these digital businesses possess certain features such as high intensity of new digital technologies utilization (which are mainly social, mobile, analytic and cloud solutions), in order to increase business actions, invent new (digital) business models, sharpen business intelligence, and engage customers and stakeholders through new (digital) channels. It is equally a term used in referring to the methods of creating a new or novel internet enabled/delivered business, product or service. This description is comprised of not just startups-bringing a new digital product or service to market-but also the digital transformation of an existing business activity inside a firm or the public sector. Accordingly, Vasilchenko & Morrish (2011) view digital entrepreneurship as businesses that provide online accounting, software development, social computing and digital platforms for cataloguing, e-commerce (Javalgi, Todd, Johnston & Granot (2012) and multi-media businesses that sell digitized products and services (Hair, Wetsch, Hull, Perotti & Hung, 2012; Onetti, Zucchella, Jones & McDougall-Covin, 2012). Thus, a digital entrepreneur is an individual who creates and delivers key business activities and functions, such as production, marketing, distribution and stakeholder management, using information and communication technologies (ICTs).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ROLES OF DIGITAL ENTREPRENEURS IN 21ST CENTURY

It is actually very difficult to say precisely when digital aspect of entrepreneurship emerged. However, Leadem (2018) observed that an important landmark in digital revolution can be traced down to 1994 when Amazon was founded, while another landmark can be linked to the first iPhone, which was released in 2007. He noted that these remarkable events not only marked the beginning of the life-changing Smartphone frenzy, but gave room for more major digital revolution, including social media and mobile apps, to surface. It is at this point that company like Netflix's streaming was launched in 2007, the birth of Bitcoin in 2009 and the release of Google Drive collaboration software. All these set the stage for a digital revolution which has given birth to digital entrepreneurship, now ruling the world.

As to the role digital entrepreneurship, it would be very difficult to undermine this, particularly in the 21st century. The reason is that digital entrepreneurship is traceable to every aspect of the business sector. For example, digital entrepreneurs help customers and companies to get the most accurate data from the most authoritative sources. Digital entrepreneurs are regarded as professionals who provide context for maps, info cards and specific answers to customers and companies in need of information, in a professional way. With digital entrepreneurship, this information is provided in an intelligent way (Forrester, 2017).

Digital entrepreneurship promotes digital marketing. In the 21st century, businesses cannot afford to ignore digital marketing, because doing so would amount to opening a business, but not telling anyone (Conigliaro, 2017). It also helps businesses to engage users online and help brands in connecting with customers. Digital entrepreneurship, through digital technologies, has broken down communication barriers, thereby improving employee's experience in the workplaces across the world.

Furthermore, digital entrepreneurs also provide digitalization concepts to ensure sustainable growth for both the government and businesses around the world (Denison, 2017). It equally provides the basis for future-oriented jobs, greater resource efficiency, and responsible economic activity. They engage in smart regulation and focus investment in education, research, and entrepreneurship, and these are considered very crucial for the world economy.

According to Nambisan (2016), digital entrepreneurship tends to balance the playing field in some specific sectors such as ICT and entrepreneurship, thereby providing opportunities to work from remote places at different hours, from the home, or on the go. One can also see the role of digital entrepreneurship in the promotion of gender equality, social and economic inclusion, which stimulate local development, and contributing to sustainable development, particularly when new technologies are joined with the availability of open and public data in cases where data for example on climate/weather, crops and soil, or road and traffic conditions, are used to develop services and apps that alleviate local problems, be it the optimization of agricultural production, emergency and disaster relief response, road safety and accident avoidance, or reducing traffic congestion and parking difficulties. Simple price information of products and services can also greatly improve economic opportunities for local suppliers; also, the bringing together or matching of supply and demand for labor, goods and services by digital technologies, tends to improve economic efficiency, productivity and income opportunities.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CHARACTERISTICS OF DIGITAL ENTREPRENEURSHIP

Psychological theory or model of entrepreneurship, which is equally called hereditary or trait theory by McClelland, Lynn & Schrage (1961), emphasized on the need for entrepreneurs to possess certain characteristics or personalities to enable them become successful entrepreneurs. Based on this, Digital Skills Academy (2017) asserts that there are several skills required by the digital entrepreneurs to effectively function in their business area. These qualities are far more different from those of the conventional entrepreneurs, such as economic entrepreneurs, social entrepreneurs, technopreneurs etc. (Lucky, Rahman & Minai, 2013). Because of the nature of the digital task that digital entrepreneurs engage in; they are forced to possess certain characteristics or skills that are more specific to their tasks. Hence, the abilities and characteristics of the digital entrepreneur become their most important assets.

According to Digital Skills Academy (2017), there are ten key unique qualities often used to qualify digital entrepreneurs in the 21st century. They are as follows:

- **Democratization:** It is one of the mo**st** interesting effects of the digital revolution in the present business world. New entrepreneurs in the digital world can gradually build businesses from the ground up without capital and business connection like before, when conventional entrepreneurs may not be able to do so without capital and business connections.
- **Visionary:** It is not just having a plan, but a clear vision of what your business will do, how your business will do it, and the business goals and objectives. This keeps the digital entrepreneurs focused and helps them to move on the right track.
- **Communicator:** Digital entrepreneurs get others off the ground by clearly articulating their business ideas, and it is this skill also needed in order for co-workers and clients to work with digital entrepreneurs efficiently. This can be achieved through strong and effective communication skills.
- **Motivated:** Digital entrepreneurs are motivators as they drive and propel others to really do what they are doing; and what they want them to do. They possess the motivational skill to always keep going on the road to success so as to reach the end. Therefore, with the support of clear vision and goals, motivation can be attained.
- **Nous:** This is human intellect that is necessary for understanding what is true and real. It is a know-how, ability, knowledge, skill or acumen to understand how the system and operation works. With this skill, digital entrepreneurs are able to work regardless whether they are functioning in their area of expertise, other related areas or wider structural systems, such as legislative frameworks or the economy, it is important to know how to manage them and how they can affect your business.
- **Opportunist:** A skill to always see or recognize business opportunities within the environment, whenever they arise, is one of the most valuable traits an entrepreneur can have. The skill equally assists digital entrepreneurs to create their own opportunities. For example, it is this skill that assisted Patrick and John Collison to see a gap in the market, that later made them billionaires.
- **Technologist**: It is important, if not compulsory, for any digital entrepreneur to possess this skill. This requires that one must be more than just a tech entrepreneur, because one needs to understand not only the technology he is developing, but the wider technology ecosystem, having the ability to see where technologies will develop and where they will provide opportunities.
- **Explorer:** Digital entrepreneurs should possess the ability to explore avenues as they arise, because it allows the discovery of new areas of possibility. It will also provide a situation where

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

what was initially the core of your business could become just a branch of a much wider and more lucrative business concept.

- **Adaptable:** This is the quality needed to overcome a number of bumps which are inevitable on the way to success. It helps digital entrepreneurs to remain on track especially when the inevitable and the unforeseen knock them off course. Adaptability allows the digital entrepreneurs to deal with any of these inevitable and unforeseen bumps.
- **Tenacity:** Digital entrepreneurs must be persistent and determined in such a way that they should not allow any challenge they face get on top of them. A tenacious entrepreneur is one that is inspired when they come up against a wall, excited by the prospect of finding a way over or around it, rather than being frustrated by it. Tenacious entrepreneurs do not give up because they don't know how to give up (Digital Skills Academy, 2017).
- **Learn From Mistakes:** Mistakes are an inevitable part of running a digital business. Digital entrepreneurs must learn how to deal with both valuable mistakes and costly mistakes. This skill should help digital entrepreneurs to spend their energy in analyzing mistakes, rather than regretting those mistakes. They should learn from the differences between valuable mistakes and costly mistakes.

DETERMINANTS OF SUCCESSFUL DIGITAL ENTREPRENEURSHIP

This paper identified five major determinants that are believed to promote successful digital entrepreneurship. These determinants include digital knowledge-based, digital business environment, digital skill, digital mindset and digital infrastructures. These determinants therefore form the basis for further discussion below.

- **Digital Knowledge-Based:** Forrester (2017) noted that digital knowledge-based management has recently emerged as one of the digital entrepreneurs with the most important responsibilities. Digital knowledge - based becomes imperative due to the fact that it is almost appearing impracticable to manage or upgrade all of this information content manually. The concept is not a passive responsibility but rather encompasses far more than just local listings management. Digital knowledge base consists of facts about your organization's people, products, and locations. It also includes the public information concerning your business, like your name, address, and phone number (NAP data), which then improves content, such as photos, descriptions, and menu items-information that is dynamic and changes often. Digital knowledge management vendors provide businesses with solutions to effectively manage all of the digital information about their business. If an entrepreneur is serious about making sure customers get accurate information about his/her brand, when and where they need it, then such an entrepreneur is actively managing his/her digital knowledge. Thus, digital knowledge management is concerned with the use of data a company has, to determine what data it needs to solve problems and drive strategy. Therefore, an effective knowledge management solution should support internal social networks that people can use to connect with each other. If business improvement is the ultimate goal of digital transformation, effective knowledge management is what' is going to pave the way there.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Digital entrepreneurs are people who have the ability to track down all the authoritative sources of knowledge about a brand, people, products, events and locations from within your organization. This could be an easy job at a small company, but it could become a huge undertaking for large corporations. It would likely require conversations with departments such as Marketing, IT, Legal, Facilities, Store Operations and others. It is no small feat to identify and find all the public facts about a business that is relevant to customers. Digital knowledge management saves time which is worth the investment. At the same time, it equally puts the company's brand in a position that would address new information needs and opportunities, as they arise. An organization such as Yext is already into digital knowledge based. For example, Yext, through its digital knowledge based, discovered in 2006 alone that its customers generated 334 million phone calls and 622 million requests for driving directions from third-party resources. Customers are not just looking for up driving directions by chance, but it is believed that they have strong intent in searching for how to get to your business; they have strong intent to go, and you want them to be able to find you. Thus, correct information everywhere is therefore needed to drive customers to your business, and ultimately improves your bottom line. From the above, it becomes crystal clear that digital entrepreneurship is greatly affected by the quality of digital knowledge based available to them. The better the quality of the digital knowledge based, the higher the success of the digital entrepreneurship.

- **Digital Business Environment:** From entrepreneurship perspectives, environment refers to external and internal conditions that affect the business. It is a condition, situation, or factors in the surrounding that affect or influence entrepreneurs. Entrepreneurs interact with the environment all the time. Therefore, digital business environment is best described as those technological factors and supports that tend to influence and support digital entrepreneurship. Environment changes from time to time; therefore, environment is full of uncertainties. However, it provides opportunities as well as threats to an entrepreneur's business. So, digital entrepreneurs must always analyze and understand the environment he/she is operating in, and by analyzing and understanding the environment, an entrepreneur will also be able to know his/her business's strengths and weaknesses. Technological factor is one of the aspects of the business environment. It is actually required to increase process efficiency, minimize cost, invent new designs, innovate and effectively use resources. For example, with ICT, digital entrepreneurs can have access to new knowledge, new processes of production, new and faster information flow and new strategy and better decision making.
- **Digital Skill:** Generally, skill is described as the capacity or ability to do something. It is the focus for analytical research (Green, 2011). It is seen as the ability one possesses or acquires mostly from training which enables him to perform his task. Therefore, skill is ability, and ability is a skill. Skill is the expertise in doing something or expertise needed to perform a task. According to European Union (EU) Skills Panorama 2014 (2015), entrepreneurship is an individual's ability to turn ideas into action. It includes creativity, innovation and risk- taking, as well as the ability to plan and manage projects in order to achieve the stated objectives. It is seen as vital to promoting innovation, competitiveness and economic growth. Fostering entrepreneurial spirit supports the creation of new firms and business growth. Basically, the OECD did identify three fundamental skills entrepreneurs needed for effective functioning. These skills include:
    - **Technical:** Communication, environment monitoring, problem solving, technology implementation and use, interpersonal and organizational skills.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Business Management:** Planning and goal setting, decision making, human resources management, marketing, finance, accounting, customer relations, quality control, negotiation, business launch, growth management and compliance with regulations skills.
- **Personal Entrepreneurial:** Self-control and discipline, risk management, innovation, persistence, leadership, change management, network building, and strategic thinking.

From the above, it is very clear that the type of entrepreneurial skills needed by the digital entrepreneurs is that of technical skill, which they required to perform the core operations in digital organization. It entails the use of technological tools, techniques and procedures, to function in their digital field. For example, internet skill, computer repair skill, innovative and creative skills etc. The quality of these entrepreneurial skills possessed by the digital entrepreneurs goes a long way to determine the type of success the entrepreneur would achieve.

- **Digital Mindset:** Entrepreneurial mindset refers to a specific state of mind, which orientates human conduct towards entrepreneurial activities and outcomes. Individuals with entrepreneurial mindsets are often drawn to opportunities, innovation and new value creation. Practically, entrepreneurs are all different with different mindsets that contribute to their success. These mindsets have to do with their individual personalities or characteristics, in relation to the field in which they have chosen to work. As pointed out by Hessinger (2018), entrepreneurs have about ten mindsets that actually make then successful in the areas of their endeavours. For example, they have the mindset on reaching out to customers first, finding a new market for an existing product, using networking to build their business, giving without expecting a return, keep control of their vision, understand the power of brand, focus their energy on what is good for their businesses, always maintain quality control, set their product apart and take ownership. Therefore, digital entrepreneurs should strive for those entrepreneurial mindsets that could make them successful in their digital field of business.
- **Digital Infrastructure:** the study by Nambisan (2016) pointed out that one factor that affects digital entrepreneurship in the 21st century is the digital infrastructures. This suggests that digital infrastructures are strongly associated with successful digital entrepreneurship. The author described digital entrepreneurship as digital technology tools and systems (e.g., cloud computing, data analytics, online communities, social media, 3D printing, digital makerspaces, etc.) that offer communication, collaboration, and/or computing capabilities to support innovation and entrepreneurship. Aldrich (2014) and Delacroix, Parguel & Benoit-Moreau (2018) asserts that digital infrastructures such as cloud computing, data analytics, online communities, social media, 3D printing, and digital makerspaces have significantly affected entrepreneurship in the form of democratization of entrepreneurship. Accordingly, Hatch (2013) affirmed that cloud computing, digital makerspaces, and data analytics have made it possible for new ventures to cost- effectively construct and test novel concepts, involving a larger set of potential customers, thereby showing the capability to support end-to-end entrepreneurial activities. A good infrastructure for incubators and corporate accelerators, funding programs for start-ups, and targeted investment in research and development, are the prerequisites for pioneering new developments (Denison, 2017). Finally, good digital infrastructures would bring about successful entrepreneurship.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Empirical Review

Authors have argued that digital entrepreneurship is driven or determined by certain key variables. However, these variables are yet to be properly identified. It is one of the main objectives of this present study to properly and effectively identify these variables, and then link them with digital entrepreneurship, while explaining how these variables affect successful digital entrepreneurship. With respect to this, Forrester (2017); Nambisan (2016); Ngoasong (2017) have made frantic attempts to determine what kind of variables predict a successful digital entrepreneurship. For example, Nambisan (2016) claimed that local context in the form of physical infrastructure affect digital entrepreneurship. However, the study failed to be specific about digital infrastructures. Also, Aldrich (2014) asserts that digital infrastructures such as cloud computing, data analytics, online communities, social media, 3D printing, and digital makerspaces have significantly affected entrepreneurship in the form of democratization of entrepreneurship. In another related development, Hatch (2013) affirmed that cloud computing, digital makerspaces, and data analytics have made it possible for new ventures to cost effectively construct and test novel concepts involving a larger set of potential customers, thereby showing the capability to support end-to-end entrepreneurial activities.

Ngoasong (2017) emphasized on entrepreneurial digital competencies. He argued that small digital businesses require digital competencies to be successful. Thus, digital competencies are referred to as digital skills, and are believed to be strongly related to a successful digital entrepreneurship. Finally, Conigliaro (2017), in his presentation, reported that digital knowledge base, digital business environment, digital skill and digital mindset, are the core pillars that can foster successful digital entrepreneurship. This has been highlighted by the digital entrepreneurship scoreboard in 2015. Hence, this paper proposed a strong relationship between digital knowledge-based, digital business environment, digital skill, digital mindset, digital infrastructure and successful digital entrepreneurship.

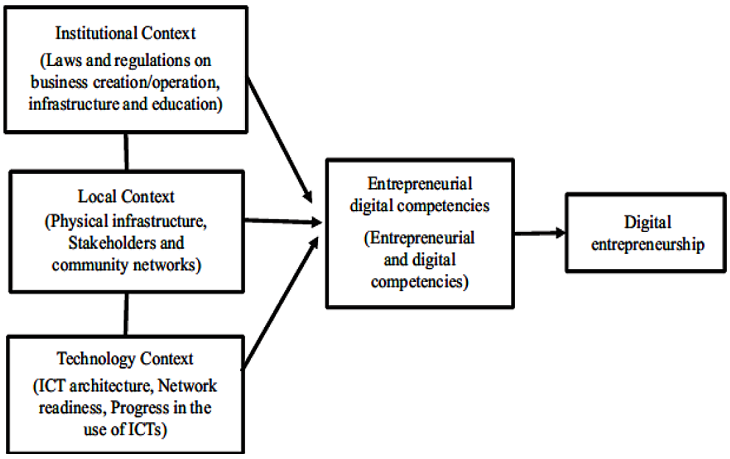
MODELS OF DIGITAL ENTREPRENEURSHIP

Ngoasong Model (2017)

In order to explain digital entrepreneurship, Ngoasong (2017) developed a model called entrepreneurial digital competencies. The major aim of the model is to demonstrate the importance of digital competence in the development of digital entrepreneurship. The model depicts the link between context, competencies and outcomes. The research framework suggests that the influence of context on digital entrepreneurship is mediated by entrepreneurial digital competencies (EDCs). Also, the framework is applied to examine how digital entrepreneurs use EDCs to either discover or create entrepreneurial opportunities and make entry choices and post-entry decisions, to overcome context-specific challenges, using Cameroon as an empirical setting. However, this model failed to take cognizance of key factors such as digital knowledge-based, digital business environment, digital skill, digital mindset and digital infrastructure in the development of successful digital entrepreneurship. It should be stressed that these factors are very crucial and must not be excluded in any entrepreneurship study of this nature. For example, Obeng (2010) observed that the need to create an enabling environment that promotes and encourages entrepreneurial activities is a crucial one. While Lucky (2013) argued that studies in entrepreneurship development that failed to consider environment, should be regarded as incomplete.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

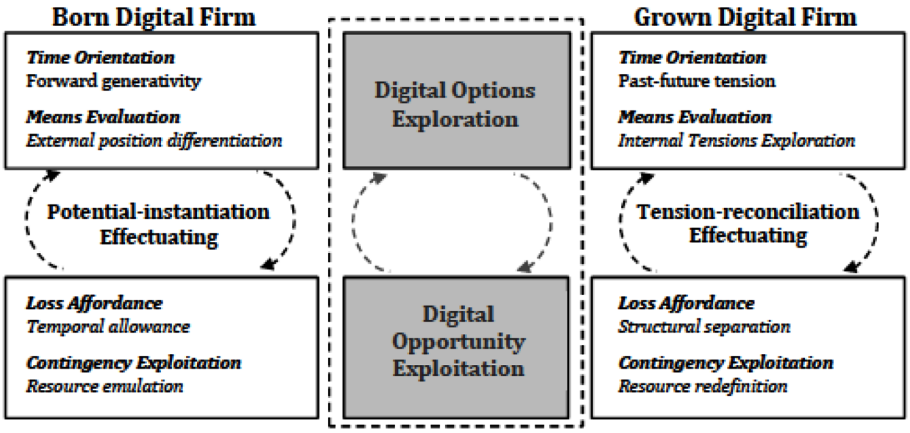
Figure 1. Ngoasong, (2017)



Leong, Pan and Liu Model (2016)

To also understand the concept of digital entrepreneurship, Leong, Pan & Liu (2016) developed a digital entrepreneurship model called digital entrepreneurship of born digital and grown digital firms. The model tends to differentiate between born digital firm and grown digital firm. They claimed that born digital firms are forward generative, while grown digital firms are past-future tension. At the middle of their relationship are digital options exploration and digital opportunity exploitation which affect each other accordingly. There are equally potential-instantiation effectuating and tension-reconciliation effectuating which revolve round to affect both born digital firm and grown digital firm accordingly. Effectuation describes a process of entrepreneurial actions based on the logic of entrepreneurial expertise and a dynamic and interactive process of creating new artifacts in the world (Sarasvathy 2008). However, Leong, Pan & Liu (2016) appear to be silent about the key factors such as digital knowledge-based, digital business environment, digital skill, digital mindset and digital infrastructure in the development of a successful digital entrepreneurship.

Figure 2. Digital Entrepreneurship of born digital and grown digital firms

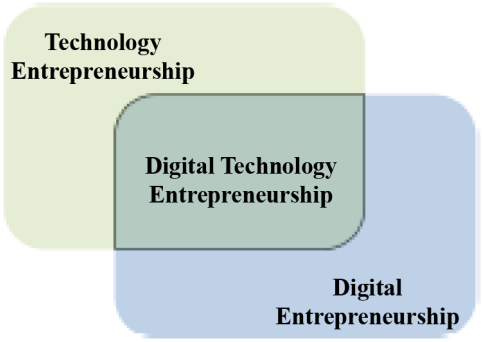


EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Giones and Brem Model (2017)

Giones & Brem (2017) developed a model of digital entrepreneurship which they described as a conceptual representation of a new type of technology entrepreneurship: digital technology entrepreneurship. The author's model describes the change in the meaning of "technology" as a continuum between the extremes represented by the commercialization of the latest scientific breakthroughs (e.g., a new material like graphene) and the latest application for smartphones (e.g., a new food delivery app). The conceptual model demonstrates the overlap between technology entrepreneurship and digital entrepreneurship. The overlap is caused by digital entrepreneurship. They argued that the concept of digital technology entrepreneurship is a combination of elements of technology and digital entrepreneurship. It is on this basis that the authors described technology entrepreneurship to include specific aspects related to this specific form of entrepreneurship: digital technology entrepreneurship is focused on the identification and exploitation of opportunities based on scientific or technological knowledge, through the creation of digital artifacts. Digital technology entrepreneurs build firms based on technologies on one hand, and on services on the other hand. Just like the previous model, this model was silent about the key factors such as digital knowledge-based, digital business environment, digital skill, digital mindset and digital infrastructure, in the development of successful digital entrepreneurship.

Figure 3. Conceptual representation of a new type of technology entrepreneurship-Digital technology entrepreneurship



THEORETICAL FRAMEWORKS

One of the most important and relevant theories that can guide the understanding of digital entrepreneurship is knowledge-based theory. This theory is one of the theories associated with the Resource-Based View of the firm (RBV) initially promoted by Penrose (1959). Knowledge-based theory became popular due to the belief that resource-based view of the firm (RBV) does not go far enough to explain and differentiate knowledge. For instance, Resource-Based View of the firm (RBV) failed to distinguish between different types of knowledge-based capabilities; rather it only recognizes the important role of knowledge in firms. Accordingly, RBV only specifically treats knowledge as a generic resource, rather than having special characteristics. Unfortunately, this is not enough to explain the understanding of digital entrepreneurship. It is believed that Knowledge-Based View (KBV) of the firm is a recent extension

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of the RBV of the firm. It is accepted to be adequate to the present economic context of digital world. According to Curado (2006), KBV of the firm has attracted great interest, as it reflects that academia recognizes the fundamental economic changes resulting from cumulative and availability of knowledge in the past two decades.

In order to effectively guide the understanding of digital entrepreneurship, an emerging theory such as Knowledge-Based theory is required. Digital entrepreneurship is part of the Information and Communication Technology (ICT) that is shaping the world. Information technologies plays a crucial role in the knowledge-based view of the firm, in that information systems can be used to synthesize, enhance, and expedite large-scale intra- and inter-firm knowledge management (Alavi & Leidner 2001). Also, it is believed that heterogeneous knowledge bases and capabilities among firms are the major determinants of sustained competitive advantage and superior corporate performance, instead of RBV. The sustainability of digital entrepreneurship is determined by the amount of knowledge the digital entrepreneurs possess. Apart from that, disseminating the information equally depends on the knowledge of the person. Knowledge-Based theory is a theory that is relevant in linking knowledge to digitalization.

KBV posits that knowledge is the most strategically significant resource of the firm and that knowledge is embedded and carried through multiple entities, including organizational culture and identity, policies, routines, documents, systems, and employees. In the digital entrepreneurship field, knowledge is the most important and relevant resource as well as the only service they offer to their clients. Therefore, knowledge would help the digital entrepreneurs to grow, expand and sustain their business in the 21st century.

Digital Entrepreneurship and Developing/Emerging Economies

The conceptual framework was developed based on the peculiar nature of the developing countries which include Saudi Arabia. According to Ngoasong (2017), advancements in digitization, and the development of ICTs is creating opportunities for new type of entrepreneurial activities in emerging economies. Unfortunately, there are very few international business studies with theoretical models to understand and guide the nature of digital entrepreneurship in developing/emerging economies. Thus, the proposed conceptual model of this present study becomes very relevant in this respect.

Developing/emerging economies are often characterized by slow economic growth, low human capital index, low standard of living, low or middle per capita income, less developed industrial base, lack of rapid development in terms of industrialization and infrastructures etc. Saudi Arabia may not be excluded from this. There are countries that have not achieved a significant degree of industrialization relative to their populations, and have, in most cases, a medium to low standard of living. There is a strong association between low income and high population growth. Developing countries differ from the developed countries, because they still rely primarily on agriculture, have made less impressive gains in infrastructure and industrial growth, and are experiencing low or middle incomes and slow economic growth (Reynolds, 2017).

One greater focus of digital entrepreneurship is the creation of new enterprises. It presents and provides huge opportunities for potential young entrepreneurs through the creation of new ventures. The new enterprises created by digital entrepreneurship covers all new enterprises and existing firms that have been "transformed" or converted, and that create economic and social value through digital technologies. The industry has a very huge capacity to absorb a large and huge population of young people who are ready to become entrepreneurs. This is in line with the crucial and pressing need of many developing countries; which is to provide employment for their many unemployed youths, who have among them

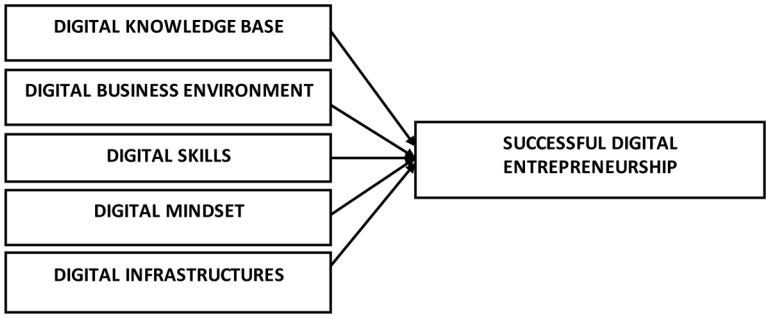
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

those that are graduates from their various tertiary institutions (Lucky, 2015). These young entrepreneurs would in time create new businesses that would hire employees. They create jobs and these economic opportunities uplift and support communities by increasing the quality of life and overall standard of living (Sappin, 2016). Achieving this objective requires that these emerging/developing economies take into account the variables presented by the conceptual model in figure 1. It implies that variables such as digital knowledge based, digital business environment, digital skill, digital mindset and digital infrastructures should be considered for successful digital entrepreneurship in emerging/developing economies.

Secondly, the model provided in this paper would boost development by promoting commerce and regional economic integration. You may ask how? It is very possible because of technology which digital entrepreneurship depends on. Digital entrepreneurship is the creation of new venture opportunities presented by new media and internet technologies; with digital entrepreneurship, small entrepreneur-led businesses in developing countries would have opportunities to expand into regional and global markets. According to (Sappin, 2016), whenever these new digital businesses export goods and services to other regions or countries, they contribute directly to a region's productivity and earnings. There is no doubt, this increase in revenue strengthens an economy and promotes the overall welfare of its population. It has been observed that economies that trade with one another are economically better off. Also, digital entrepreneurship is an easy way to engage in regional and international trade, which in turn promotes investment in regional transportation and infrastructure, and then strengthens economies. Countries such as the United States, China etc. are greatly benefiting from this. Foreign trade, according to some estimates, is responsible for over 90 percent of the world economic growth.

Finally, the conceptual framework emphasizes on factors such as digital knowledge base, digital business environment, digital skill, digital mindset and digital infrastructure. Unfortunately, many developing countries lack all these factors needed for the development of successful digital entrepreneurship. There is no doubt, digital entrepreneurs bring new ideas to life in a digital way; however, their flourishing condition depends on key factors aforementioned above. For example, digital entrepreneurs need education and training to enable them possess the required digital skills for the jobs. The government can play a major role in this aspect, by providing them with training and by so doing, they can raise the human capital index of their countries.

Figure 4. Developing a conceptual framework to examine and guide the understanding of a successful digital entrepreneurship development in the 21st century.



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

This paper examined digital entrepreneurship with particular attention to developing/emerging economies. It identified and discussed the key variables needed to develop and promote successful digital entrepreneurship. Therefore, variables such as digital knowledge - based, digital business environment, digital skill, digital mindset and digital infrastructures, were identified and the extent and how they contribute to the development of a successful digital entrepreneurship in developing/emerging economies was equally discussed. Evidence from the previous studies (Giones & Brem, 2017; Leong, Pan & Liu, 2016; Ngoasong, 2017; Sappin, 2016) helped to establish a strong correlation between identified factors and their contributions to the successful development of a digital entrepreneurship particularly in developing/emerging economies.

From the ongoing, this paper provided two major contributions to practice and research in the area of digital entrepreneurship. First and foremost, this paper documented the relevance of digital entrepreneurship as an area of inquiry within entrepreneurship and elucidated the potential implications of such research for innovators and entrepreneurs in industries across the digital spectrum.

Secondly, the paper provided a conceptual framework for better understanding and the relationships that exist between different dimensions and components that determine successful digital entrepreneurship in this 21st century. These variables arguably greatly influence successful digital entrepreneurship. In so doing, practitioners and academia will not neglect the relevant factors or variables in their study of digital entrepreneurship. Conclusively, digital entrepreneurship, as an emerging area of entrepreneurship discipline, is creating opportunities for new types of entrepreneurial activities in developing/emerging economies; it however lacks a theoretical model to guide its understanding in the developing/emerging economies. This is therefore being taken care of in this present paper.

REFERENCES

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems. *Management Information Systems Quarterly*, *25*(1), 107–136. doi:10.2307/3250961

Aldrich, H. (2014). The democratization of entrepreneurship? Hackers, makerspaces, and crowdfunding. In Annual Meeting of the Academy of Management, Philadelphia, PA, October 27.

Archer, S., Hull, L., Soukup, T., Mayer, E., Athanasiou, T., Sevdalis, N., & Darzi, A. (2017). Development of a theoretical framework of factors affecting patient safety incident reporting: a theoretical review of the literature. *BMJ open*, *7*(12). Digital entrepreneurship. Retrieved from https://www.slideshare.net/GiovanniConigliaro/digital-entrepreneurship-67720006

Davidson, E., & Vaast, E. 2010.Digital Entrepreneurship and its Sociometrical Enactment. *Paper presented at 43rd Hawaii International Conference on System Sciences (HICSS)*, January 5-8.

Delacroix, E., Parguel, B., & Benoit-Moreau, F. (2018). Digital subsistence entrepreneurs on Facebook. *Technological Forecasting and Social Change*. doi:10.1016/j.techfore.2018.06.018

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Denison, E. (2017). Driving prosperity in the digital era. The role of digital talent, innovation and entrepreneurship. Retrieved from https://www2.deloitte.com/de/de/pages/about-deloitte/articles/prosperity-digital-era.html

Digital Skills Academy. (2017). Ten Traits of Successful Digital Entrepreneurs. Retrieved from https://digitalskillsacademy.com/blog/10-traits-of-successful-digital-entrepreneurs

Entrepreneur.com. (October 20, 2016). 7 Ways Entrepreneurs Drive Economic Development. Retrieved from https://www.entrepreneur.com/article/283616

Forrester, D. (2017). Digital knowledge manager: 5 Skills You Need to Succeed at the Newest Marketing Role. Retrieved from https://www.entrepreneur.com/article/299178

Giones, F., & Brem, A. 2017. Digital Technology Entrepreneurship: A Definition and Research Agenda. *Technology Innovation Management Review,* 7(5), 44–51. Retrieved from http://timreview.ca/article/1076

Hair, N., Wetsch, L. R., Hull, C. E., Perotti, V., & Hung, Y.-T. C. (2012). Market Orientation in Digital Entrepreneurship: Advantages and Challenges in A Web 2.0 Networked World. *International Journal of Innovation and Technology Management*, *9*(6), 1250045. doi:10.1142/S0219877012500459

Hatch, M. (2013). *The maker movement manifesto: Rules for innovation in the new world of crafters, hackers, and tinkerers*. New York: McGraw-Hill.

Javalgi, R. G., Todd, P. R., Johnston, W. J., & Granot, E. (2012). Entrepreneurship, muddling through, and Indian Internet-enabled SMEs. *Journal of Business Research*, *65*(6), 740–744. doi:10.1016/j.jbusres.2010.12.010

Leadem, R. (2018). The History of Digital Content (Infographic). How did we get to where we are today? https://www.entrepreneur.com/article/309740

Leong, C., Pan, S. L., & Liu, J. (2016). Digital Entrepreneurship of Born Digital and Grown Digital Firms: Comparing the Effectuation Process of Yihaodian and Suning Research-in-Progress. In *Thirty Seventh International Conference on Information Systems*, Dublin, Ireland.

Lucky, E. O.-I. (2013). Exploring the ineffectiveness of government policy on entrepreneurship in Nigeria. *International Journal of Entrepreneurship and Small Business*, *19*(4), 471–487. doi:10.1504/IJESB.2013.055487

Lucky, E. O.-I., Rahman, H. A., & Minai, M. S. (2013). *A conceptual framework for a successful co-operative entrepreneurship development. In Handbook of entrepreneurship and co-operative development. Co-operative and Entrepreneurship Development institute (CEDI), Universiti Utara Malaysia (UUM)*. Malaysia: Sintok.

Nambisan, S. (2016) Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship. SAGE Publications Inc. doi:. doi:10.1111/etap.12254

Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship Theory and Practice*, *41*(6), 1029–1055. doi:10.1111/etap.12254

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ngoasong, M. Z. (2017). Digital entrepreneurship in a resource-scarce context: A focus on entrepreneurial digital competencies. *Journal of Small Business and Enterprise Development*. doi:10.1108/JSBED-01-2017-0014

O'Sullivan, A., & Sheffrin, S. M. (2003). *Economics: Principles in action*. Upper Saddle River, NJ: Pearson Prentice Hall.

Onetti, A., Zucchella, A., Jones, M., & McDougall-Covin, P. (2012). Internationalization, innovation and entrepreneurship: Business models for new technology-based firms. *The Journal of Management and Governance*, *16*(3), 337–368. doi:10.100710997-010-9154-1

Prodanov, H. (2018). Social Entrepreneurship and Digital Technologies. *Economic Alternatives*, (1), 123-138.

Reynolds, J. (September 26, 2017). Difference Between Developing Countries & Emerging Countries. Retrieved from https://bizfluent.com/info-10002682-difference-between-developing-countries-emerging-countries.html

Santana, M. (2017). *Digital entrepreneurship: expanding the economic frontier in the Mediterranean*. European institute of the Mediterranean.

Sarasvathy, S. D. (2008). *Effectuation: Elements of entrepreneurial expertise*. Cheltenham, U.K.: Edward Elgar Publishing. doi:10.4337/9781848440197

Tumbas, S., Berente, N., Seidel, S., & Brocke, V. J. (2015). The 'digital façade' of rapidly growing entrepreneurial organizations. In *International Conference on Information Systems*, Fort Worth, TX.

Vasilchenko, E., & Morrish, S. (2011). The role of entrepreneurial networks in the exploration and exploitation of internationalization opportunities by information and communication technology firms. *Journal of International Marketing*, *19*(4), 88–105. doi:10.1509/jim.10.0134

Zhao, F., & Collier, A. (2016). Digital entrepreneurship: Research and practice. In *9th Annual conference of the EuroMed academy of business*, Warsaw, Poland, September 14–16.

KEY TERMS AND DEFINITIONS

Digital: A new industrial revolution and the good thing is that digital entrepreneurship is its primary component.

Digital Entrepreneur: Provides the basis for future-oriented jobs, greater resource efficiency, and responsible economic activity.

Digital Entrepreneurship: The creation of new venture from opportunities presented by new media and internet technologies.

This research was previously published in Business Transformations in the Era of Digitalization; pages 126-141, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 16
Leading Anywhere Workers:
A Scientific and Practical Framework

Christianne T. Varty
Wilfrid Laurier University, Canada

Thomas A. O'Neill
University of Calgary, Canada

Laura A. Hambley
Work EvOHlution, Canada

ABSTRACT

As organizations continue to adopt anywhere working, it remains critical to address the leadership and management challenges of leading anywhere workers. Through interviews with experienced anywhere leaders from several different organizations, this chapter clarifies how leaders meet and overcome those challenges. Building on existing behaviorally-based models of leadership, the authors propose a hierarchical taxonomy of anywhere leadership effectiveness behaviors. The taxonomy is composed of four metacategories (Relationships, Flexibility, Productivity, Culture) and fourteen subcategories, which detail the behavioral capabilities necessary for anywhere leadership. In doing so, this chapter provides a common framework for understanding anywhere leadership, lays the foundation for the assessment and development of anywhere leaders, and is a starting point for further research.

INTRODUCTION

The globalization of work coupled with rapid technological advancements have contributed to the rise of anywhere working, also known as telework, mobile, agile, or distributed work. Increasingly, organizations also leverage diverse expertise across geographies by utilizing virtual teams – physically and temporally dispersed work teams that communicate primarily through electronic media (Minton-Eversole, 2012). These various arrangements mean that employees are no longer tied to the traditional office or assigned workstations, which brings benefits such as freedom from the restrictions of a nine-to-five workday and

DOI: 10.4018/978-1-7998-7297-9.ch016

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

reduced costs and time associated with commuting, travel, and relocation (Cascio & Shurygailo, 2003). However, this shift also raises complex challenges for organizations, particularly for the leadership and management of people (Biermeier-Hanson, Liu, & Dickson, 2015).

Leadership is a foundational cornerstone of an effective modern workforce, but recent research has indicated that traditional leadership is more difficult from a distance and the leadership challenges are more extensive (e.g., Hambley, O'Neill, & Kline, 2007a; Purvanova & Bono, 2009). Mainstream models of leadership were not designed with anywhere workers in mind and many of the key behaviors (e.g., motivating employees, setting a vision) may be driven by, or rely on, face-to-face contact (Avolio, Kahai, & Dodge, 2000). At the same time, research into the management capabilities necessary for anywhere work is lacking (Blount, 2015). Inefficiencies in typical uses of e-mail, videoconferencing, text messaging, and other communication media draw from an organization's bottom line due to mismanaged time, frustration, isolation, and turnover. Increasing reliance on these modes of communication requires managers find ways to effectively organize and direct employees, delegate tasks, and manage workflow.

The current chapter reports on recent research examining the behavioral capabilities necessary for effectively leading anywhere workers. Specifically, the authors develop and propose a taxonomy of leadership and management behaviors. Past research has distinguished between leadership behaviors (e.g., change processes such as developing a vision and empowering employees to support that vision) and management behaviors (e.g., behaviors focused on daily operations including planning, organizing, and coordinating others; Kotter, 1987; Lunenburg, 2011). Instead of focusing on this distinction, the current research uses the term *anywhere leadership* to refer to the range of leadership and management behaviors. In doing so, the authors do not aim to propose a new *type* of leadership but use this term to refer to capture the broad set of behaviors that fall under the umbrella term anywhere leadership. Moreover, the authors suggest that successfully leading anywhere workers will depend on the integration of leadership and management behaviors adapted to the anywhere working context. Accordingly, the terms leadership and anywhere leadership are used throughout the chapter.

The usefulness of this proposed taxonomy is threefold. First, a working taxonomy provides a common framework for understanding anywhere leadership. Second, the taxonomy is based on a large and diverse database of effectiveness behaviors, which practitioners and organizations can leverage to inform leadership development. Third, the taxonomy provides a starting point for the assessment and development of leaders in organizations. Overall, the objective of this chapter is to advance existing understanding of the behavioral capabilities necessary for leading the anywhere workforce and providing scholars, organizations, policy makers, and leaders with a framework and best practices.

BACKGROUND

As technology has developed and the employment of knowledge workers has grown, many employees have gained the ability to work anytime and from anywhere (Blount, 2015). This chapter uses the term anywhere work to describe this flexibility. Also known as teleworking or distributed work, anywhere workers can do their jobs away from the conventional office while communicating with colleagues and accessing organizational resources through computer-based technology (Nilles, 1994). The recent trend towards virtual teams dispersed across locations, time zones, and cultural boundaries (Bell & Kozlowski, 2002) constitutes another type of anywhere work. To manage the challenges of dispersion, team members must leverage electronic communication technologies to work collaboratively from anywhere. A final

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

type of anywhere work refers to an individual's job characteristics. Employees increasingly depend on distributed contacts (e.g., colleagues, clients, suppliers, freelancers) and rely on electronic communication regardless of whether their organizations are formally utilizing virtual teams or telework arrangements (Orhan, 2014). In fact, recent estimates indicate that approximately 30% of college-educated professional employees in the United States engage in anywhere working (see Noonan & Glass, 2012), and over half of multinational organizations use virtual teams (Minton-Eversole, 2012). Other studies assert that many employees are away from their desks up to half of the time (Global Workplace Analytics, 2016), due to meetings, travel, use of satellite offices, or remote work (e.g., home, coffee shops, client spaces). These findings show that working from anywhere is a key feature of the modern workplace.

Organizations have responded to these changes by increasingly designing workplaces compatible with anywhere work, as well as implementing communication and collaborative technologies. Despite these adaptations, both organizations and researchers have largely overlooked whether the behavioral capabilities have shifted. This is both surprising and concerning given the prevalence of these ways of working and the leader's role in facilitating the success of the anywhere workforce (e.g., Bell & Kozlowski, 2002; Gajendran & Joshi, 2012; Golden & Veiga, 2008; Hambley et al., 2007a). Moreover, it appears that leadership depends on the specific context and characteristics of the virtual or anywhere work (Gajendran & Joshi, 2012; Golden & Veiga, 2008; Hoch & Kozlowski, 2014; Joshi, Lazarova, & Liao, 2009; Kahai, Huang, & Jestice, 2012). This highlights the need for a stronger understanding of how leaders currently manage the challenges of anywhere work while continuing to perform important roles such as motivating and developing employees, coordinating efforts, and managing cross-cultural differences (O'Neill, Lewis, & Hambley, 2008).

Leaders face numerous challenges when it comes to anywhere work. First, the lack of in-person exchanges between anywhere team members and leaders complicate the development of a seamless and coherent work unit. Leaders must also help employees overcome feelings of isolation or disconnectedness from colleagues (Gibson & Gibbs, 2006, Kirkman, Rosen, Gibson, Tesluk, & McPherson, 2002). Second, anywhere work is characterized by ambiguity. Leaders face the challenge of effectively communicating with different individuals from a distance (Mukherjee, Lahiri, Mukherjee, & Billing, 2012) and adapting to new technology (Qureshi & Vogel, 2001). Third, monitoring anywhere workers' performance requires new methods that do not involve face-to-face contact (Blackburn, Furst, & Rosen, 2003; Hertel, Geister, & Konradt, 2005). As such, leaders must learn to effectively manage by objectives instead of presenteeism (Konradt, Hertel, & Schmook, 2003). Moreover, minimizing process losses inherent in the use of electronic communication media remains one of the leader's fundamental challenges (Connaughton & Daly, 2004). Fourth, spanning multiple geographic boundaries raises new challenges (e.g., time zone management, cultural diversity), which increase the difficulty of becoming an efficient and cohesive work team (Armstrong & Cole, 2002). Across cultural boundaries, for example, it is more likely that self-regulation methods, power distance, uncertainty avoidance, collectivistic orientation, and assertiveness will differ. (Bell & Kozlowski, 2002; Javidan, Dorfman, de Luque, & House, 2006). Accordingly, anywhere leaders must manage these differences, and translate them into process gains (through complementary knowledge sharing). Fifth, the inherent reliance on technology in anywhere work presents an overarching challenge; the leader's ability to appropriately match the communication media to the task (Riopelle et al., 2003) is foundational to managing the other challenges of anywhere work. In fact, according to one perspective, research has failed to keep up with the organizational use of electronic technologies and little is known about the impact on leadership (Avolio, Sosik, Kahai, & Baker, 2014). For example, maintaining employee engagement and focus from a distance poses a seri-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ous challenge. Distractions from the Internet and other applications have led to an increased prevalence of cyberslacking, or using the Internet for non-work purposes while being paid (Lim, 2002), although some personality traits are more strongly associated with cyberslacking than others (O'Neill, Hambley, & Bercovich, 2014; O'Neill, Hambley, & Chatellier, 2014).

To understand how leaders can manage the litany of challenges, studies have attempted to apply current knowledge of traditional hierarchical leadership to the distributed context (e.g., Avolio & Kahai, 2003; Hambley, O'Neill, & Kline, 2007b; Zigurs, 2003). In particular, there has been a strong focus on transactional and transformational leadership (Hambley et al., 2007b; Hoch & Kozlowski, 2014; Howell, Neufeld, & Avolio, 2005; Kahai & Avolio, 2008; Purvanova & Bono, 2009). Transactional leadership involves the exchange of rewards or punishment for desired behavior, whereas transformational leadership is focused on inspiring and motivating followers to achieve higher performance (Bass & Avolio, 1993). Substantial research has supported the effectiveness of both leadership styles in face-to-face work groups (Judge & Piccolo, 2004), but transformational leadership, in particular, has been linked to stronger performance (Lim & Ployhart, 2004) and enhanced group cohesion (Jung & Sosik, 2002). However, studies suggest that transformational leadership requires greater effort and is more difficult from a distance (Purvanova & Bono, 2009). Moreover, the effects of transformational leadership are attenuated by increases in virtuality (Hambley et al., 2007b; Hoch & Kozlowski, 2014; Howell et al., 2005). One study found that a related concept referred to as shared leadership – decision-making characterized by collaboration and shared responsibility (Day, Gronn, & Salas, 2004) – positively influenced performance, independent of virtuality (Hoch & Kozlowski, 2014). This led those authors to conclude that shared team leadership may be an effective alternative to traditional hierarchical leadership for managing in environments characterized by geographic dispersion, cultural diversity, and reliance on electronic communication. However, Avolio and colleagues (2014) have noted that "the shift in locus from individual to a shared or collective leadership in most organizations remains a stretch goal as opposed to reality" (p. 126). This is because modern organizations are still organized by hierarchies according to business function or service, and therefore the sharing of leadership authority runs counter to the organization's design. Thus, it remains necessary to understand how existing formal leaders meet and overcome the challenges of anywhere work.

A second line of research has studied the role of leader-member exchange (Graen & Scandura, 1987; Graen & Uhl-Bien, 1995). Leader-member exchange (LMX) considers the relationship between managers and subordinates and posits that both possess resources the other desires. For example, managers possess social support, consideration, and information, whereas employees can offer extra effort, goal commitment, or loyalty. High quality relationships are characterized by the reciprocal exchange of these resources (Liden, Sparrowe, & Wayne, 1997). Researchers have recently begun to consider the effects of LMX within anywhere working relationships and outcomes such as job performance, satisfaction, and organizational commitment. One study found that employees whose work was extensively virtual demonstrated the highest levels of performance, satisfaction, and commitment when they reported high-quality relationships with their leaders (Golden & Veiga, 2008). Another showed that high-quality LMX was most important for those employees who relied heavily on electronic communication (Hill et al., 2014). In a field study of 40 globally distributed teams, Gajendran and Joshi (2012) observed that the teams only successfully leveraged diverse expertise and achieved innovative problem solving when virtual team members were willing to contribute and offer their perspectives. That study also showed that high-quality LMX relationships positively influenced innovation, suggesting that leadership offers a way to overcome the challenges of virtual teamwork.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

While this is an important finding, it is still unclear exactly *how* leaders develop high quality relationships with their subordinates. For example, how do leaders establish personal connections, develop trust, or even effectively delegate from a distance? The majority of existing research is not well positioned to provide a clear answer to these questions, because most scholars have not taken a behavioral approach to understanding leadership of anywhere workers. Instead, researchers have largely focused on mapping existing theories to anywhere work without explicitly considering the differences between anywhere work and more conventional forms of work. Arguably, anywhere leadership constructs and their measurement should incorporate relevant new terms and concepts, especially related to electronic communication use. However, before assessments can be tailored to this type of leadership, it is critical to clarify the behaviors through interviews with anywhere leaders who have experience leading and managing employees who telework, work in virtual teams, and otherwise work away from the office. Without an understanding of what these leaders actually *do* (i.e., behaviors) to be effective, it is very difficult to provide guidance, training, and coaching.

This chapter aims to identify and classify leadership and management behaviors that experienced leaders view as fundamental to leading anywhere workers. In doing so, this chapter goes beyond describing the challenges of anywhere work (e.g., Kirkman et al., 2002) or comparing anywhere and face-to-face leadership (e.g., Rosen, Furst, & Blackburn, 2006; Zimmerman, Wit, & Gill, 2008). Although these are important first steps, they are unlikely to be very helpful for organizations or leaders (O'Neill et al., 2008). Instead, the current research proposes a taxonomy of effectiveness behaviors. This is in line with the long history (Halpin & Winer, 1957; Kahn & Katz, 1952; Stogdill & Coons, 1957) and ongoing perspective that behaviors are the key mechanism for transmitting leadership. Eberly, Johnson, Hernandez, and Avolio (2013) recently argued that the leader's traits, affect, cognition, and behaviors are each mechanisms of leadership that interact to exert influence. Behaviors, though, are the primary mechanism because they can be *observed by others* and provide interpersonal cues about the leader's traits, affect, and cognition. That is, "behaviors are the primary carrier of leadership between the loci and therefore drive interactions that shape leadership" (p. 438).

Some researchers have offered contributions through a behavioral approach to virtual team leadership (e.g., Hambley et al., 2007a; Malhotra, Majchrzak, & Rosen, 2007). Hambley et al. (2007a) interviewed existing virtual team leaders and members to identify four overarching themes: leadership critical in virtual teams, virtual team meeting effectiveness, personalizing virtual teamwork, and learning to effectively use different media. Perhaps more importantly, those authors presented specific behavioral examples from the interviews (e.g., "leader must establish acceptable ground rules for use of e-mail"), which provide insight into how leaders manage the daily challenges of leading from a distance. In another field study on the effective practices of virtual team leaders, Malhotra et.al. (2007) collected interview and survey data from globally distributed team leaders and members who were part of short-term project teams. They identified six leadership practices (establish and maintain trust through the use of communication technology; ensure diversity in the team is understood, appreciated, and leveraged; manage virtual work-cycle and meetings; monitor team progress through the use of technology; enhance external visibility of the team and its members; and ensure individuals benefit from participating in virtual teams). They also presented specific behavioral examples to explain how leaders enacted these practices (e.g., "use check-ins during meetings to ensure everyone is engaged and heard").

These studies laid the groundwork for behaviorally-focused research of leadership in distributed contexts; however, they have several limitations. Both studies were focused specifically on virtual team leadership effectiveness, whereas the current research aims to incorporate the wider discipline of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

anywhere leadership. This is a broader, all-encompassing concept suggested by the authors of the current chapter that includes virtual team leadership as well as leadership of any mobile or dispersed team member. In addition, Hambley et al. (2007a) only interviewed nine leaders and Malhotra et al. (2007) focused on short-term project teams, thereby raising questions regarding the generalizability to other leaders and other types of anywhere work. Finally, the concept of anywhere work has continued to evolve over the last decade. In particular, significant technological advancements (e.g., social media platforms, smartphones, integrated collaborative software programs) mean it is critical to revisit the behavioral capabilities of anywhere leadership.

Behaviorally-based models of leadership have a long history in the literature. Notably, studies from Ohio State University and the University of Michigan identified two categories of behaviors as central to effective leadership: task and relationship (Halpin & Winer, 1957; Kahn & Katz, 1952; Stogdill & Coons, 1957). Also known as Initiating Structure and Consideration, or Concern for Production and Concern for People (Blake & Mouton, 1982), this two-dimensional framework once dominated leadership research (Yukl, Gordon, & Taber, 2002). Initiating Structure or task-oriented behaviors are those used by the leader to help employees do their jobs, such as clarifying roles or establishing processes. Consideration, or relationship-focused behaviors are those actions that center on enhancing employee well-being, such as expressing appreciation or demonstrating support. Although mixed evidence led researchers to question the efficacy of these leadership dimensions, a recent meta-analysis from Judge, Piccolo, and Ilies (2004) supported the validity of these behavioral categories. Building on this work, Yukl and colleagues (2002) attempted to integrate the vast literature of behavioral leadership taxonomies (see Bass & Stogdill, 1990) to develop a "meaningful conceptual framework" (p. 15). Their proposed hierarchical taxonomy of leadership behavior contained three meta categories: task behavior, relations behavior, and change behavior. The former two categories encompassed the behaviors discussed above whereas the latter category, change behavior, was a new addition. This category captured behaviors centered on promoting growth, utilizing and encouraging creative problem-solving, and monitoring changes in the environment in preparation to adapt. Yukl and colleagues (2002) distinguished the categories based on the primary objective of the specific leadership behavior. That is, while leadership behaviors serve multiple purposes they are driven by a primary goal. For example, the objective of task behaviors is mainly to improve outcomes like performance and efficiency, the objective of relation behaviors is to develop commitment to the group and build trust, and the objective of change behaviors is to facilitate innovation and adapt to change. This categorization approach is useful for providing outcome-focused best practices for managers.

One relevant meta category of behaviors missing from the hierarchy is that of culture (e.g., Malhotra et al., 2007). Past research has shown that behaviors aimed at managing cultural differences and leveraging diverse perspectives are pertinent to leading anywhere workers for several reasons. Anywhere working enables the use of globally distributed team structures, often associated with innovation (Gibson & Gibbs, 2006). At the same time, the modern workforce is becoming increasingly diverse, and a strong business case is building for the inclusion of diverse perspectives (e.g., Hunt, Layton, & Prince, 2015). While crossing cultural boundaries and accessing diverse expertise is often cited as a key advantage of anywhere working, managing cultural differences requires additional leadership behaviors (Javidan et al., 2006). Diverse workers bring differing cultural values, assumptions, and perspectives on appropriate behaviors, which can complicate team functioning and performance (Armstrong & Cole, 2002; Cramton, 2001). The leader plays a key role in translating diversity into improvements in performance, decision making, and innovative thinking (Ang et al., 2007; Caligiuri & Tarique, 2012; Gajendran & Joshi, 2012).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

This requires behaviors such as adjusting one's communication style during and after cross-cultural interactions (Earley & Ang, 2003; Ang et al., 2007) and adapting to different cultural practices (Shaffer, Harrison, Gregersen, Black, & Ferzandi, 2006).

The current chapter incorporates Yukl and colleagues' (2002) leadership taxonomy and research on cross-cultural leadership capabilities (e.g., Earley & Ang, 2003; Caligiuri & Tarique, 2012) to propose a taxonomy of effectiveness behaviors. This extends work on virtual team leadership (Hambley et al., 2007a; Malhotra et al., 2007) to the broader range of anywhere workers, including teleworkers, part-time remote workers, employees working in mobile and campus environments, and virtual team members. Since the taxonomy is modeled after existing research, significant differences at the metacategory level were not expected, whereas differences were anticipated at the more granular levels of behavioral clusters and specific behaviors. For example, promoting a vision is a key behavior for all leaders (Yukl et al., 2002) but *how* a leader effectively communicates that vision via electronic communication media may not be captured in existing models. Without a taxonomy of specific behaviors needed for success, we are left with a limited theoretical understanding of the anywhere leadership performance domain. Moreover, to optimally train and develop leaders in the modern workplace, specific leadership and management behaviors must be catalogued, classified, and understood. The authors aim to address these issues in this chapter.

MAIN FOCUS OF THE CHAPTER

Research Method

The researchers interviewed 34 leaders from North America and Europe who had experience leading anywhere workers. This included leading employees working in different cities or countries, or working remotely from the same city. The leaders were recruited purposively through the networks of the research team and references from other participants. In an effort to capture the diverse experiences of leading anywhere workers, interviewees were drawn from 12 different organizations in a range of industries including energy, engineering, information/communication technology, financial services, and pharmaceuticals. All participants were currently leading anywhere employees or teams, with the exception of one participant who had recently returned to an individual contributor role but who had significant previous leadership experience and was therefore deemed suitable for participation. Leaders spanned a variety of roles and levels, i.e., the sample include front-line managers, middle managers, and senior leaders (e.g., vice presidents). The majority of leaders had led anywhere workers in multiple roles (65.0%) and had an average of 8.25 years of experiences ($SD = 5.61$). Twenty-nine leaders were based in Canada, four in the United Kingdom, and one in the Netherlands, and the majority (55.9%) were male. Interviews were conducted over the phone and typically ranged from 45-60 minutes. Detailed notes were taken during each interview, and interviews were recorded and transcribed.

Leaders were interviewed using the Critical Incident Technique (CIT; Flanagan, 1954). The CIT is an interview technique where individuals are asked to provide instances of high and low performance. Specifically, participants were asked to outline different situations in which they effectively and ineffectively led anywhere workers, describe the behaviors and actions taken in each situation, and specify the outcome (e.g., O'Neill, Goffin, & Gellatly, 2010). This method allows the researcher to observe differences in behaviors associated with different levels of performance. In addition to asking CIT ques-

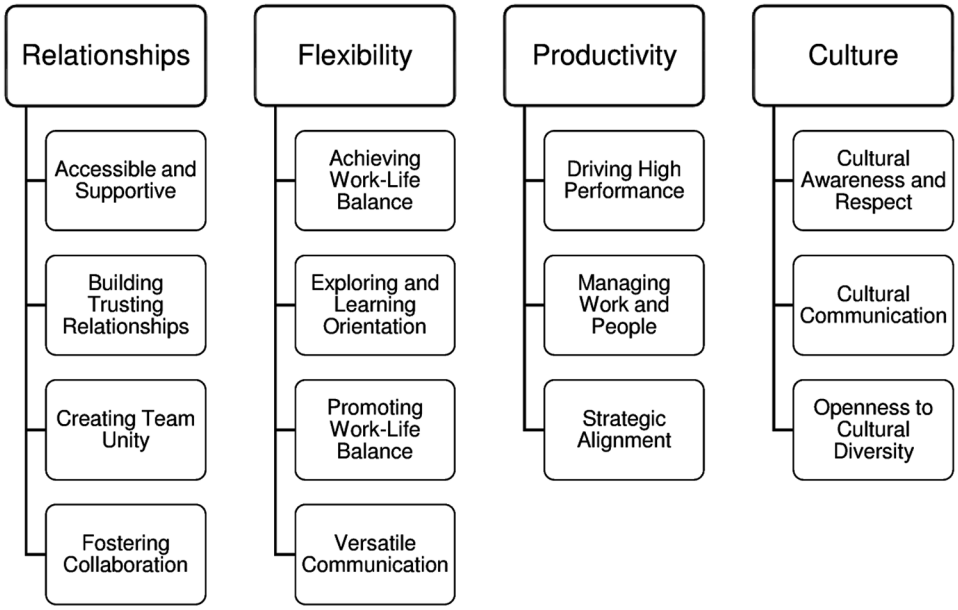
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tions, the researchers drew questions from a past interview study of virtual team leaders (Hambley et al., 2007a) and asked leaders to outright list and describe the behaviors and actions necessary for success when leading/managing anywhere workers.

Proposed Taxonomy and Framework

The authors developed the behavioral taxonomy by identifying and classifying behavioral statements from the interviews. First, a member of the research team extracted behavioral statements from the interview transcripts and notes to create a database of 680 unique statements. Two researchers then independently classified the first 200 behavioral statements by thematically organizing them into behavioral clusters. The researchers discussed their themes and decided on the number, name, and definition of the clusters that captured the statements (cf. Bownas & Bernardin, 1988) and then classified the remaining 480 statements into those clusters. They discussed all disagreements and made adjustments to the definitions in order to capture the nature of additional statements that were included. Finally, the researchers categorized the fourteen behavioral clusters into the four meta categories (Relationships, Flexibility, Productivity, Culture) to arrive at a preliminary hierarchical framework of effectiveness behaviors (see Figure 1). These procedures are in accordance with modern applications of the CIT (e.g., O'Neill et al., 2010). Below the findings are considered with respect to the meta categories, behavioral clusters, marker behaviors, and relevant past research.

Figure 1. Preliminary hierarchal framework of anywhere leadership effectiveness behaviors



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Relationships

The Relationships meta category captures relations-focused behaviors (Yukl et al., 2002) aimed at overcoming the challenges of limited face-to-face interactions. This meta category was defined by four behavioral clusters: Accessible and Supportive, Building Trusting Relationships, Creating Team Unity, and Fostering Collaboration. Each cluster is defined and discussed in connection with relevant past research. See Table 1 for key behaviors that leaders can implement to develop these capabilities.

- **Accessible and Supportive:** Makes him/herself accessible by being easy to get a hold of and retrieve information. Remains approachable, such that employees feel comfortable reaching out with questions and concerns. Is responsive, communicates regularly, and gets to know employees.

One major challenge associated with anywhere work is limited face-to-face interactions. This can slow communication and information flow and leave employees feeling isolated from their team, leader, or organization. The key to overcoming these challenges was conveying constant availability through a virtual "open-door policy" by keeping the "available" light turned on in collaborative software programs, using instant messaging, and responding to e-mails promptly. Consistent with previous research, leaders maintained constant communication via various communication media (Brake, 2006; Kayworth & Leidner, 2002). To prevent isolation and lessen the impacts of distance, they incorporated communication on a personal level through IM, "virtual coffee," and pausing to allow for a few minutes of personal conversation/personal moments.

- **Building Trusting Relationships:** Forms strong relationships with employees that are built on trust and rapport. Makes people feel important and valued. Communicates in a fair and consistent manner to all employees and is present and focused on interactions.

Research on the challenges of anywhere work has repeatedly stressed the importance, and difficulty, of building trust from a distance (Kirkman et al., 2002; Brahm & Kunze, 2012). This was reiterated by leaders in the current study. They described communicating with honesty and transparency, and tried to provide consistent messages to different people. These communication techniques have been emphasized in previous research (Clark, Clark, & Crossley, 2010; Malhotra et al., 2007), and building trust is a key leadership function that is heavily dependent upon frequency of communication (Staples & Cameron, 2004). Punctuality in virtual meetings and remaining focused during virtual communications were other approaches used to convey respect and build strong relationships. Finally, it is noteworthy that every interviewee stressed the importance of trying to meet employees face-to-face to establish a personal connection and build trust, especially with newly formed workgroups (cf. Hambley et al., 2007a). Though it is optimal for organizations to equip leaders for success by providing resources for some face-to-face interactions, at other times closely approximating face-to-face through video and integrated collaborative software was identified as an effective alternative.

- **Creating Team Unity:** Cultivates a powerful sense of team unity by learning the team's history and integrating new members. Builds strong social and emotional bonds among employees, recognizes individuals and shows appreciation, and makes it fun to be on the team.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

This behavioral cluster captures the leader's broader efforts to meet the challenge of developing a healthy distributed team environment. Leaders leveraged rich communication media (e.g., face-to-face or one-on-one video conference) to learn about existing relationships or team conflicts. This was a critical behavior since the electronic communication media relied on in anywhere work can facilitate misunderstanding and exacerbate team conflicts (Furst, Reeves, Rosen, & Blackburn, 2004). Leaders also created opportunities for team members to connect and work together on a semi-regular basis to prevent feelings of isolation from the work group. One leader expressed that setting up face-to-face working opportunities for her anywhere workers was valuable because individuals used the time to problem solve and to build personal connections which enhanced their long-term working relationships. This is consistent with Gibson and Manuel's (2003) recommendation that managers develop interdependencies among anywhere workers, and that they do so explicitly. Interdependency fosters team spirit (O'Neill et al., 2008) because members are accountable and dependent on each other. However, conflicts and performance issues must be addressed swiftly for this structure to enable strong team unity.

- **Fostering Collaboration:** Supports idea sharing and cooperation across locations, including with other teams or leaders. Identifies common ground among people in and outside of the team to accomplish goals. Builds alliances and connects employees in cross-department collaborations.

Paradoxically, although the ability to collaborate across geographies is cited as a key benefit of anywhere working (Peters & Manz, 2007), leaders described challenges with technology, time lags, and cultural differences that *hindered* effective distributed teamwork. To address some of these issues, leaders promoted collaboration by establishing processes for effective technology use (e.g., require meeting materials 24-hours in advance), preparing backup communication options, and facilitating schedule-sharing to help workers connect and reduce the impact of time zone delays. Leaders also took other actions such as virtually introducing employees to others in the organization, and organizing workspaces for closely located individuals to meet and solve problems in person. Regarding managing the impact of culture on collaboration, leaders discouraged the formation of sub-groups and "us versus them" attitudes especially for globally distributed workers. Although there is limited research on sub-groups within anywhere working teams (Gilson, Maynard, Young, Vartiainen, & Hakonen, 2015), the available literature does suggest that fault lines are readily developed across geographical boundaries (O'Leary & Mortensen, 2010). Leaders need to make sure these sub-groups identify with the team and its objectives rather than the sub-team. Indeed, according to Shapiro and colleagues, the salience of identification with the global team is the primary determinant of members' willingness to sacrifice and work hard for the group (Shapiro, Furst, Spreitzer, & Von Glinow, 2002).

Flexibility

The Flexibility meta category captures change-focused behaviors (Yukl et al., 2002) aimed at managing and embracing the dynamic and ambiguous nature of anywhere work. This meta category was defined by four behavioral clusters: Achieving Work-Life Balance, Exploring and Learning Orientation, Promoting Work-Life Balance, and Versatile Communication. Each cluster is defined and discussed in connection with relevant past research. See Table 2 for key behaviors that leaders can implement to develop these capabilities.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Marker behaviors of the Relationships meta category

Relationships **Accessible and Supportive**
Schedule "virtual coffee" to chat between formal meetings and check-ins.
Take a moment to allow for personal conversation or time to "catch up" during formal communications.
Communicate a virtual open-door policy by staying online in instant messaging software, responding to e-mails quickly, and reiterating your accessibility.
Communicate your accessibility by making your schedule available online to team members or by letting workers know the best time/way to contact you.
Respond to communications quickly to prevent feelings of isolation (i.e., acknowledge the receipt of e-mails even if you're still working on an answer).
Building Trusting Relationships
Be careful not to constantly miss or reschedule meetings with those at a distance, or anywhere workers may feel they are a lower priority than those who are in closer proximity or face-to-face.
Use communication media that approximate face-to-face as much as possible (i.e., videoconference), especially for difficult or important conversations.
Turn off your phone, e-mail, and instant message notifications during phone calls/video conference and pay attention. Do not multitask on distance calls.
Try to meet every employee face-to-face at least once to start building a relationship. Use this opportunity to begin to understand his/her body language and nuances in communication, which will be less obvious via electronic communication.
Record personal information that individuals share with you (birthdays, work anniversaries, other personal details) and deliberately bring up to help personalize conversation and prevent people from feeling forgotten.
Creating Team Unity
When visiting workers at other locations/when workers visit your location, plan activities outside of work (e.g., lunch, dinner, teambuilding activities) to help individuals connect with you and each other on a personal level.
Use technology to recognize anywhere workers and their contributions (e.g., on a team conference call, on the organization's social media page).
To prevent employees from disengaging during virtual meetings be enthusiastic, request contributions from each individual by name, and use interactive activities (e.g., prizes, games, online polling).
Take time to learn about and understand existing relationships between your staff members (anywhere and collocated). Accomplish this by interacting with both individuals and groups of workers at different locations via different media (face-to-face, conference call, videoconference).
When new team members join the work group, try to give them the opportunity to meet with others face-to-face. If face-to-face is not feasible, make sure to encourage both formal introductions and informal virtual meetings.
Fostering Collaboration
Introduce and connect likeminded groups/disciplines within the organization to help anywhere workers get to know and leverage the expertise available.
When trying to facilitate large-group virtual collaboration, first connect with and update workers individually and then pull into group meetings. Providing the opportunity for questions and understanding one-on-one can help everyone get up to speed quickly and smooth subsequent workflow.
Encourage and expect individuals to communicate with each other so you are not always relied upon as the "middle person" for communication.
If you lead people who largely work at other company locations, build relationships and alliances with leaders at those locations. Engage those leaders to help monitor and support your workers – and do the same for theirs.
Pay attention to "us versus them" attitudes that may develop between employees in different locations, or anywhere workers and those who mostly work in the office. Demonstrate and reinforce the value that all workers add in your everyday behavior and language to prevent sub-groups from developing and disrupting collaboration.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Achieving Work-Life Balance:** Maintains a healthy balance between work and life commitments.

Although anywhere work is often cited as a way to enhance balance, the impact of electronic media on work-life boundaries has come under recent scrutiny (Demerouti, Derks, Lieke, & Bakker, 2014; Gerdenitsch, Kubicek, & Korunka, 2015). This is relevant to leaders because electronic communication technology underpins anywhere work. Several interviewees described endless workdays in which a constant stream of e-mail and requests kept them tethered to their computer long after standard work hours. To overcome this, leaders intentionally scheduled non-work time in which they "signed off" from working remotely by shutting the home-office door and turning off work phones and computers. Leaders managing globally distributed workers experienced the added complication of 24/7 work across time zones. One leader's approach to managing this was to carve out specific times during the day to attend to e-mails or other communications. He explained this process to his staff to ensure they did not feel isolated or ignored. Lastly, leaders repeatedly pointed out that managing anywhere workers requires more work than traditional face-to-face leadership (Purvanova & Bono, 2009). One aspect of ensuring sufficient time and energy for success involved diligently managing the boundaries between work and life activities with the strategies described.

- **Exploring and Learning Orientation:** Open to a distributed work environment and willing to learn how to succeed in it. Is open to and accepting of change.

Anywhere working represents a massive shift regarding how and where work is done, as well as how it is evaluated. Leaders emphasized that success depended on remaining open to this dynamic nature, investing significant effort into learning how to adapt and embracing constant shifts in technology. For example, leaders must be open and willing to evaluate employees on the quality of deliverables, instead of on time spent. As well, leaders constantly reevaluated processes and consulted with others when seeking solutions for problems with communication or workflow. In fact, developing and maintaining a network of mentors and peers who understand the context was cited as critical. Regarding technology, leaders agreed that electronic media underpins successful anywhere work (Blount, 2015). They often revisited whether their current technology was adequate, reported constantly searching for new applications to support workers, and strived to provide workers with different options for communication (Workman, Kahnweiler, & Bommer, 2003). Further, leaders considered it their responsibility to train employees to effectively utilize different communication media (Maruping & Agarwal, 2004).

- **Promoting Work-Life Balance:** Encourages employees to seek a healthy work-life balance. Supports the use of strategies to achieve balance.

As described, leaders experienced substantial challenges managing their work-life balance. Unsurprisingly, leaders also expressed that the use of electronic media and constant access to communication via smartphones, for example, has blurred work-life boundaries for their employees. This is supported by research showing that virtual and anywhere work arrangements do not necessarily equate to improved work-life balance (Allen, Johnson, Kiburz, & Shockley, 2013). Leaders attended to this challenge by modeling and promoting work-life balance norms such as taking a lunch break or not sending e-mails late at night. One leader committed to using the delayed send feature for any e-mails after 7:00 p.m., so as not to set the expectation that she required a response at night. Although working outside of standard work hours was not always avoided, leaders employed different strategies to manage this. For example,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

they flexed their workdays instead of always expecting others to accommodate the leader's work hours and encouraged employees to delay the start of their workday on days where they were working later to accommodate those in another time zone.

- **Versatile Communication:** Knows and understands that employees' preferences for how to communicate from a distance will differ. Is willing and able to adjust personal style to others' preferences.

A recent review suggested member consideration and recognition of individual needs were important capabilities for managing anywhere workers (Mukherjee et al., 2012). Leaders echoed this finding, noting that adapting to individual communication preferences was more important in the distributed context. Leaders mentioned that relying on e-mail for communications with employees whom they saw face-to-face every day was effective because the low richness of e-mail was supplemented with face-to-face interactions. For anywhere workers, however, leaders tried to use communication methods better suited to the individual. For example, some employees were fine with text-based media like e-mail or instant messaging, whereas others preferred phone or video calls. This depended on individual preference, as well as the worker's relationship with the leader. Leaders also reported adjusting the content of their messages; some members preferred directive and concise communications, whereas others also desired personal interaction and social support. To accommodate the latter group, leaders would schedule "virtual coffee," and initiate or be available for informal contact. These behaviors can be understood as specific examples of high-quality leader-member exchange (Graen & Uhl-Bien, 1995; Golden & Veiga, 2008).

Productivity

The Productivity meta category captures task-focused behaviors (Yukl et al., 2002) aimed at managing the daily work environment and enabling performance. This meta category was defined by three behavioral clusters: Driving High Performance, Managing Work and People, and Strategic Alignment. Each cluster is defined and discussed in connection with relevant past research. Table 3 contains key behaviors that leaders can implement to develop these capabilities.

- **Driving High Performance:** Sets high standards for the team, communicates the standards and expectations clearly, and holds him/herself and others accountable. Is outcome and objective focused.

Leaders consistently emphasized that their role was to drive and facilitate high performance, regardless of the work arrangement. As such leaders were required to explicitly set, communicate, and document expectations. Leaders also moved away from managing time on tasks and instead focused on managing by objectives. This was accomplished by providing clear directions and deadlines, and then encouraging employees to work where and when they were most effective. Leaders spoke to incorporating this results-focused approach into performance appraisals by primarily evaluating the quality of deliverables. This behavioral cluster also contains behaviors related to the transformational leadership facet of inspirational motivation (Avolio, Bass, & Jung, 1999). One leader articulated this as "using every conversation to leverage passion for the work." She pointed out that motivating performance and inspiring enthusiasm was much more difficult from a distance. Her approach to overcoming this challenge was to be energetic and positive and use every conversation to boost and engage employees.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Marker behaviors of the Flexibility meta category

Flexibility **Achieving Work-Life Balance**
Set your own boundaries of availability and communicate those boundaries. However, ensure that employees can access other leaders/managers/resources during periods of unavailability.
When not working, make sure to limit your access to work demands and tasks by turning off your company phone, powering down your laptop, or pausing email notifications.
If you lead workers across multiple time zones, be careful to avoid literally working around the clock. Instead of trying to answer as messages come in, set specific times for responding to e-mails and requests.
It is more work to support and develop employees from a distance, so monitor yourself for symptoms of stress and burnout and ask for help if you need it.
Take breaks. Don't be afraid of others thinking you are not working hard just because you cannot see each other.
Exploring and Learning Orientation
Research and experiment with new ways of communicating instead of relying on e-mail. Try instant messaging, videoconferencing, or integrated communication platforms.
Constantly and deliberately ask your staff for feedback on various processes. You cannot see what is and is not working for others, so make sure to ask.
Seek out other leaders who have experience managing anywhere workers. Ask questions and share your successes and failures in order to learn from their experiences.
Ask your employees a lot of questions about their daily experiences so that you are better able to support them (e.g., what resources do they use, who do they consistently communicate with, what communication media do they rely on).
Demonstrate your buy in to the concept of anywhere working and remain open to constantly learning and adapting.
Promoting Work-Life Balance
Try to ensure that meetings across time zones fall within work hours. If that is not possible, then rotate who starts early/late; if meetings fall over lunch hours, then encourage workers to bring a meal to the meetings. "Share the pain."
Demonstrate and model the behaviors that you expect such as not working through the lunch hour, taking breaks, and not replying to e-mails late at night.
Respect others' boundaries. For example, only contact people outside of their typical working hours when necessary and set this as a standard of behavior among the entire team or work group.
Encourage people to be flexible with how they manage their time. For example, if someone has to work late to accommodate those in another time zone, encourage that individual to start their workday later or take a longer break during the day.
Discuss work-life balance with your people. Help them to re-create the boundaries that can be blurred with anywhere working.
Versatile Communication
Ask your employees how they prefer to be communicated with and periodically revisit this. People vary in their preference for various communication media.
Take time to understand the needs of your workers and adjust your behavior accordingly. Some will require more regular check-ins or support, whereas others may prefer to work more independently – this depends on individual personality, confidence, and competence.
Pay attention to workers' social needs. Some workers may desire and need more social interactions. Make time for personal conversation during formal communications, or schedule "virtual coffee."
Try to ensure that communications are engaging, interactive, and not one-way by varying the communication media, or by alternating who leads meetings/communications.
Demonstrate and encourage the use of different communication media for different tasks to help employees learn how to best utilize various communication media with each other.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Managing Work and People:** Manages the flow of work among employees in an effective, efficient, and detailed manner. Provides frequent feedback.

This cluster provides a detailed understanding of the behaviors related to task-structure and efficiency, which are consistent across research in this domain (Bell & Kozlowski, 2002; O'Neill et al., 2008). In particular, the effective management of technology and work processes is critical to ensuring smooth workflow (King & Majchrzak, 2003). Leaders set up communication guidelines and expectations for meeting preparation. For example, in one distributed engineering team, the leader mandated all on-site engineering problems between on-site engineers and engineers located in company headquarters be discussed via video conference. This facilitated quicker and clearer communication by allowing the headquartered engineers to see the issues instead of relying on an oral description. Other leaders strictly enforced rules such as requiring meeting materials be accessible ahead of the meeting or preventing employees from introducing any new materials during meetings. Leaders also used project management software and checklists to follow up on tasks and people. In a traditional office, follow-up and feedback often take place during informal physical encounters (Kirkman et al., 2002). Since anywhere work limits those opportunities for contact, leaders recorded and delivered feedback during regular check-ins.

- **Strategic Alignment:** Communicates a vision, provides direction, and establishes strategic plans. Engages both the team and individual employees to overcome feelings of isolation from objectives.

As pointed out, the nature of anywhere work limits opportunities for informal communication and clarification. This meant leaders worried about employees veering from objectives or struggling to understand the relevance of their role to broader team and organizational objectives. One mitigation strategy involved articulating a vision and providing strategic plans that clearly linked an individual's work to the broader goals. Promoting a vision is considered central to many leadership models (e.g., Bass & Avolio, 1993; Harvey, Novicevic, & Garrison, 2005), and leaders felt that anywhere work was no different. The behaviors used to accomplish this were not fundamentally different than those that occur in face-to-face environments, but leaders structured them more formally and delivered them more regularly (through various communication media) to be effective. For example, one leader described how her former manager included all team members in the development of strategic plans, regardless of distance. Since face-to-face planning meetings were not feasible, he pulled together individual ideas and contributions from one-on-one meetings and then communicated the plan back out to the group. This approach resulted in stronger identification with and knowledge of the objectives.

Culture

The Culture meta category captures cross-cultural leadership behaviors (e.g., Earley & Ang, 2003) aimed at leveraging diversity and overcoming challenges related to cultural differences. This meta category was defined by three behavioral clusters: Cultural Awareness and Respect, Cultural Communication, and Openness to Cultural Diversity. Each cluster is defined and discussed in terms of relevant research. Table 4 contains key behaviors that leaders can implement to develop these capabilities.

- **Cultural Awareness and Respect:** Conscious and respectful of cultural differences among employees. Considers the impact of cultural diversity on the team's interactions.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Marker behaviors of the Productivity meta category

Productivity **Driving High Performance**
Be enthusiastic and positive in every conversation you have with your employees to create and motivate passion for the work.
Manage by results. Clearly outline deliverables and deadlines and then allow team members to manage their own time within those parameters.
Set, document, and display clear expectations for all employees to have constant access to (e.g., in a collaborative software program).
Emphasize that anywhere working depends on individuals taking responsibility for themselves. Be clear that workers are accountable for results, but make yourself available to answer questions, alleviate concerns, and remove obstacles.
Model and exceed the behaviors that you expect from others, especially those which are critical to facilitating success (e.g., adhering to communication or workflow processes, demonstrating enthusiasm, using the correct communication media for the task).
Managing Work and People
Plan ahead and be sensitive to time frames and deadlines as much as possible. It is more difficult to execute "need it now" work.
Establish explicit policies and guidelines around communication to streamline workflow (e.g., meeting materials must be made available 24 hours before the start of a meeting).
Facilitate schedule sharing among your entire team or work group to prevent inefficiencies in communication due to differing work hours, time zones, or preferences.
Beware of "out of sight, out of mind." Take detailed notes during meetings and immediately create and share a list of items for follow up.
Opportunities for more informal feedback will be limited, so establish a culture of deliberate, ongoing feedback.
Strategic Alignment
Consult employees in the development of strategic plans. Integrate input from your employees as much as possible and then communicate the plan back to the group for feedback.
To overcome the lack of casual check-ins that happen more informally when collocated, use regularly schedule touch points for adjustment and to ensure workers are headed in the right direction.
Workers at a distance may struggle to understand organizational or team norms. Explicitly communicate norms or aspects of the team/organizational culture (e.g., what is most important to the group, how work gets done).
Meet with other managers or stakeholders (e.g., clients) outside of your team/work group to get a better sense of whether your staff's actions and behaviors are aligned with objectives.
When you receive notice of organizational decisions/changes, quickly communicate this information to your employees. This prevents them slowly hearing news through the grapevine and feeling that they are the last to be informed.

Leaders identified developing self-awareness as a key first step to effectively managing cultural diversity. Leaders accomplished this by examining their cultural assumptions and biases (Brislin, Worthley, & MacNab, 2006; Triandis, 2006) and by seeking the advice of other leaders with experience managing culturally diverse teams. One leader described a situation in which one of his employees was consistently late, even to local client meetings. While this aggravated the leader, he recognized that punctuality is a culturally-bound expectation and in the employee's context, it was normal to arrive late. The leader recognized his assumptions and had a collaborative discussion with the employee about expectations, demonstrating an ability to go beyond acknowledging differences and adapt to the context (e.g., Wang, Feng, Freeman, Fan, & Zhu, 2014). In addition to recognizing individual cultural differences, leaders also paid attention to the broader cultural context of their staff. For example, in some cultures, anywhere working is less accepted and leaders had to support employees through additional challenges (e.g., family resistance to working outside of standard work hours). Finally, leaders paid close attention to how cultural differences impacted team interactions. During the interviews, several North American-based leaders

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

noted key differences in work-life balance between those in Canada and those in the United States. For instance, expectations of availability differed across regions, so leaders helped clarify expectations to ensure that frustrations such as receiving e-mails on vacation or being unavailable during evenings did not prevent communication or collaboration.

- **Cultural Communication:** Capable of adjusting verbal and nonverbal behaviors during cross-cultural interactions. Uses communication to create an inclusive working environment.

Cultural distribution presents an added obstacle to achieving the smooth, effective communication necessary to anywhere work success. For example, differing social cues may increase the chance for misunderstandings (Shaw & Barrett-Power, 1998). One leader described how she misinterpreted an employee's silence during conference calls as an unwillingness to contribute, whereas the behavior was tied to the individual's cultural beliefs about speaking when more senior employees (e.g., leaders) were present. Upon becoming aware of this, the leader made sure to invite the individual to speak – a simple, but effective, behavioral adjustment. Other leaders emphasized taking time to clarify whether their message was understood when managing workers whose first language was not English. Although these businesses largely operated in English and all employees were fluent in English, leaders took extra time with those individuals to limit opportunities for miscommunication and to ensure language barriers did damage outcomes such as trust (Tenzer, Pudelko, & Harzing, 2014).

- **Openness to Cultural Diversity:** Open attitude towards diverse backgrounds. Enjoys learning about and interacting with people from different cultures.

Leaders identified a third set of behaviors centered on demonstrating openness towards cultural diversity. They acknowledged that it was paramount to communicate their willingness to engage with individuals across cultural boundaries (Deci & Ryan, 1985). Leaders served as role models for other employees in the business, and it was critical that they demonstrated both willingness and confidence when working cross-culturally (Bandura, 2002). Effective leaders showed an intrinsic belief in the value of diversity and made an effort to get to know and understand their workers' personal and cultural backgrounds. Moreover, they encouraged employees to share this information with each other and provided opportunities during team interactions for members to discuss and get to know one another's histories.

DISCUSSION

The current chapter extends Yukl and colleagues' (2002) hierarchical leadership taxonomy to the anywhere working context. Further, this research incorporates work on cross-cultural leadership capabilities (e.g., Early & Ang, 2003; Caligiuri & Tarique, 2012; Malhotra et al., 2007) by adding a Culture meta category to the framework. In doing so, the authors clarify the theoretical understanding of the anywhere leadership performance domain. This helps to address the "criterion problem" as it is related to anywhere leadership by identifying the criterion space and facilitating the identification of variables that may be important predictors of effectiveness. This taxonomy also provides specific behaviors to guide item development for future measures of the leadership facets (e.g., behavioral clusters). Thus,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Marker behaviors of the Culture meta category

Culture **Cultural Awareness and Respect**
Facilitate activities (e.g., personality assessment, personal history sharing) to help you and your workers build self-awareness about cultural assumptions and biases.
Seek the advice of leaders who have worked with culturally diverse or globally distributed teams in order to learn from their experiences. Consider inviting experienced leaders to a team meeting to lead a discussion about cultural awareness and respect.
Constantly revisit whether your expectations of employees are culturally bound. Do not assume that your way is the only, or "right," way.
Pay attention to how an individual's local context and culture could impact his/her work and be prepared to support him/her through additional challenges (e.g., is anywhere working an accepted practice in his/her location?)
Watch for cultural differences among employees that may impede communication or collaboration (e.g., different expectations about work hours, availability on vacation).
Cultural Communication
Some individuals may feel uncomfortable speaking in meetings with more senior employees present. Deliberately invite those people to contribute or solicit input in different ways (e.g., in writing, pre/post meetings).
If you lead employees who speak a different first language, take extra time to clarify your message and ask probing questions to ensure you are understood.
To gain insight into how culture may influence your employees, question them on the decisions they make and their reasoning for those decisions. Take the time to get to know the culture of all your staff and be sensitive to it.
Pay attention to differences in nonverbal communication (e.g., eye contact, nodding) and be prepared to adjust your habits.
Do not assume that you are understood: always recap or summarize the main points of your message and encourage and reward clarification and questions.
Openness to Cultural Diversity
Regularly emphasize and demonstrate the importance and value of cultural diversity to your staff through your language and behavior.
Get to know and understand your employees' personal and cultural backgrounds by asking questions and encouraging them to share their stories with you and each other. Don't feel like you can't talk about each other's backgrounds.
Try to visit individuals at their locations. If this is not possible, consider attending cultural events in your own city/location in an effort to immerse yourself and gain more understanding of your workers' cultures.
Display an open, inquisitive, and respectful attitude towards others and expect the same behaviors from all of your employees. Encourage team members to maintain their cultural identity.
Don't just try to help employees fit in. Instead, also consider what they can teach you and use this to broaden your ability to fit in with them.

the main contribution of this research is in laying the foundation for a program of research on leadership effectiveness of the anywhere workforce.

This taxonomy also extends existing behavioral research focused on virtual team leader effectiveness (Hambley et al., 2007a; Malhotra et al., 2007). There are several similarities, and also important differences, between current and past research. Several of the main themes are strikingly similar. For example, Malhotra et al. (2007) identified the importance of establishing and maintaining trust and acknowledging and leveraging cultural diversity, which corresponds with Building Trusting Relationships and the Culture meta category, respectively. Hambley et al., (2007a) considered personalizing virtual teamwork a key capability, which corresponds to Creating Team Unity. Both Malhotra et al. (2007) and Hambley et al. (2007a) recognized the role of facilitating effective team meetings, which was reflected in the Managing Work and People behavioral cluster. Malhotra et al. (2007) identified two categories (enhance external visibility of the team and its members; ensure individuals benefit from participating in virtual

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

teams) which did not constitute major themes in the current study, but captured behaviors categorized under Fostering Collaboration (e.g., connect workers to others in the organization) and Creating Team Unity (e.g., acknowledge virtual/anywhere contributions). This difference in categorization may have arisen due to the nature of the interviewees in each study. Malhotra et al., (2007) focused on short-term project teams, whereas the current study examined a wider range of anywhere leadership. Thus, while the behaviors were considered important by leaders in the present study, they were identified in relation to other capabilities instead of as individual categories. One final similarity revolved around the effective use of different communication media. Hambley and colleagues (2007a) defined this as a capability in and of itself, Malhotra et al. (2007) linked the effective use of technology to monitoring team progress, and leaders in the current study stressed the importance of utilizing technology and communication media when discussing several behavioral clusters.

There are also important differences. One major difference is the number and specificity of the behavioral categories in the present taxonomy. The authors took a bottom-up approach to developing the behavioral clusters to capture the breadth of experiences described by interviewees. This resulted in the three-level hierarchical taxonomy presented. This difference is best illustrated by comparing Malhotra and colleagues' (2007) category Ensuring Diversity is Understood, Appreciated, and Leveraged to the Culture meta category. The three behavioral clusters (Cultural Awareness and Respect, Cultural Communication, and Openness to Cultural Diversity) correspond to Malhotra et al.'s (2007) category, but breaking the concept into several clusters serves two specific purposes. First, it adds specificity to the vaguely defined domain of anywhere leadership. Second, this approach highlights the complexity and depth of leading anywhere workers, which serves to make the taxonomy more applicable and useful for organizations and leaders who must navigate that complexity daily. Another key difference in this taxonomy is the presence of the work-life balance clusters (Achieving Work-Life Balance, Promoting Work-Life Balance). Previous taxonomies have not systematically defined these behavioral capabilities for leaders of virtual teams, teleworkers, or other types of anywhere workers. The recent emergence of research on the impacts of electronically mediated communication on the work-life interface (e.g., Allen et al., 2013) may partly explain this discrepancy. Moreover, the ongoing development of technology and the way humans leverage technology for work has continued to evolve over the last decade (e.g., social media, smartphones). This has contributed to the blurring of work-life boundaries (e.g., Nam, 2014) and has drawn attention to the role of organizational leadership in navigating these challenges (Fonner & Stache, 2012). While certain behavioral capabilities of anywhere leaders have remained constant over the past decade of research, the discipline has continued to develop, and ongoing research is warranted.

Practical Implications

This proposed taxonomy could be useful to organizations and leaders. First, this research offers a starting point for assessing the behavioral capabilities for leading anywhere workers. Given the lack of assessment tools focused on leadership in the anywhere working domain, this is a key practical contribution. Leadership assessment can offer individual leaders and organizations valuable insight into strengths and areas for development. However, a lack of tools addressing relevant leadership criteria could leave leaders and organizations unable to recognize or address the key issues regarding anywhere leadership training and development. By clarifying what constitutes effective leadership behavior, this taxonomy lays the groundwork for accurate and comprehensive leadership assessment. For example, leaders could incorporate these tips and strategies into their daily practices, and organizations could integrate the con-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

cepts into existing training and development resources. Thus, this taxonomy could be practically applied to guide anywhere leadership assessment and development.

Development of a Preliminary Assessment and Results from the Workplace

Using the marker behaviors, the authors developed a preliminary assessment of anywhere leadership effectiveness in conjunction with the consulting firm Work EvOHlution. The researchers developed a Likert-type scale with multiple items per behavioral cluster (e.g., I have regularly scheduled contact with my anywhere workers; I ask each anywhere worker how to best communicate with him/her). Individual item responses were averaged across the behavioral clusters and meta categories to obtain overall dimension scores on each behavioral cluster and leadership meta category. To illustrate the potential utility of anywhere leadership assessment, the researchers collected preliminary data comparing leader self-assessments to direct report assessments on the fourteen behavioral clusters. Fifty leaders of two large, multinational organizations self-rated their effectiveness on each behavioral cluster. Leaders were from the information and communication technology industry or the insurance and financial services industry and were based in North America or Europe. Individual ratings were averaged across the behavioral clusters in each organization. The clusters were rank ordered and compared to the rank ordering of direct report ratings. Interestingly, in both organizations leaders self-rated Strategic Alignment and Creating Team relatively high, while direct reports ranked these clusters near the bottom (see Table 5). Although this is an exploratory comparison, it provided the participating organizations with valuable information about potential blind spots within their leadership. The finding suggests that the leaders may need to adjust their behaviors focused on developing Strategic Alignment and Creating Team Unity. More broadly, this result highlights the diagnostic potential of individual leader assessment in the anywhere leadership domain.

Leader assessment also lends itself to organizational benchmarking. Benchmarking is a useful way for organizations to gain insight into current areas of success and areas of opportunity (Drew, 1997). The information can help leaders and decision makers better allocate resources and direct development investments. Using the same pilot assessment described above, the authors obtained self-ratings from 200 leaders across five different organizations in the energy sector, information and communication technology, and insurance and financial services. The individual assessments were aggregated by organization, and comparisons were made between the participating members. Examples are presented in Figures 2 and 3. Figure 2 shows the Flexibility meta category results from a large oil and gas organization based in Canada. That organization's leaders scored significantly higher on Achieving Work-Life Balance and significantly lower on Versatile Communication, compared to leaders from the other participating organizations. Discussion with stakeholders at the target organization revealed that anywhere working was only recently adopted by the organization and previously collocated teams were now distributed across North America. The results of this assessment provided valuable information to human resource leaders on where to focus their development efforts, namely, improving leaders' capability to adjust their communication styles to workers' preferences. Figure 3 shows the Relationships meta category results from a mid-size North American engineering firm. That organization's leaders scored significantly lower on all four behavioral clusters of the meta category. Human resource leaders in this organization were not surprised with the assessment results but were able to use the data to make a stronger case to senior management about the need to address these specific deficits of anywhere leaders. These two examples provide further evidence for the usefulness of assessing leaders tasked with the challenge of leading

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Rank ordering of self and other ratings on the anywhere leadership dimensions (behavioral clusters). Discrepancies between self and other ratings of Strategic Alignment and Creating Team Unity are marked with an asterisk

Organization 1 **Self Report Ratings**	**Organization 1** **Direct Report Ratings**
Driving High Performance Strategic Alignment* Creating Team Unity* Building Trusting Relationships Accessible and Supportive Fostering Collaboration Promoting Work-Life Balance Cultural Awareness and Respect Managing Work and People Exploring and Learning Orientation Versatile Communication Openness to Cultural Diversity Cultural Communication Achieving Work-Life Balance	Driving High Performance Openness to Cultural Diversity Building Trusting Relationships Versatile Communication Accessible and Supportive Fostering Collaboration Cultural Awareness and Respect Exploring and Learning Orientation Promoting Work-Life Balance Strategic Alignment* Achieving Work-Life Balance Managing Work and People Creating Team Unity* Cultural Communication
Organization 2 **Self Report Ratings**	**Organization 2** **Direct Report Ratings**
Driving High Performance Strategic Alignment* Fostering Collaboration Creating Team Unity* Accessible and Supportive Building Trusting Relationships Promoting Work-Life Balance Openness to Cultural Diversity Managing Work and People Versatile Communication Cultural Awareness and Respect Exploring and Learning Orientation Cultural Communication Achieving Work-Life Balance	Openness to Cultural Diversity Cultural Awareness and Respect Driving High Performance Versatile Communication Building Trusting Relationships Accessible and Supportive Fostering Collaboration Exploring and Learning Orientation Promoting Work-Life Balance Achieving Work-Life Balance Managing Work and People Strategic Alignment* Creating Team Unity* Cultural Communication

anywhere workers. As a whole, this exercise demonstrates some applications of this taxonomy and its potential value as the basis of an assessment tool.

Implications for Organizational Policy and Processes

Historically, significant attention has been paid to the technology and facility issues of anywhere work (see Blount, 2015). This chapter draws attention to the *human elements* of anywhere work and suggests that it is important to consider the human factors of effective anywhere leadership. In fact, research has shown that leadership/managerial resistance remains a key obstacle to widespread anywhere and flexible work adoption (e.g., Blount, 2015; Hegewisch, 2009; Lee & Hong, 2011). This means it is critical to ensure that leaders are equipped with the requisite leadership and management behavioral capabilities and that the proficiency levels of anywhere leaders are addressed and supported. Based on the current research, the authors recommend that organizations formally acknowledge the demands of these forms of leadership by supplementing their current talent management and human resources processes with leadership selection, training and development, performance appraisal, and succession planning processes

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Organizational benchmarking results on the Flexibility meta category

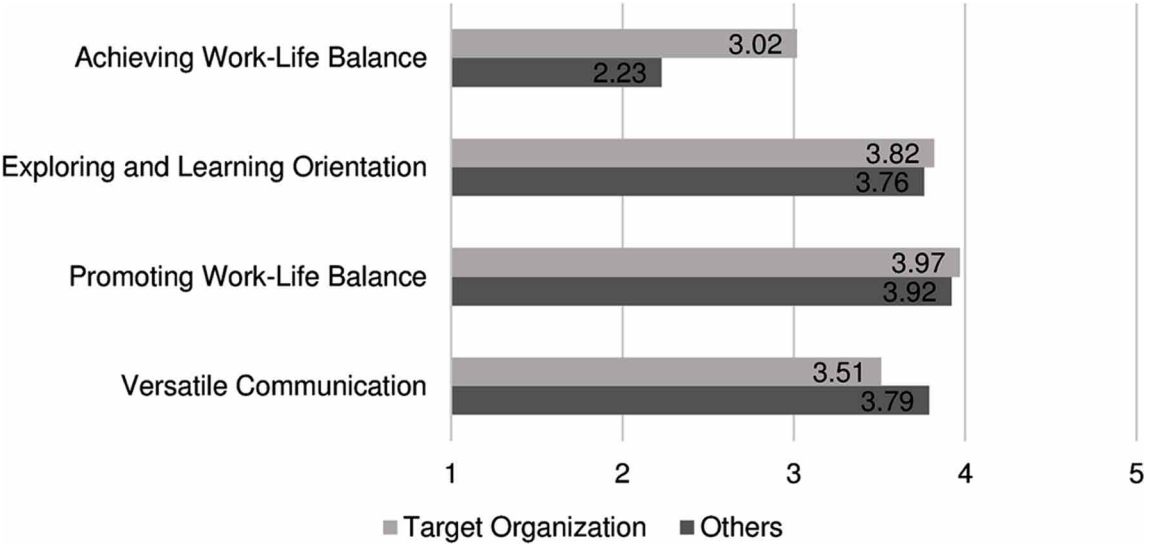
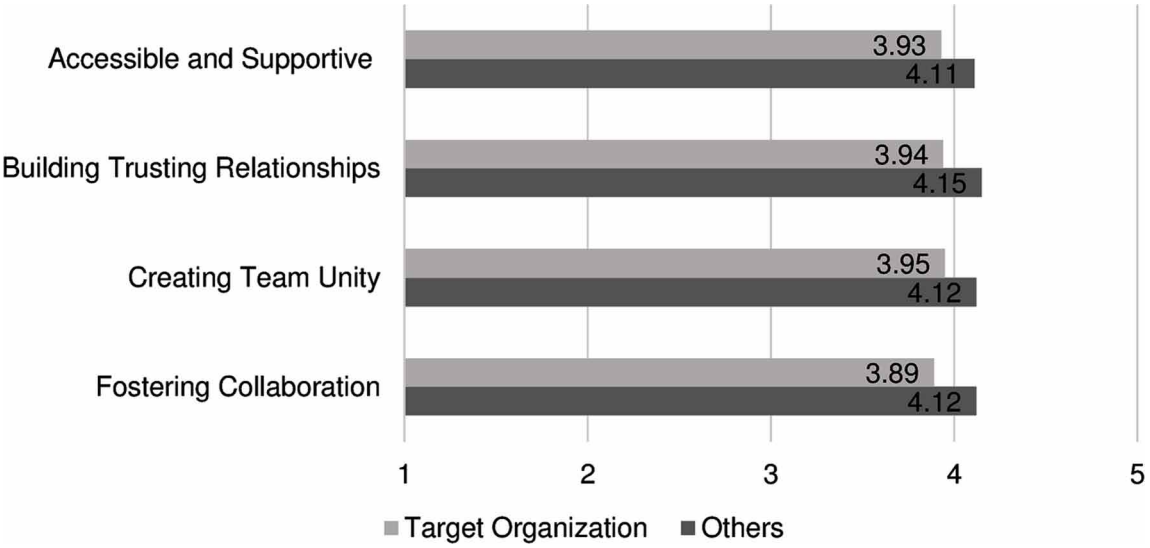


Figure 3. Organizational benchmarking results on the Relationships meta category



targeted towards leading the anywhere workforce. During the interviews, leaders repeatedly emphasized that leading from a distance was more difficult than face-to-face leadership.

Poor leadership, in general, can result in employee turnover, raise employee stress levels, and diminish employee confidence (Erickson, Shaw, & Zha, 2007). The added demands of anywhere leadership mean selecting leaders with the right skills and attributes to perform the critical behaviors is paramount. For example, a leader who lacks technology savvy may be able to lead somewhat effectively in face-to-face arrangements but could become completely ineffective when required to lead workers from a distance. Without explicitly considering the behavioral capabilities specific to leading anywhere workers during

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

leadership selection processes, an organization may mistakenly move a leader into a position where he/she is likely to fail – a costly, yet avoidable error. Following selection of the behaviors, skills, and attributes needed for effective anywhere leadership, the training and development, performance appraisal, and succession planning processes should also be carefully aligned with the requirements of this type of leadership.

Integrating specific behavioral capabilities into leadership development and performance appraisal processes is particularly important. Many organizations already assess, train, and develop their leaders, but it is less clear whether they consider the full range of leadership capabilities necessary for anywhere leadership. Leading anywhere workers requires similar yet nuanced, as well as additional, leadership and management behaviors. Using assessments designed for and validated with face-to-face leaders is thus insufficient and could leave organizations unable to accurately address leadership deficiencies and leverage key strengths. Moreover, failing to adequately appraise the range of leadership and management behaviors necessary for anywhere leadership success means organizations are without accurate data on the performance of leaders. This could mean that key performance issues inherent in this context are overlooked or ignored, or that leaders who are effectively handling the challenges are inadequately acknowledged for their contributions.

Finally, it is important to consider policy around succession planning. Effective succession planning is key to ongoing organizational effectiveness as it prepares the organization to meet future leadership demands. Without incorporating the leadership and management capabilities specific to anywhere leadership, organizations may be overlooking a critical factor when attempting to identify and develop future leaders. Leaders in the current study pointed out that a key source of their knowledge and learning about leading anywhere workers came from experienced colleagues, mentors, or supervisors. This informal learning may be useful, but policy and systems should be in place to formally integrate knowledge of anywhere leadership directly into succession management practices. This would allow organizations to leverage this expertise more formally when developing the next generation of leaders. Moreover, this is relevant to successfully training and supporting those currently in leadership positions. As the nature of work continues to evolve, the acknowledgment of the human success elements of anywhere work by human resource and organizational policymakers is a key step to developing a culture that acknowledges, promotes, and leverages anywhere work.

FUTURE RESEARCH DIRECTIONS

The current chapter serves as a starting point for future research into the behavioral capabilities necessary for effectively leading anywhere workers. A key first step is the empirical validation of this model. This is dependent on the development of reliable measures of the behavioral clusters and meta categories. One approach could be to use the database of behavioral markers to guide the development of survey items, which was the method used by the authors when developing the preliminary assessment previously described. Second, upon the development a reliable and valid measurement instrument, confirmatory factor analyses can be used to test the robustness of the hierarchical categorization proposed. Third, future research should investigate the relationships involving leadership and individual, team, and organizational outcomes, such as individual and business unit performance, employee engagement, and job satisfaction. Fourth, researchers should examine how feedback, training, and development specific to anywhere leadership may impact leader proficiency and individual, team, and organizational outcomes. Fifth, the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

behavioral interviews also provided insight into the skills and personality attributes that leaders rely on for success. Future research should endeavor to systematically identify individual differences (e.g., skills, attributes, general mental ability) that predict anywhere leadership effectiveness. Understanding the predictors of effective leadership in this context is foundational to the accurate assessment and development of leaders. Lastly, it will be important to compare the anywhere working specific assessment of leadership effectiveness to other leadership constructs and models. This is a critical research phase for determining the utility and value of assessing leadership in this domain. For example, researchers could examine whether there are differences in the prediction of employee outcomes, or if the antecedents of effective anywhere leadership differ from other leadership constructs. Thus, this taxonomy forms the basis for a program of future research into leading anywhere workers.

CONCLUSION

Anywhere working is a fundamental evolution in the nature of work from a place (e.g., "I am going to work") to an activity (e.g., "I am working"). While this shift is driven by factors including the desire for flexibility, the globalization of work, and rapidly improving technological infrastructure, it continues to be limited by an inadequate understanding of the management challenges of anywhere work (Blount, 2015). This chapter is a step forward in addressing that gap. Through behavioral interviews with leaders who lead anywhere workers, the authors detailed the behavioral capabilities required for effectiveness and provided insight into overcoming the daily challenges of anywhere work. The proposed taxonomy extends existing leadership taxonomies (Hambley et al., 2007; Malhotra et al., 2007; Yukl et al., 2002) and brings clarity to the performance domain of leading the anywhere workforce. Hopefully, by extending prior research, suggesting future research directions, and demonstrating potential applications for leaders and organizations, this chapter will serve as a resource for researchers, practitioners, and leaders who seek to understand and address what it takes to lead anywhere workers.

REFERENCES

Allen, T. D., Johnson, R. C., Kiburz, K. M., & Shockley, K. M. (2013). Work-family conflict and flexible work arrangements: Deconstructing flexibility. *Personnel Psychology*, *66*(2), 345–376. doi:10.1111/peps.12012

Ang, S., Van Dyne, L., Koh, C., Ng, K. Y., Templer, K. J., Tay, C., & Chandrasekar, N. A. (2007). Cultural intelligence: Its measurement and effects on cultural judgment and decision making, cultural adaptation and task performance. *Management and Organization Review*, *3*(03), 335–371. doi:10.1111/j.1740-8784.2007.00082.x

Armstrong, D. J., & Cole, P. (2002). Managing distances and differences in geographically distributed work groups. In P. J. Hinds & S. Kiesler (Eds.), *Distributed work* (pp. 167–186). Cambridge, MA: MIT Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Avolio, B. J., Bass, B. M., & Jung, D. I. (1999). Re-examining the components of transformational and transactional leadership using the multifactor leadership. *Journal of Occupational and Organizational Psychology*, *72*(4), 441–462. doi:10.1348/096317999166789

Avolio, B. J., Kahai, S., & Dodge, G. E. (2000). E-leadership: Implications for theory, research, and practice. *The Leadership Quarterly*, *11*(4), 615–668. doi:10.1016/S1048-9843(00)00062-X

Avolio, B. J., & Kahai, S. S. (2003). Adding the e to e-leadership: How it may impact your leadership. *Organizational Dynamics*, *31*, 325–338. doi:10.1016/S0090-2616(02)00133-X

Avolio, B. J., Sosik, J. J., Kahai, S. S., & Baker, B. (2014). E-leadership: Re-examining transformations in leadership source and transmission. *The Leadership Quarterly*, *25*(1), 105–131. doi:10.1016/j.leaqua.2013.11.003

Bandura, A. (2002). Social cognitive theory in cultural context. *Applied Psychology*, *51*(2), 269–290. doi:10.1111/1464-0597.00092

Bass, B. M., & Avolio, B. J. (1993). Transformational leadership and organizational culture. *Public Administration Quarterly*, *17*, 112–121.

Bass, B. M., & Stogdill, R. M. (1990). *Handbook of leadership*. New York, NY: Free Press.

Bell, B. S., & Kozlowski, S. W. (2002). A typology of virtual teams: Implications for effective leadership. *Group & Organization Management*, *27*(1), 14–49. doi:10.1177/1059601102027001003

Biermeier-Hanson, B., Liu, M., & Dickson, M. W. (2015). Alternate views of global leadership: Applying global leadership perspectives to leading global teams. In J. L. Wildman & R. L. Griffith (Eds.), *Leading global teams* (pp. 195–223). New York, NY: Springer. doi:10.1007/978-1-4939-2050-1_9

Blackburn, R., Furst, S. A., & Rosen, B. (2003). Building a winning virtual team: KSA's, selections, training, and evaluation. In C. B. Gibson & S. G. Cohen (Eds.), *Virtual teams that work: Creating conditions for virtual team effectiveness* (pp. 95–120). San Francisco, CA: Jossey-Bass.

Blake, R. R., & Mouton, J. S. (1982). A comparative analysis of situationalism and 9, 9 management by principle. *Organizational Dynamics*, *10*(4), 20–43. doi:10.1016/0090-2616(82)90027-4

Blount, Y. (2015). Pondering the fault lines of anywhere working (telework, telecommuting): A literature review. *Foundations and Trends (R) Information Systems*, *1*, 163–276.

Bownas, D. A., & Bernardin, H. J. (1988). Critical incident technique. *The Job Analysis Handbook for Business, Industry, and Government*, *2*, 1120–1137.

Brahm, T., & Kunze, F. (2012). The role of trust climate in virtual teams. *Journal of Managerial Psychology*, *27*(6), 595–614. doi:10.1108/02683941211252446

Brake, T. (2006). Leading global virtual teams. *Industrial and Commercial Training*, *38*(3), 116–121. doi:10.1108/00197850610659364

Brislin, R., Worthley, R., & Macnab, B. (2006). Cultural intelligence understanding behaviors that serve peoples goals. *Group & Organization Management*, *31*(1), 40–55. doi:10.1177/1059601105275262

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Caligiuri, P., & Tarique, I. (2012). Dynamic cross-cultural competencies and global leadership effectiveness. *Journal of World Business*, *47*(4), 612–622. doi:10.1016/j.jwb.2012.01.014

Cascio, W. F., & Shurygailo, S. (2003). E-leadership and virtual teams. *Organizational Dynamics*, *31*(4), 362–376. doi:10.1016/S0090-2616(02)00130-4

Clark, W. R., Clark, L. A., & Crossley, K. (2010). Developing multidimensional trust without touch in virtual teams. *Marketing Management Journal*, *20*, 177–193.

Connaughton, S. L., & Daly, J. A. (2004). Leading from afar: Strategies for effectively leading virtual teams. In S. H. Godar & S. P. Ferris (Eds.), *Virtual and collaborative teams* (pp. 49–75). Hershey, PA: Idea Group Publishing. doi:10.4018/978-1-59140-204-6.ch004

Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science*, *12*(3), 346–371. doi:10.1287/orsc.12.3.346.10098

Day, D. V., Gronn, P., & Salas, E. (2004). Leadership capacity in teams. *The Leadership Quarterly*, *15*(6), 857–880. doi:10.1016/j.leaqua.2004.09.001

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, *19*(2), 109–134. doi:10.1016/0092-6566(85)90023-6

Demerouti, E., Derks, D., Lieke, L., & Bakker, A. B. (2014). New ways of working: Impact on working conditions, work-family balance, and well-being. In C. Korunka & P. Hoonakker (Eds.), *The impact of ICT on quality of working life* (pp. 123–141). Dordrecht, Netherlands: Springer. doi:10.1007/978-94-017-8854-0_8

Drew, S. A. (1997). From knowledge to action: The impact of benchmarking on organizational performance. *Long Range Planning*, *30*(3), 427–441. doi:10.1016/S0024-6301(97)90262-4

Earley, P. C., & Ang, S. (2003). *Cultural intelligence: Individual interactions across cultures*. Stanford, CA: Stanford University Press.

Eberly, M. B., Johnson, M. D., Hernandez, M., & Avolio, B. J. (2013). An integrative process model of leadership: Examining loci, mechanisms, and event cycles. *The American Psychologist*, *68*(6), 427–443. doi:10.1037/a0032244 PMID:23528243

Erickson, A., Shaw, J. B., & Agabe, Z. (2007). An empirical investigation of the antecedents, behaviors, and outcomes of bad leadership. *The Journal of Leadership Studies*, *1*(3), 26–43. doi:10.1002/jls.20023

Flanagan, J. C. (1954). The Critical Incident Technique. *Psychological Bulletin*, *51*(4), 327–358. doi:10.1037/h0061470 PMID:13177800

Fonner, K. L., & Stache, L. C. (2012). All in a days work, at home: Teleworkers management of micro role transitions and the work–home boundary. *New Technology, Work and Employment*, *27*(3), 242–257. doi:10.1111/j.1468-005X.2012.00290.x

Furst, S. A., Reeves, M., Rosen, B., & Blackburn, R. S. (2004). Managing the life cycle of virtual teams. *The Academy of Management Executive*, *18*(2), 6–20. doi:10.5465/AME.2004.13837468

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gajendran, R. S., & Joshi, A. (2012). Innovation in globally distributed teams: The role of LMX, communication frequency, and member influence on team decisions. *The Journal of Applied Psychology*, *97*(6), 1252–1261. doi:10.1037/a0028958 PMID:22708920

Gerdenitsch, C., Kubicek, B., & Korunka, C. (2015). Control in flexible working arrangements. *Journal of Personnel Psychology*, *14*(2), 61–69. doi:10.1027/1866-5888/a000121

Gibson, C. B., & Gibbs, J. L. (2006). Unpacking the concept of virtuality: The effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on team innovation. *Administrative Science Quarterly*, *51*, 451–495.

Gibson, C. B., & Manuel, J. A. (2003). Building trust: Effective multicultural communication processes in virtual teams. In C. B. Gibson & S. G. Cohen (Eds.), *Virtual teams that work: Creating conditions for virtual team effectiveness* (pp. 59–86). San Francisco, CA: Jossey-Bass.

Gilson, L. L., Maynard, M. T., Young, N. C. J., Vartiainen, M., & Hakonen, M. (2015). Virtual teams research 10 years, 10 themes, and 10 opportunities. *Journal of Management*, *41*(5), 1313–1337. doi:10.1177/0149206314559946

Global Workplace Analytics. (2016, January). *Latest telecommuting statistics.* Retrieved from http://globalworkplaceanalytics.com/telecommuting-statistics

Golden, T. D., & Veiga, J. F. (2008). The impact of superior-subordinate relationships on the commitment, job satisfaction, and performance of virtual workers. *The Leadership Quarterly*, *19*(1), 77–88. doi:10.1016/j.leaqua.2007.12.009

Graen, G. B., & Scandura, T. A. (1987). Toward a psychology of dyadic organizing. *Research in Organizational Behavior*, *9*, 175–208.

Graen, G. B., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of leader-member exchange (LMX) theory of leadership over 25 years: Applying a multi-level multi-domain perspective. *The Leadership Quarterly*, *6*(2), 219–247. doi:10.1016/1048-9843(95)90036-5

Halpin, A. W., & Winer, B. J. (1957). A factorial study of the leader behavior descriptions. In R. M. Stogdill & A. E. Coons (Eds.), *Leader behavior. Its description and measurement* (pp. 39–51). Columbus, OH: Bureau of Business Research, Ohio State University.

Hambley, L. A., ONeill, T. A., & Kline, T. J. (2007a). Virtual team leadership: Perspectives from the field. *International Journal of e-Collaboration*, *3*(1), 40–64. doi:10.4018/jec.2007010103

Hambley, L. A., ONeill, T. A., & Kline, T. J. (2007b). Virtual team leadership: The effects of leadership style and communication medium on team interaction styles and outcomes. *Organizational Behavior and Human Decision Processes*, *103*(1), 1–20. doi:10.1016/j.obhdp.2006.09.004

Harvey, M., Novicevic, M. M., & Garrison, G. (2005). Global virtual teams: A human resource capital architecture. *International Journal of Human Resource Management*, *16*(9), 1583–1599. doi:10.1080/09585190500239119

Hegewisch, A. (2009). *Flexible working policies: a comparative review*. Manchester, UK: Equality and Human Rights Commission.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hertel, G., Geister, S., & Konradt, U. (2005). Managing virtual teams: A review of current empirical research. *Human Resource Management Review*, *15*(1), 69–95. doi:10.1016/j.hrmr.2005.01.002

Hill, N. S., Kang, J. H., & Seo, M. G. (2014). The interactive effect of leader-member exchange and electronic communication on employee psychological empowerment and work outcomes. *The Leadership Quarterly*, *25*(4), 772–783. doi:10.1016/j.leaqua.2014.04.006

Hoch, J. E., & Kozlowski, S. W. (2014). Leading virtual teams: Hierarchical leadership, structural supports, and shared team leadership. *The Journal of Applied Psychology*, *99*(3), 390–403. doi:10.1037/a0030264 PMID:23205494

Howell, J. M., Neufeld, D. J., & Avolio, B. J. (2005). Examining the relationship of leadership and physical distance with business unit performance. *The Leadership Quarterly*, *16*(2), 273–285. doi:10.1016/j.leaqua.2005.01.004

Hunt, V., Layton, D., & Prince, S. (2015). *Why diversity matters: New research makes it increasingly clear that companies with more diverse workforces perform better financially.* Retrieved from http://www.mckinsey.com/business-functions/organization/our-insights/why-diversity-matters

Javidan, M., Dorfman, P. W., De Luque, M. S., & House, R. J. (2006). In the eye of the beholder: Cross cultural lessons in leadership from Project GLOBE. *The Academy of Management Perspectives*, *20*(1), 67–90. doi:10.5465/AMP.2006.19873410

Joshi, A., Lazarova, M. B., & Liao, H. (2009). Getting everyone on board: The role of inspirational leadership in geographically dispersed teams. *Organization Science*, *20*(1), 240–252. doi:10.1287/orsc.1080.0383

Judge, T. A., & Piccolo, R. F. (2004). Transformational and transactional leadership: A meta-analytic test of their relative validity. *The Journal of Applied Psychology*, *89*(5), 755–768. doi:10.1037/0021-9010.89.5.755 PMID:15506858

Judge, T. A., Piccolo, R. F., & Ilies, R. (2004). The forgotten ones? The validity of consideration and initiating structure in leadership research. *The Journal of Applied Psychology*, *89*(1), 36–51. doi:10.1037/0021-9010.89.1.36 PMID:14769119

Jung, D. I., & Sosik, J. J. (2002). Transformational leadership in work groups the role of empowerment, cohesiveness, and collective-efficacy on perceived group performance. *Small Group Research*, *33*(3), 313–336. doi:10.1177/10496402033003002

Kahai, S., & Avolio, B. (2008). Effects of leadership style and anonymity on the discussion of an ethical issue in an electronic meeting system context. In S. P. Weisband (Ed.), *Leadership at a distance: Research in technologically-supported work* (pp. 97–125). Mahwah, NJ: Lawrence Erlbaum Associates.

Kahai, S. S., Huang, R., & Jestice, R. J. (2012). Interaction effect of leadership and communication media on feedback positively in virtual teams. *Group & Organization Management*, *37*(6), 716–751. doi:10.1177/1059601112462061

Kahn, R. L., & Katz, D. (1952). *Leadership practices in relation to productivity and morale*. Ann Arbor, MI: Institute for Social Research.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kayworth, T. R., & Leidner, D. E. (2002). Leadership effectiveness in global virtual teams. *Journal of Management Information Systems*, *18*, 7–40.

King, N., & Majchrzak, A. (2003). Technology alignment and adaptation for virtual teams involved in unstructured knowledge work. In C. B. Gibson & S. G. Cohen (Eds.), *Virtual teams that work: Creating conditions for virtual team effectiveness* (pp. 265–291). San Francisco, CA: Jossey-Bass.

Kirkman, B. L., Rosen, B., Gibson, C. B., Tesluk, P. E., & McPherson, S. O. (2002). Five challenges to virtual team success: Lessons from Sabre, Inc. *The Academy of Management Executive*, *16*(3), 67–79. doi:10.5465/AME.2002.8540322

Konradt, U., Hertel, G., & Schmook, R. (2003). Quality of management by objectives, task-related stressors, and non-task-related stressors as predictors of stress and job satisfaction among teleworkers. *European Journal of Work and Organizational Psychology*, *12*(1), 61–79. doi:10.1080/13594320344000020

Kotter, J. (1987). *The leadership factor*. New York, NY: The Free Press.

Lee, S. Y., & Hong, J. H. (2011). Does family-friendly policy matter? Testing its impact on turnover and performance. *Public Administration Review*, *71*(6), 870–879. doi:10.1111/j.1540-6210.2011.02416.x

Liden, R. C., Sparrowe, R. T., & Wayne, S. J. (1997). Leader-member exchange theory: The past and potential for the future. *Research in Personnel and Human Resources Management*, *15*, 47–120.

Lim, B. C., & Ployhart, R. E. (2004). Transformational leadership: Relations to the five-factor model and team performance in typical and maximum contexts. *The Journal of Applied Psychology*, *89*(4), 610–621. doi:10.1037/0021-9010.89.4.610 PMID:15327348

Lim, V. K. (2002). The IT way of loafing on the job: Cyberloafing, neutralizing and organizational justice. *Journal of Organizational Behavior*, *23*(5), 675–694. doi:10.1002/job.161

Lunenburg, F. (2011). Leadership versus management: A key distinction - at least in theory. *International Journal of Management. Business and Administration*, *14*, 1–4.

Malhotra, A., Majchrzak, A., & Rosen, B. (2007). Leading virtual teams. *The Academy of Management Perspectives*, *21*(1), 60–70. doi:10.5465/AMP.2007.24286164

Maruping, L. M., & Agarwal, R. (2004). Managing team interpersonal processes through technology: A task-technology fit perspective. *The Journal of Applied Psychology*, *89*(6), 975–990. doi:10.1037/0021-9010.89.6.975 PMID:15584836

Minton-Eversole, T. (2012). *Virtual teams used by most global organizations, survey says.* Retrieved from https://www.shrm.org/hrdisciplines/orgempdev/articles/pages/virtualteamsusedmostbyglobalorganizations,surveysays.aspx

Mukherjee, D., Lahiri, S., Mukherjee, D., & Billing, T. K. (2012). Leading virtual teams: How do social, cognitive, and behavioral capabilities matter? *Management Decision*, *50*(2), 273–290. doi:10.1108/00251741211203560

Nam, T. (2014). Technology use and work-life balance. *Applied Research in Quality of Life*, *9*(4), 1017–1040. doi:10.100711482-013-9283-1

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Nilles, J. M. (1994). *Making telecommuting happen: A guide for telemanagers and telecommuters*. New York, NY: Van Nostrand Reinhold.

Noonan, M. C., & Glass, J. L. (2012). The hard truth about telecommuting. *Monthly Labor Review*, *135*, 38–45.

O'Neill, T. A., Lewis, R. J., & Hambley, L. A. (2008). Leading virtual teams: Potential problems and simple solutions. In J. Nemiro, M. Beyerlein, L. Bradley, & S. Beyerlein (Eds.), *The handbook of high-performance virtual teams: A toolkit for collaborating across boundaries* (pp. 213–238). San Francisco, CA: Jossey-Bass.

OLeary, M. B., & Mortensen, M. (2010). Go (con) figure: Subgroups, imbalance, and isolates in geographically dispersed teams. *Organization Science*, *21*(1), 115–131. doi:10.1287/orsc.1090.0434

ONeill, T. A., Goffin, R. D., & Gellatly, I. R. (2010). Test-taking motivation and personality test validity. *Journal of Personnel Psychology*, *9*(3), 117–125. doi:10.1027/1866-5888/a000012

ONeill, T. A., Hambley, L. A., & Bercovich, A. (2014). Prediction of cyberslacking when employees are working away from the office. *Computers in Human Behavior*, *34*, 291–298. doi:10.1016/j.chb.2014.02.015

ONeill, T. A., Hambley, L. A., & Chatellier, G. S. (2014). Cyberslacking, engagement, and personality in distributed work environments. *Computers in Human Behavior*, *40*, 152–160. doi:10.1016/j.chb.2014.08.005

Orhan, M. A. (2014). Extending the individual level of virtuality: Implications of task virtuality in virtual and traditional settings. *American Scientist*, *4*, 400–412.

Peters, L. M., & Manz, C. C. (2007). Identifying antecedents of virtual team collaboration. *Team Performance Management: An International Journal*, *13*(3/4), 117–129. doi:10.1108/13527590710759865

Purvanova, R. K., & Bono, J. E. (2009). Transformational leadership in context: Face-to-face and virtual teams. *The Leadership Quarterly*, *20*(3), 343–357. doi:10.1016/j.leaqua.2009.03.004

Qureshi, S., & Vogel, D. (2001). Adaptiveness in virtual teams: Organisational challenges and research directions. *Group Decision and Negotiation*, *10*(1), 27–46. doi:10.1023/A:1008756811139

Riopelle, K., Gluesing, J. C., Alcordo, T. C., Baba, M., Britt, D., McKether, W., …Wagner, K. H. (2003). Context, task, and the evolution of technology use in global virtual teams. In C. B. Gibson & S. G. Cohen (Eds.), Virtual teams that work: Creating conditions for virtual team effectiveness (pp. 239–264). San Francisco, CA: Jossey-Bass.

Rosen, B., Furst, S., & Blackburn, R. (2006). Training for virtual teams: An investigation of current practices and future needs. *Human Resource Management*, *45*(2), 229–247. doi:10.1002/hrm.20106

Shaffer, M. A., Harrison, D. A., Gregersen, H., Black, J. S., & Ferzandi, L. A. (2006). You can take it with you: Individual differences and expatriate effectiveness. *The Journal of Applied Psychology*, *91*(1), 109–125. doi:10.1037/0021-9010.91.1.109 PMID:16435942

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Shapiro, D. L., Furst, S. A., Spreitzer, G. M., & Von Glinow, M. A. (2002). Transnational teams in the electronic age: Are team identity and high performance at risk? *Journal of Organizational Behavior*, *23*(4), 455–467. doi:10.1002/job.149

Shaw, J. B., & Barrett-Power, E. (1998). The effects of diversity on small work group processes and performance. *Human Relations*, *51*(10), 1307–1325. doi:10.1177/001872679805101005

Staples, D. S., & Cameron, A. F. (2004). Creating positive attitudes in virtual team members. In S. H. Godar & S. P. Ferris (Eds.), *Virtual and collaborative teams: Process, technologies and practice* (pp. 76–98). Hershey, PA: Idea Group. doi:10.4018/978-1-59140-204-6.ch005

Stogdill, R. M., & Coons, A. E. (1957). *Leader behavior: Its description and measurement*. Academic Press.

Tenzer, H., Pudelko, M., & Harzing, A. W. (2014). The impact of language barriers on trust formation in multinational teams. *Journal of International Business Studies*, *45*(5), 508–535. doi:10.1057/jibs.2013.64

Triandis, H. C. (2006). Cultural intelligence in organizations. *Group & Organization Management*, *31*(1), 20–26. doi:10.1177/1059601105275253

Wang, D., Feng, T., Freeman, S., Fan, D., & Zhu, C. J. (2014). Unpacking the skill–cross-cultural competence mechanisms: Empirical evidence from Chinese expatriate managers. *International Business Review*, *23*(3), 530–541. doi:10.1016/j.ibusrev.2013.09.001

Workman, M., Kahnweiler, W., & Bommer, W. (2003). The effects of cognitive style and media richness on commitment to telework and virtual teams. *Journal of Vocational Behavior*, *63*(2), 199–219. doi:10.1016/S0001-8791(03)00041-1

Yukl, G., Gordon, A., & Taber, T. (2002). A hierarchical taxonomy of leadership behavior: Integrating a half century of behavior research. *Journal of Leadership & Organizational Studies*, *9*(1), 15–32. doi:10.1177/107179190200900102

Zigurs, I. (2003). Leadership in virtual teams: Oxymoron or opportunity? *Organizational Dynamics*, *31*(4), 339–351. doi:10.1016/S0090-2616(02)00132-8

Zimmermann, P., Wit, A., & Gill, R. (2008). The relative importance of leadership behaviours in virtual and face-to-face communication settings. *Leadership*, *4*(3), 321–337. doi:10.1177/1742715008092388

KEY TERMS AND DEFINITIONS

Anywhere Leadership: Managing one or more workers from a distance at least part of the time; includes employees working in different cities or countries, and mobile employees working remotely from the same city.

Behavioral Cluster: A subcategory of a leadership metacategory; composed of a set of related behaviors identified by leaders as fundamental to effective anywhere leadership.

Behaviorally-Based Leadership: An approach to leadership focused on understanding and enacting effectiveness behaviors.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Behavioral Taxonomy: The classification of a set of related behaviors.

Marker Behavior: Specific behaviors identified by leaders as fundamental to effective anywhere leadership and classified as representative of a behavioral cluster.

Metacategory: An overarching category or leadership dimension containing three to four subcategories (behavioral clusters).

Virtual Team: Organizational work teams dispersed across geographic, temporal, and/or cultural boundaries.

This research was previously published in Anywhere Working and the New Era of Telecommuting; pages 47-88, copyright year 2017 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 17
The Walkability of the Cities: Improving It Through the Reuse of Available Data and Raster Analyses

Luigi La Riccia
https://orcid.org/0000-0002-4800-2641
Politecnico di Torino, Italy

Antonio Cittadino
Università degli Studi di Torino, Italy

Francesco Fiermonte
Politecnico di Torino, Italy

Gabriele Garnero
Università degli Studi di Torino, Italy

Paola Guerreschi
Università degli Studi di Torino, Italy

Franco Vico
Politecnico di Torino, Italy

ABSTRACT

The issue of city walkability is nowadays a theme in evidence. The chapter proposes a two-level reasoning. At the city level, the goal is to recognize the parts where actions aimed at improving walkability can be more effective. The second level is more detailed: lacking pedestrian paths' specific graphs, the urban space is modeled through a raster with 1x1 m. cells. Considering a series of criteria, an impedance has been assigned to each cell (i.e., the cost of travelling the cell on foot). This approach is applied to the city of Torino (Italy), but it is largely generalizable. To calculate this impedance, inter alia, the Torino geo-topographic database was used. The elaborations described in this chapter are seen as an aid to stakeholders to reason on city walkability and to compare different points of view in an explicit and articulated way.

INTRODUCTION

The walkability of the city has been the subject of consideration for at least fifteen years, but today it is certainly in evidence. In February 2018 the small volume *Pedestrians First* (ITDP 2018) was published, that was inspiring in particular for two reasons: it was conceived in a context and with a vision absolutely global; it has a clear operational objective, to support the different subjects (policy and decision makers,

DOI: 10.4018/978-1-7998-7297-9.ch017

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

planners and technicians, pro-active subjects at a local level, etc.) involved in the promotion and planning of the increase of the city's walkability, as a factor of sustainability and growth of the its livability.

The city's walkability theme intersects several relevant current themes. The reasons reported in the literature to deal with it are surprisingly varied, ranging from the sustainability of urban mobility, from soft mobility (recovery of walking as a solution to the problems of transport over short distances), to the health of people (contrast of obesity (Agampatian 2014) prevention of cardiovascular diseases, osteoporosis (Eynard, Melis and Tabasso 2017). In the middle there is a wide range of motivations concerning the livability of the city, security, pollution, urban densification. Some analyzed researches often describe a path that led to the construction of walkability indices, taking into consideration, along with other aspects, such as the physical form of the city and its way of functioning, that is population, building density and the mix of urban activities and functions (which, together, lead to multiplication of possible origins and destinations of movements), security (which concerns both the intersections between pedestrian paths and vehicular routes, that anthropic safety), the pleasantness of the environment (quality of the sidewalks, presence of shops and other activities along the pedestrian paths, presence of green, low level of pollution and noise, etc.).

For people, to decide to get walking a little more, instead (specifically in Italy) to use their car, involves reviewing their own habits and building new mental maps of their city.

If the ultimate goal is to provide views of the walkability of the city, useful for people to reconsider the possibility of walking different areas of the city, and the accessibility of different interest points on foot, the specific objective of this chapter is to demonstrate the possibility of constructing effective views of city's walkability, using existing data, extensible (more or less easily) to the entire urban or metropolitan area, bypassing the lack of specific networks related to foot mobility, which allow municipal technicians and policy-makers to focus on critical points of pedestrian paths, considering all the factors that influence the walkability.

BACKGROUND

Definitions of Walkability

Walkability and accessibility with alternative mobility are conditions for the development of the quality of urban and territorial life, as well as a way to deal concretely with the great issues of the "right to the city" (Lefebvre 1968; Harvey 2008) and the relationship between city and welfare.

In literature, there are many definitions of "walkability". For Abley (2005) *walkability* or *walkable* is "the extent to which the built environment is walking friendly": this definition enables the opportunity for a subjective or qualitative assessment against specific criteria. These criteria may be characteristics such as the "5 Cs": connected, convivial, conspicuous, comfortable and convenient, or other criteria specific to a particular user.

For Seilo (2004), walkability "is a measure of the urban form and the quality and availability of pedestrian infrastructure contained within a defined area. Pedestrian infrastructure includes amenities developed to promote pedestrian efficiency and safety such [as] sidewalks, trails, [and] pedestrian bridges".

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Walkability for a More Livable City

In the policy "Walking action plan. Making London the world's most walkable city" (Mayor of London and Transport for London 2018), walking is considered "(…), in many ways, the mode of travel that is most important to the aims of the strategy. It makes efficient use of street space. It is good for individuals' health. It produces no emissions or noise. It is safe and encourages interaction, which improves lives. It is good for business".

Then, USA's Walkable Communities Inc. website defines walkable communities "those who put urban environments back on a scale for sustainability of resources (both natural and economic) and lead to more social interaction, physical fitness and diminished crime and other social problems".

The concept of walkability is a way of looking beyond the presence, distribution, and accessibility of urban facilities: spatial quality and the ability to accommodate and promote the pedestrian mobility of the urban environment and in particular of the road influence the way in which people perceive and use the city.

In this regard, many studies show how the psychophysical wellbeing of individuals, as well as urban studies, corroborates the thesis that better urban quality is given by the walkability and the development of the possibilities of action of the individual in urban space. Planning strategies need to be built through empirical research that identifies correlates of walking behavior.

While socio-demographic (i.e. ethnicity, income, age) correlates of walking have been widely probed in the literature (Saelens et al. 2003), physical environmental variables have been studied with much less rigor. However; the limited number of studies on the link between the built environment and walkability demonstrate that physical environmental variables are significantly associated with walking behavior controlling for socio-demographic factors (Jacobs 1961; Handy and Clifton 2001). Walking activity promotes also social life and public participation by providing opportunities for face-to-face contact and casual interaction, all of which subsequently are proven to improve mental health and well-being (Robertson et al. 2012). A vibrant, economically viable and safe community needs people on streets and in public places. A walkable environment can also provide significant health benefits and independence to specific groups such as children and third age people who rely more on their local neighborhoods (Berke et al. 2007).

There are also numerous case studies of public policies and projects that have shown how the quality of the city and the urban environment improve considerably in case of walkable friendly environments or soft mobility policies. In particular, several attempts are being refined and disseminated to make the concept of urban walkability operative in terms of physical well-being and improvement of the urban quality of life. These researches are aimed at systematize and simplify procedures for the formal assessment of the concept and the possibility of using walkability in a more rigorous way as a tool to support decision making, urban planning and mobility planning (Saelens and Handy 2008, Talen and Koshinsky 2013).

Measuring Walkability

Effectively understanding and measuring the complexity of walkability has proven challenging for many organizations and governments, given the various levels of policy-making and implementation involved. With a better understanding of walkability, and more consistent and frequent measurement of the walkability of urban environments, decision-makers could be empowered to push policies that create more walkable urban areas.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Over the last two decades, there has been in literature considerable progress regarding measuring walkability, various different measurable features of the built environment have been incorporated to models, and different approaches have been developed.

A first method is based on interviews or questionnaires. Questionnaires can potentially reveal the extent to which individuals perceive various elements of the built environment and how a person experiences a neighborhood. This method is considered as "subjective" because two unique individuals may perceive the same environment differently. The most commonly assessed measurable environmental features of perception are land use, traffic, aesthetics, and neighborhood safety from crime (Tomalty et al. 2009).

A second approach uses built environment characteristics obtained by systematic observations or audits that quantify the environmental attributes of an area, including the presence or absence of features hypothesized to affect physical activity. Audit tools are used for measuring and assessing physical features through direct observation, and include one or more measurable characteristics, such as: land use (i.e. commercial space), streets and traffic (i.e. crosswalks), sidewalks (i.e. presence, width, and continuity of sidewalks), public space and amenities (i.e. presence of benches), architecture and building characteristics (i.e. height), parking (i.e. presence of parking lots), maintenance (i.e. presence of litter), and other indicators related to safety (i.e. presence of graffiti) (Brownson et al. 2009; Pelletier 2009; Gauvin et al. 2005).

Finally, another method uses geospatial databases and Geographic Information Systems (GIS) in order to assess or develop relevant indicators that measure walkability. A GIS "is a facility for preparing, presenting, and interpreting facts that pertain to the surface of the earth. This is a broad definition… a considerably narrower definition, however, is more often employed. In common parlance, a Geographic Information System or GIS is a configuration of computer hardware and software specifically designed for the acquisition, maintenance, and use of cartographic data" (Tomlin 1990). The increasing use of Geographic Information Systems (GIS) has made them an essential part of urban planning research. Nowadays, GIS techniques are being utilized more frequently also by the public health sector. In particular, GIS has been used to assess potential associations between a number of built environment characteristics and walking (Butler et al. 2011), taking into account the physical location of areas, boundaries, people, and services, as well as types of land use and natural features, and facilitating researchers by providing them the ability to create maps, measure distances and travel times, as well as define the extent and nature of spatial relationships.

One of the latest advancements in GIS methods and techniques that are used to measure walkability is the employment of composite indices (WalkScore 2011). These indices are expected to measure the degree to which an area provides opportunities to walk to various destinations (Manaugh et al. 2011). This is achieved by measuring both form and content of neighborhoods, which eventually captures the interrelation of various built environment characteristics, minimizes the effect of spatial collinearity and facilitates the communications of results. Understanding the potential impact of the built environment on walkability requires relevant, easy-to-comprehend, and reliable measurable features (Brownson et al. 2009, Hollenstein and Bleisch 2016). These measurable characteristics can assist in determining how much the built environment affects the people. These measures can also provide indirectly evidence of the state of population health for the area under study. Composite measures of walkability are also expected to provide more consistent predictors of walking behavior than single component measures (Vargo et al. 2011).

Many attempts to measure walkability fail to capture all of its nuances in an urban context. Other attempts to measure walkability involve complicated indices that leave the user with a score, but with little

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

understanding of how that score was calculated, or how to improve it, or how it relates to walkability. Although conventional approaches to the assessment of quality of life usually measure the distribution, density and distances of different opportunities in space, other studies take into account the quality of accessibility and urban opportunities (Blečić et al. 2014). Besides the mere distance, it matters a great deal if a place can be reached also by foot or by bicycle, if the pedestrian route is pleasant and spatially integrated with the surrounding by good urban design, if it is brim-full of urban activities, if it is well maintained and (perceived as) secure, if it is not submissive and surrendering to the car traffic whether by design or by predominant social practices of use of that space. At the same time, it is important to go beyond the simple presence of urban services, to understand their characteristics, if they are able to serve different categories of individuals, if their relevance is on the neighborhood, urban or metropolitan/regional level, if there are possibilities of choice between two or more relevant places.

Walkability suffers from the metrics problem: that is the subject to be measured is influenced by a large number of factors. For this reason, a simplified tool is preferable and metrics must not be overly resource and time consuming, but must also capture the elements of a city that are most important to the basic building blocks of walkability. Meanwhile, they have to be easy to measure with as reliable and objective as possible data.

The already mentioned ITDP's *Pedestrians First* (2018), aiming to improve understanding and measuring walkability, defines a set of criteria and tools, based on the following key concepts:

- Data inputs that are relatively quick and inexpensive to collect;
- Metrics that are easy to understand and are designed to avoid hidden biases;
- An understanding of walkability at multiple levels (citywide, neighborhood, single stretch of street).

In following paragraphs, we explain in what these concepts influenced our work.

A DIFFERENT APPROACH: OVERVIEW

Walkability is typically "the forgotten mode of transport" (ITDP 2018): consequently, few analytical techniques are available to help practitioners identify low standard walking environments. But walkability is a crucial first step in creating sustainable mobility in an urban environment and the basis in creating sustainable city. Improving it means support a green type of mobility which except crowding reduction and also has low level of environmental influence, energy conserving without any air and noise pollution. It can be more than a purely useful type of travel to shopping, school and work: also have both social and recreational importance. For this reason, our approach proposed in the chapter takes on the theme of walkability as a fundamental piece of more sustainable urban mobility.

A Raster Model of Urban Walkable Space

The approach proposed here is applied to the case of Torino (Italy)[1], but it is largely generalizable given some conditions that are however widespread. It allows, first of all, to get around the obstacle of the lack of pedestrian paths' specific graph. The urban space is modeled through a raster with 1x1 meter cells, a rather small cell in order to obtain a high level of detail. An impedance is assigned to each cell, that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is a *cost* to be traveled on foot, more or less pleasantly and safely. Cells that cannot be traveled because they are included in areas destined to vehicular traffic or because they are non-public, are excluded. This raster is often named *cost raster*.

Reuse of Torino Large-Scale Geo-Topographic Data Base

The second distinguishing feature of proposed approach is that, in order to build the cost raster, the information contained in the Torino municipal large-scale digital map was used above all. A technical map is normally seen and used as a representation of the forms of the territory, often materialized as a printed map or saved as a PDF file. In the case of Torino, this topographic map is at high level of detail and is structured according to the national specifications for geo-topographic databases. Territorial objects (*features*) are organized into classes (very numerous); each feature has attributes… a lot of information. The explicit and implicit information of this cartographic database were used to characterize the location of each walkable area, their context, the level of separation with respect to the areas dedicated to vehicular traffic, the type of paving, etc. In no case, in the literature, we found cases of such extensive use of cartographic information.

Reuse of Some Alphanumeric Data-Set

Various other data-sets of different types have been used: population, commercial activities, noise, etc. All of them contain georeferenced information. Most of them were available as *open data*. However, it was not easy to use them for the reasons that will be explained later.

On one side, having in mind the criteria to be taken into consideration to evaluate the walkability, and, on the other, the information obtainable from the municipal geo-topographic database and from the data-sets actually available and usable, a series of indices have been built. These indices have been reported, in different ways, to the grid of 1x1 meter cells, producing a series of rasters whose weighted sum (the map algebra was used) led to the final construction of the cost raster.

This cost raster is a view of the walkability of the city: it is an exploitable result in the evaluation of walkability per se, as well as being a fundamental information for the next step.

Accessibility Computed as Cost Distance

Almost always in researches on walkability there is an analysis of accessibility, expressed as walking distance to certain services. This distance is usually computed on the center street lines, using data and tools developed for vehicular traffic. This is obviously due to the unavailability of pedestrian paths' graphs. But in this way significant distortions are introduced.

Moreover, if the analysis stops calculating a distance, the distance is taken into account but not the quality of paths. Walkability and accessibility are related but walkability means more.

The cost raster plays a fundamental role in calculating accessibility to some destinations of urban mobility on foot. Accessibility has to take into consideration also the quality of walking paths, that is has to be calculated as cumulative distance weighted on the base of cost raster. The result is an overlapping raster with the same properties as the cost raster: it is often called *cost distance*.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Using this procedure, various raster accessibility maps were produced, referred to different possible destinations. They can be added, using the map algebra, as weighted sum, obtaining synthetic views of the walkability that include the accessibility to different groups of activities and points of interest.

Is this Approach Really Different?

In the analyzed literature on walkability we found some papers in which raster analyses are used. For example: Holbrow (2010) generates network distance buffers around various destination points, measured on street centerlines (i.e. calculates the *service areas* using ESRI ArcGIS Network Analyst), and converts distance buffers in raster to make possible a weighed sum of them: in this way a walkability raster surface is produced (cell size 5 meter). Eynard, Melis and Tabasso (2017) follow the same approach (but the cell size is 50 meter).

Hollenstein and Bleisch (2016) apply the concepts of cost raster and cost distance, but the cost raster is very simplified, taking into consideration only the presence of sidewalks, the car speed, the presence of crossings.

A single case of a more substantial use of cost raster and cost distances was found. It is the website *Walkshed find your walkable way through the urban jungle* (http://www.walkshed.org/; Ogle, undated) that allows you to build your own personal walkability maps, varying the weight attributed to different criteria. The term walkshed echoes watershed. It is a very interesting case, precisely because it allows to build your own maps. But it seems that the grain at which the analyzes are conducted, too wide, and the excessive simplifications make the result less significant. However, this evaluation of *Walkshed* is provisional, because, if the key passage is the production of the cost raster, it is not enough documented how the impedances are calculated.

EVALUATION OF WALKABILITY AT THE NEIGHBORHOOD LEVEL

As mentioned, in *Pedestrian first* (IDT 2018) more levels of analysis / intervention are suggested: this is very reasonable. The first is the entire city/metropolitan area. The second one is the neighborhood level[2]: what has been described in the previous paragraph on cost raster and cost distance, applies to this second level.

For reasons of better exposure, analyzes on the neighborhood level are presented first.

For neighborhood level ITDP 2018 (page 31) suggests 1 km^2 areas, but this is merely to avoid too large and expensive data collections.

In our case, the analyzes could potentially be extended to the entire city of Torino, as all data-sets used cover the entire municipal area. With the exception of one, the pedestrian crossings data-set which is completely missing. In order to model the pedestrian circulation areas, pedestrian crossings are essential to generate the continuity of the pedestrian paths when these intersect the areas of vehicle circulation.

Incidentally, we have adopted a narrow definition of pedestrian circulation areas, not providing the possibility that pedestrians cross vehicular traffic areas outside pedestrian crossings. In other research (Hollenstein and Bleisch 2016), this possibility has been considered, which, on the other hand, corresponds to real pedestrian behavior in the roads covered by low-speed vehicles.

Lacking the pedestrian crossing data-set, it was therefore necessary to digitize them ad hoc. For this practical reason, the analysis of walkability is limited, for the moment, to a test area, San Salvario district,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of 193 Ha. It is a rather central area, which has various socio-economic and environmental characteristics: we do not consider San Salvario as a representative area of the entire city, but just a test area.

In identifying the criteria at the neighborhood level, the starting point was the *Walkability Hierarchy of Needs Pyramid* (ITDP 2018, pages 13-14). The 6 criteria proposed were compacted in 3 macro-criteria: practicability (physical possibility of moving on foot), safety (physical safety and anthropic safety), comfort/pleasure.

On the base of available data-sets 15 indices were identified. Some alphanumeric georeferenced data-sets were punctual: data have been spatialized using the Kernel Density Estimation (KDE) which, given the value of a phenomenon in one point, represents its diffusion and attenuation in a circular neighborhood, with a radius defined appropriately in relation to the phenomenon represented[3]. The 3 macro-indices were calculated as weighted sum of indices. The cost raster is the weighted sum of these macro-indices. Since indices and macro-indices have different values, mean, deviations, they have been normalized, which was done using the 0-100 scale. High values of macro-indices mean high practicability, high security, high pleasure, while the cost raster values represent a cost, an obstacle to walk the cell. Then the cost-raster values were calculated as the complement to 100 of the normalized sum of the macro-indices. Table 1 displays the complete process, from criteria, to indices, to macro-indices.

In addition to the criteria considered, listed in Table 1, it would be reasonable (and likely possible) to consider other criteria that at the moment have not been implemented because the necessary data were not available. We list some of them: presence of traffic calming areas and protected intersections with vehicular traffic, muggings and other street crimes, lighting levels, presence of dehors, presence of artworks.

Figure 1 shows the cost raster for a portion of the test area. On the right a part of the large urban park of Valentino stands out, with its pathways. On the right the urban fabric made up of more or less regular blocks. [To make the map more readable a dotted buffer line is drawn inside the blocks at 5 meters from the buildings' front line (same for the maps in Figure 2 and 3).]

Figure 2 is a zoom in of the map of previous figure. The 1x1 meter cells become visible. You can see the sidewalks, with variable costs; pedestrian crossings, with a higher cost; a tram platform, raised but inside the vehicular traffic area, which took the maximum cost value...

NEIGHBORHOOD LEVEL: ACCESSIBILITY OF POINTS OF INTEREST

The overall evaluation of walkability has to consider the accessibility to attractive activities and to points of interest, present within a walking distance. The cost distance represents the cumulative cost of the movement, where the *cost* is given by the value of the cost raster cell. Therefore, the cost distances calculate a weighted accessibility, which, in our case, takes into account distance, practicability, safety and pleasantness of walking. A value of accessibility to a certain activity or point of interest is attributed to each 1x1 meter walkable cell. Using cost distance algorithm, the accessibility to some attractive activities and significant intermodal points in urban mobility was calculated. The weighed sum of various cost distances can lead to synthetic views of accessibility. It should be noted that at this point the computation of accessibility is simple and it is easy to explore different aspects of the matter.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Neighborhood level: criteria considered, indices and macro-indices constructed, weights attributed in the weighed sum

Indices			Macro indices			Summary Index
Description	**Name**		**Description**	**Name**	**Weight Attributed in the Weighted Sum**	
Presence of sidewalks, pedestrian crossings, curb ramps, paths in the parks, steps…	I_NPER_MAR	100%	Practicability, possibility of moving on foot	I_NPER	40%	
Presence of sidewalks businesses: stores, bars and restaurants, stalls…	I_NSIC_COM	20%	Security	I_NSIC	30%	
Low number of pedestrian incidents	I_NSIC_INC	20%				
Presence of crossroads regulated by traffic lights	I_NSIC_SEM	20%				
Separation between pedestrian paths and vehicular traffic	I_NSIC_SEP	40%				
Presence of trees	I_NPIA_ALB	10%	Comfort/ pleasure	I_NPIA	30%	
Presence of street furniture	I_NPIA_ARU	5%				
Presence of sidewalks businesses: (same as I_NSIC_COM)	I_NPIA_COM	15%				
Presence of covered paths	I_NPIA_COP	10%				
Presence of historical buildings	I_NPIA_EDI	10%				
Presence of fountains	I_NPIA_H2O	5%				
Quality of pavements	I_NPIA_PAV	10%				
Low noise level	I_NPIA_RUM	15%				
Contiguous paths with green areas	I_NPIA_VER	15%				
Presence of visuals and panoramic points	I_NPIA_VIS	5%				

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Neighborhood level: the cost raster. The color, from light gray to dark gray, represents increasing impedance, that is increasing "cost" of walking through the cell.

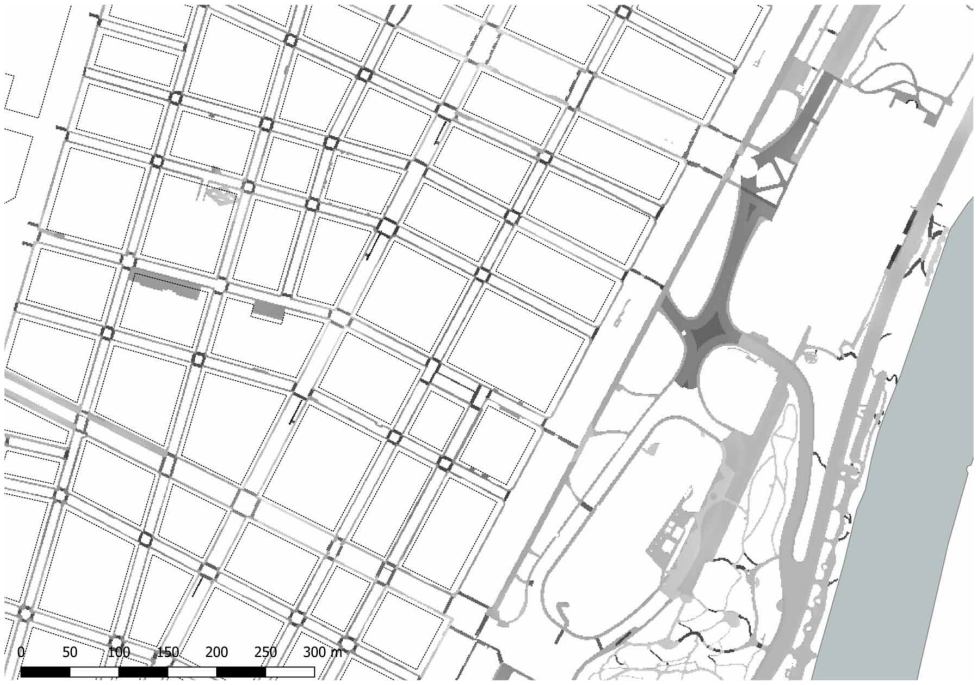
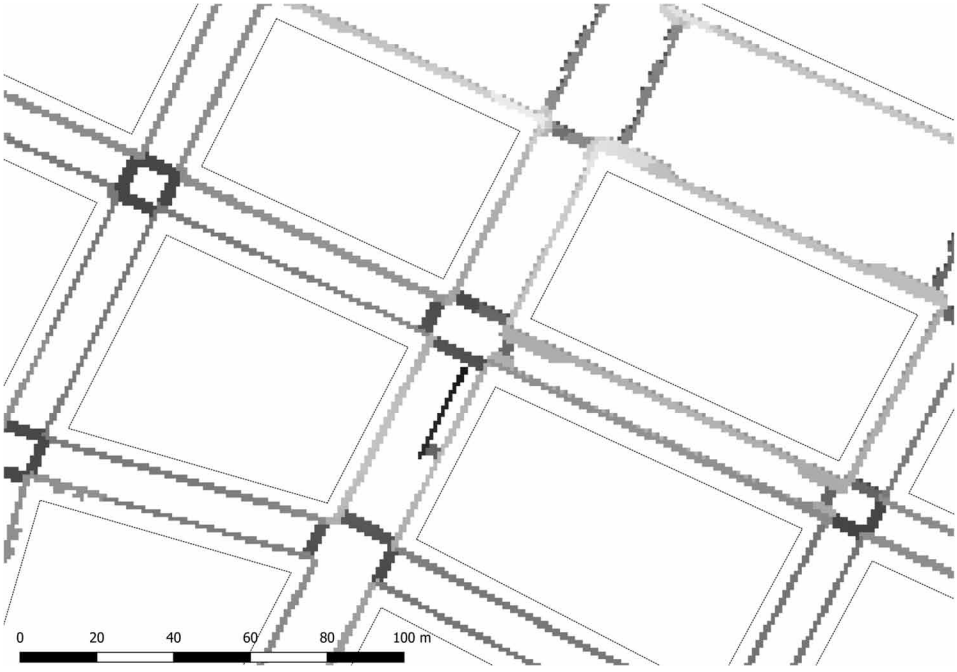


Figure 2. Neighborhood level: cost raster. Zooming, you see the raster cells of 1x1 meter.



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2 lists some cost distances that were calculated, within the San Salvario test area, and displays how the overall accessibility to intermodal points in urban mobility and to 3-14 years old schools was calculated as weighted sum of several cost distances. As previously the cost distances were normalized using the scale 0-100 before being summed.

Table 2. Neighborhood level: accessibility to attractive activities and points of interest. Calculated cost distances, accessibility indices and macro-indices, weights assigned in weighed sums.

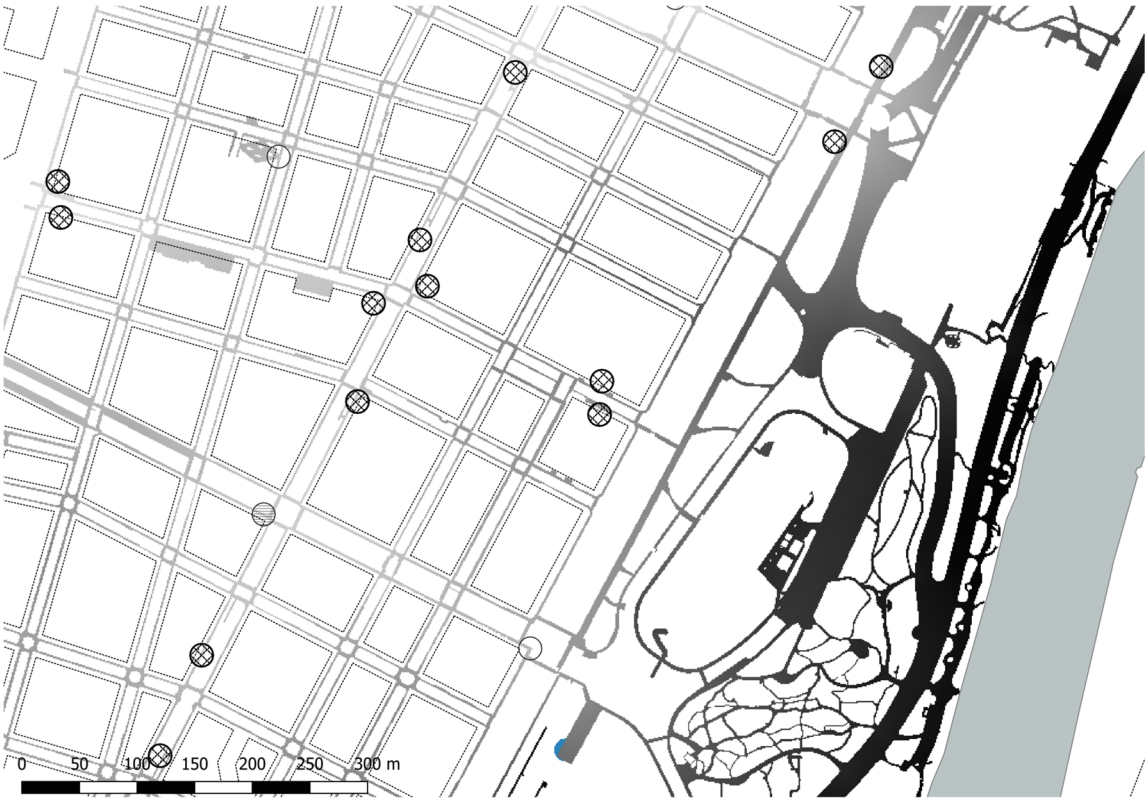
Accessibility Indices		**Macro-Indices of Accessibility**		**Summary Index**
Cost/Distance Relative to Points of Interest	**Weight Attributed to the Weighted Sum**		**Weight Attributed to the Weighted Sum**	
Childhood schools	20%	Accessibility to 3-14 years old schools		
Elementary and middle schools	80%			
Metro stops	30%	Accessibility to intermodal points in urban mobility		
Main Torino transports stops	30%			
Bike sharing stations	20%			
Car sharing stations	5%			
Taxi stations	5%			
Train stations	10%			
High schools	100%			
Universities	100%			
Hospitals	100%			
Catholic churches	80%	Accessibility to religious facilities		
Other places of worship	20%			
Cinemas	50%	Accessibility to leisure facilities		
Theaters	20%			
Museums	30%			

Figure 3 shows the cost distance to intermodality points in urban mobility for a portion of the test area (the same as in Figure 1) as weighted sum of the 6 related cost distances. Weights assigned in the weighted sum are shown in table 2.

An overall summary accessibility can be computed, as weighed sums of all cost distance rasters: however, at this stage we preferred to stop and compute summary accessibilities only for groups of activities or points of interest.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Neighborhood level: cost distance to intermodal points in urban mobility



COST RASTER AND COST DISTANCE ALGORITHMS: SOME ADDITIONAL CONSIDERATIONS

All processings were done in the QGIS environment (various releases from 2.18 to 3.4). The choice of a *Free and Open Source Software* (FOSS) is not casual and should be seen together with the choice of using open data (ex post we must say, only predominantly). It should also be remembered that QGIS is promoted by City of Torino and adopted in its technical offices for all GIS elaborations. The guiding idea is that the overall elaboration path had to be easily repeatable and generalizable.

While we used QGIS we took into consideration the similar algorithms in ESRI ArcGIS, well known and widespread proprietary SW. This is not the place to introduce a comparison between the different implemented algorithms. Anyway in this chapter we decided to use the widely enforced terms *cost raster* and *cost distance* (used also by ArcGIS) rather than the various corresponding terms used in QGIS, that are cost surface, local cost, unit cost layer, cumulative cost, accumulated cost and may be others.

Cost Raster does not refer to a specific algorithm or sw tool: it is in fact a concept and does not necessarily imply financial cost. In general, this raster is the result of a multi-criteria approach: it is the weighted sum of several rasters whose cells values represent various aspects of cost, i.e. of impedance or friction in traveling the cell. In previous paragraphs the considered aspects of cost are listed. By the way, the slope is a cost aspect often considered in building cost raster, but we did not because the test area is basically flat.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In building the cost raster the raster layer of macro index I_NPER (see table 1), which contains only the pedestrian circulation areas, was the first one. All cells not included in these areas became "null cells". In the following sums with the rasters relative to the other indices, these null cells are left out, so it is not necessary to introduce any kind of masking.

As far as *Cost Density*, generally speaking, it works this way: starting from target points or cells it is calculated the cost of moving to the 8 neighboring cells, as average cost, two by two. This value is multiplied by the cell size (in our case 1 meter) or, if the cell is traveled diagonally, by 1 * 1,41. This computation is repeated in all directions and costs are added up, choosing the least cost increment at each step. This process is propagated on the whole cost raster (de Smith, Goodchild and Longley 2018).

We used the QGIS/GRASS algorithm *r.cost.* Various options are available (e.g. different movement rules from cell to cell, how null cells have to be dealt…), none of these has been used. Incidentally we have to report that some problems of SW instability occurred updating the sw from one release to the next one.

An interesting optional output of the cost distance algorithm is *allocation*, that is the identification of the area of influence of each activity: the result can be usefully interpreted if referred to destinations of the same kind. Some allocations have been calculated, together with the cost distances, but they are not shown and discussed here.

EVALUATION OF WALKABILITY AT CITY LEVEL

As mentioned, the first levels of analysis/intervention suggested in *Pedestrian first* (IDT 2018) is the entire city/ metropolitan area. The goal (there and here) is to recognize the parts of the city where actions aimed at improving walkability can be relatively easier and more effective. With this in mind, criteria to be considered were focused and indices to make them operable were developed. For reasons of easier data availability, the reference area is only the Municipality of Torino, but it makes sense and it would be possible to extend the analysis to the entire Torino metropolitan area[4].

The walkability analyzes developed at the city level are relatively more common.

Also for this level the approach has been raster. Some useful data-sets are referred to the statistical areas (average area 138 Ha), others to the census track (e.g. population, economic activities, employed: average area 3.3 Ha), others are punctual data. Data referring to statistical zones and census track have been rasterized, with a 20×20 meter cell (therefore much larger than the one used for the neighborhood level). In this way, the fact that the data do not refer to a single type of areas becomes irrelevant. Furthermore, these data are referred to predefined statistical areas, that is they are affected by a distortion related to their dependence on the delimitation of the areas themselves, defined a priori with respect to the analysis (areal dependence of data). The raster approach attenuates this distortion.

Several used data-sets were referred to points: they have been spatialized using the Kernel Density Estimation algorithm (see before). In this case radius has been assigned considering the area of influence of each activity, setting a maximum limit (1200 meter) corresponding to 20 minutes walking. The cell size was the same, 20×20 m.

Ultimately, all produced maps are raster and all with the same cell size.

The various rasters have been then simply summed giving to each one an appropriate weight, using the map algebra. Having used only weighed sums, avoiding more complex statistical algorithms, here and also for the neighborhood level, is functional to maintain a certain control on the meaning of the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

results: this is very appropriate because these results derive from a procedure which contains several debatable steps. To make indices and macro-indices comparable and summable they were normalized on a 0-100 scale. Table 3 and Table 4 list produced indices and display the complete process.

Figure 4 shows the result of the weighted sum of each Kernel Density Estimation related to the attractiveness index at the city level. The individual indicators, shown in Table 4, which make up this index concern three basic categories: services, leisure, intermodality.

Figure 5 shows the result of the weighted sum of all the indices at the city level (see Table 3). The darker areas are those that are best suited to walkability. Note that they are identifying some semi-peripheral areas with respect to the central ones, where the weighted walkability index is higher.

SOLUTIONS AND RECOMMENDATIONS

For the development of this research, the involvement of some officials of the City of Torino and of some staff members of the City of Torino Authority for Urban Mobility was fundamental. It took place within the *Framework Agreement... of collaboration between the City of Torino and the Politecnico of Torino to promote the culture and dissemination of geographical information among the institutions,* signed in September 2017. This involvement was helpful for the retrieval of various data-sets, for their correct use, and also for the identification of the criteria to be considered and the definition of the weights to be attributed to indices. This involvement will be obviously fundamental also for the desired future developments.

Despite this privileged conditions in which the collaboration with the City of Turin allowed us to operate, despite the current presence of European and national standards regarding metadata and interoperability of geographical data, despite the principle of *open by default* established by Italian law with regard to public property data, we had some difficulty in accessing data and in their (re)use. We had problems of absence or insufficient meta-documentation (e.g. code-list lacking, unexplained coding rules...), but also of inconsistencies in coding, as well as missing data.

In conclusion, the easy retrieval and reuse of data is still an unearned goal.

In addition to integrating missing data, making consistent enumerations etc., in the spirit of INSPIRE, of multiple use of information resources, it would make sense to revisit some existing data sets, also thinking of possible wider uses than those for which they were originally produced. An example can clarify. We used intensively Torino Geo-Topographic Data Base: the *forms* of the various objects and portions of the territory are represented, but other important aspects are not included, for example "pedestrian circulation areas" are not distinguished between "in public areas" or "in private areas". Another example: the areas that still retain the shape of vehicular road are classified as "vehicular circulation areas" even if a municipal deliberation has declared them only pedestrian. We understand the reasons (non-trivial) behind considering only the physical form, but this weakens the usability of the resource.

The views on walkability presented in this chapter (Figures 1-5) have been commented little or nothing at all because we think that their reading on paper is difficult and above all that it is not very stimulating. It is better to analyze these views, on a monitor, in a GIS environment that allows turning on and off layers, zooming, querying etc.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. City level: criteria considered, indices and macro-indices built, weights attributed in the weighed sums

Indices			Macro indices			Summary Index
Description	**Name**		**Description**	**Name**	**Weight Attributed in the Weighted Sum**	
Population density 0-14 (per census section) ab/ha	I_DNS0-14	25%	Population density	I_POP	40%	**I_LIV_ CITTA**
Population density 15-64 (per census section) ab/ha	I_DNS15-64	40%				
Population density over 64 (per census section) ab/ha	I_DNS65+	35%				
Density of employees (per census section) employees/ha	I_DNS_ADD	40%	Density and mix of economic activities	I_ATTECON	20%	
Density of local units (per census section) N. LU/ha	I_DNS_UNIT	30%				
Mix of economic activities (per census section) N.	I_MIX	30%				
Blocks Density. N. blocks/km2	I_BLKDENS	50%	Urban physical structure	I_STRUFIS	20%	
Density of public areas of pedestrian traffic (per census section) sqm/sqm	I_DENSPED	50%				
(see Table 4)	*(see Table 4)*	All weighted the same 2,56%	Presence of attractive activities	I_ATTATT	20%	

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. City level: indices related to the attractive activities (I_ATTATT) divided by "services", "leisure", "intermodality"

Service Activities	Leisure Activities	Intermodality Activities
Local health companies Public bathrooms Libraries Churches Other places of worship Counseling Pharmacies Local markets Hospitals Carabinieri Finance guard Municipal police Civil protection Police stations Fire fighters Childhood schools Primary schools Secondary schools Administrative offices Registry offices Post offices Social-assistance structures Fiscal Assistance Centers Italian National Institute for Insurance against Accidents at Work offices Italian National Social Security Institution bisogna che si capisca che non sono ulteriori elementi della lista Universities	Cinemas Sport centers Thematic markets Museums Touristic offices Theaters	Taxi parking lots areas Car sharing stations Bike sharing stations Suburban bus stations Parking lots for disabled people Parking lots Metro stops

This statement is also based on some partial experiences we made: the views were presented and discussed, in a GIS environment, with some of municipal officials involved in the research. They obviously know the city well. These views are *objective* and depend on the data used, and may differ from the people's perceptions of the walkability. So, in front of these views, many questions arose, to understand how and why the analysis got those evaluations.

We think this is exactly the usefulness of our research: looking at walkability from multiple, partly new, points of view.

FUTURE RESEARCH DIRECTIONS

In fact, we think that the elaborations described in this chapter have to be seen as an aid to the various stakeholders to compare different points of view in an explicit and articulated way. Many steps of elaborations are questionable, in the sense that they imply choices, evaluations: it makes sense therefore, precisely, to use these elaborations to discuss on it.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 4. City level: weighted sum of the Kernel Density Estimation related to the attractive activities listed in Table 4

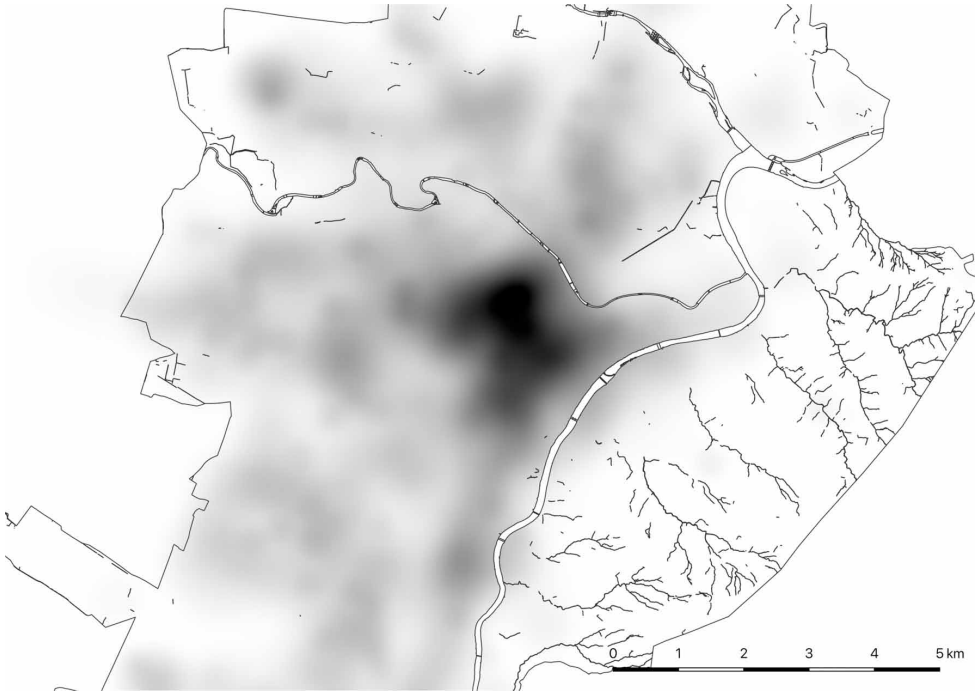
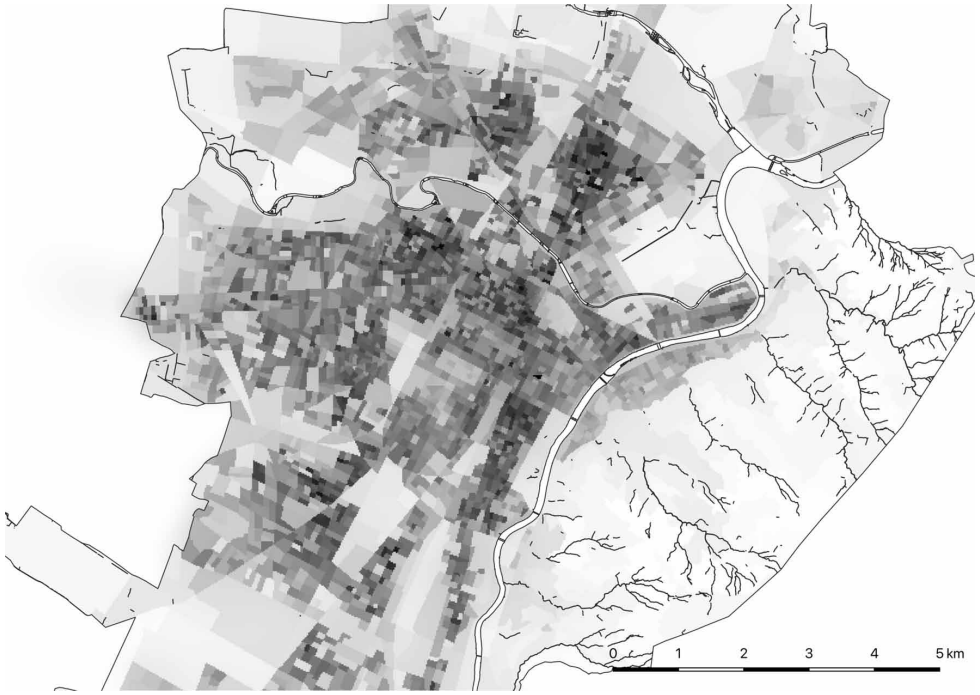


Figure 5. City level: in darker gray the parts of the city most suitable for the development of walkability



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Among the desirable developments (the chapter describes a work that is still ongoing) there is a certain automation of (at least) parts of the procedures, so that they can be used *live*, in operational contexts or in communication and participation situations. Some automation is also essential to produce sensitivity tests on the various indices and weights used, tests that help to focus on what is really important.

From the point of view of the Torino municipal mobility sector, the key point to the future development of walkability is not only to improve and increase the space for pedestrians but also that people take into consideration the possibility of walking on short distances, that is, they have to review their habits and build new mental maps of neighboring urban spaces. In 2015 the Municipality distributed a map named *Walk To* (where *To* stands for Torino), which contains some suggestions: some circumferences centered on the city center are drawn with the indication of the distances and the time to move on foot, but calculated as the crow flies, not significant and not very useful.

More stimulating information is required, for example, indications on what is the most pleasant and/or safe route and some highlights on the urban opportunities that can be encountered along the pedestrian paths. With this in mind we are thinking of making accessible meaningful parts of information that was elaborated and displayed in this research, producing an app for smartphone. Very important, this app shall allow also those who walk to provide some feedback to the Municipality.

CONCLUSION

The cost raster seems to be, and partly proved to be, a flexible and effective tool for reasoning, in detail, on the walkability of the city: it can be useful at neighborhood level, in discussion groups of interested people who know the places. The approach is objective, in the sense that the views of walkability are based on data, but we know that they depend to a large extent on implemented indices and weights. We think that people can be led to reconsider their perceptions of urban spaces and their urban mobility habits, also by varying the considered these indices and weights: questions and suggestions can arise. Perhaps even more questions and suggestions can arise when looking at the cost distances. It is with this process in mind that we avoided to use complex statistical algorithms that is we put it into practice the concept of IDTP 2018 *metrics ... easy to understand.*

Another concept of IDTP 2018 is *data… relatively inexpensive and quick to collect*. Hence the idea of using above all open data and of extracting thoroughly the information contained. If the San Salvario test area is limited, the extension of the survey to the whole city, and also to the urbanized parts of the metropolitan area, is feasible, not without costs but with sustainable costs.

ACKNOWLEDGMENT

We thank our colleagues Giuseppe Chiantera, Stefano Cianchini, Gabriele Del Carlo, Filippo Orsini, Rocco Picerno, Gianfranco Pirrello from Municipality of Turin who provided insight and expertise that greatly assisted the research.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Abley, S. (2005). *Walkability scoping paper.* Retrieved from http://levelofservice.com/walkability-research.pdf

Agampatian, R. (2014). *Using GIS to measure walkability: A Case study in New York City* (Master's thesis). Royal Institute of Technology (KTH), Stockholm, Sweden. Retrieved from https://pdfs.semanticscholar.org/20ef/6302095148094b97b229c50fe236321be338.pdf

Berke, E. M., Koepsell, T. D., Moudon, A. V., Hoskins, R. E., & Larson, E. B. (2007). Association of the built environment with physical activity and obesity in older persons. *American Journal of Public Health*, *97*(3), 486–492. doi:10.2105/AJPH.2006.085837 PMID:17267713

Blečić, I., Cecchini, A., Congiu, T., Fancello, G., & Trunfio, G. A. (2014). Walkability Explorer: An Evaluation and Design Support Tool for Walkability. In *Computational Science and Its Applications – ICCSA 2014, 14th International Conference*. Dordrecht: Springer.

Brownson, R.C., Hoehner, C.M., Day, K., Forsyth, A., & Sallis, J.F. (2009). Measuring the Built Environment for Physical Activity. *American Journal of Preventive Medicine, 36*, S99–S123.e12.

Butler, E. N., Ambs, A. M. H., Reedy, J., & Bowles, H. R. (2011). Identifying GIS measures of the physical activity built environment through a review of the literature. *Journal of Physical Activity & Health*, *8*(s1Suppl 1), S91–S97. doi:10.1123/jpah.8.s1.s91 PMID:21350268

de Smith, M. J., Goodchild, M. F., & Longley, P. A. (2018). *Geospatial Analysis. A Comprehensive Guide to Principles Techniques and Software Tools* (6th ed.). Retrieved from http://www.spatialanalysisonline.com/HTML/index.html?cost_distance.htm

Eynard, E., Melis, G., & Tabasso, M. (2017). *Una metodologia per il calcolo della camminabilità in città: il walk index a Torino*. ASITA.

Gauvin, L., Richard, L., Craig, C. L., Spivock, M., Riva, M., Forster, M., ... Potvin, L. (2005). From walkability to active living potential: An "ecometric" validation study. *American Journal of Preventive Medicine*, *28*(2), 126–133. doi:10.1016/j.amepre.2004.10.029 PMID:15694520

Handy, S., & Clifton, K. (2001). Evaluating Neighborhood Accessibility: Possibilities and Practicalities. *Journal of Transportation and Statistics*, *4*, 67–78.

Harvey, D. (2008). The Right to the City. *New Left Review*, *53*. Available at https://newleftreview.org/II/53/david-harvey-the-right-to-the-city

Holbrow, G. (2010). *Walking the Network. A Novel Methodology for Measuring Walkability Using Distance to Dastinations Along a Network*. Tufts University. Retrieved from http://sites.tufts.edu/gis/files/2013/02/Holbrow_Gabriel.pdf

Hollenstein, D., & Bleisch, S. (2016). Walkability for different urban granularities. In The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLI-B2, 2016 XXIII ISPRS Congress, 12–19 July 2016, Prague, Czech Republic

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Institute for Transportation and Development Policy (ITDP). (2018). *Pedestrians first. Tools for a walkable city*. New York: ITDP.

Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York: Random House.

Lefebvre, H. (1968). *Le Droit à la ville* (2nd ed.). Paris: Anthropos.

Livi, A. D., & Clifton, K. J. (2004). Issues and Methods in Capturing Pedestrian Behaviours, Attitudes and Perceptions: Experiences with a Community Based Walkability Survey. *Transportation Research Board, Annual Meeting*.

Manaugh, K., & El-Geneidy, A. (2011). Validating walkability indices: How do different households respond to the walkability of their neighborhood? *Transportation Research Part D, Transport and Environment*, *16*(4), 309–315. doi:10.1016/j.trd.2011.01.009

Mayor of London, Transport for London. (2018). *Walking action Plan: Making London the world's most walkable city*. Available at: http://content.tfl.gov.uk/mts-walking-action-plan.pdf

Ogle, A. (n.d.). *Walkshed find your walkable way through the urban jungle.* Retrieved from http://www.walkshed.org/

Pelletier, A., Paquin, S., Chartrand, A., & Montréal, Q. (2009). *Are all walking audits equivalent? A comparison of three walking audits in a Montreal neighbourhood*. Academic Press.

Robertson, R., Robertson, A., Jepson, R., & Maxwell, M. (2012). Walking for depression or depressive symptoms: A systematic review and meta-analysis. *Mental Health and Physical Activity*, *5*(1), 66–75. doi:10.1016/j.mhpa.2012.03.002

Saelens, B. E., & Handy, S. L. (2008). Built Environment Correlates of Walking: A Review. Med Sci Sports Excerc, 40(7), 550-566. doi:10.1249/MSS.0b013e31817c67a4

Saelens, B. E., Sallis, J. F., & Frank, L. D. (2003). Environmental Correlates of Walking and Cycling: Findings from the Transportation, Urban Design, and Planning Literatures. *Annals of Behavioral Medicine*, *25*(2), 80–91.

Seilo, P. (2004). *Walkability and Urban Form: A Gis-Based Analysis of Nodal Development Areas In The Eugene-Springfield Metropolitan Area* (Thesis). University of Oregon.

Talen, E., & Koschinsky, J. (2013). The walkable neighbourhood: A literature review. *International Journal of Sustainable Land Use and Urban Planning*, *1*(I).

Tomalty, R., Haider, M., Smart Growth BC, (2009). *BC sprawl report: walkability and health 2009.* Smart Growth BC.

Tomlin, C. D. (1990). *Geographic Information Systems and Cartographic Modelling*. Englewood Cliffs, NJ: Prentice-Hall. xi.

Vargo, J., Stone, B., & Glanz, K. (2012). Google walkability: A new tool for local planning and public health research? *Journal of Physical Activity & Health*, *9*(5), 689–697. doi:10.1123/jpah.9.5.689 PMID:21946250

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Walkable Communities, Inc. (n.d.). Retrieved from https://www.walkable.org/

WalkScore. (2011). *Most walkable large cities - New York*. Available: http://www.walkscore.com/NY/New_York

ENDNOTES

1. Torino is a city in the North-West of Italy, in the past it was a typical one company town (car industry), in profound transformation since the 90s. It currently has almost 900,000 inhabitants. It was discovered as a tourist destination after the 2006 Winter Olympics Games.
2. *Pedestrian First* (IDT 2018) suggests also a third level of analysis/intervention, named *street level*, that concerns the redesign of urban space: this level is beyond our competences and the purpose of this work.
3. For example, shops, bars and restaurants overlooking the sidewalk, which can be seen both as pleasure and security factor (social control), in this context are not considered as a destination of movement and has been given to them a radius of 50 meters.
4. Various Torino metropolitan area definitions have been given over time. In the context of this chapter it makes sense to refer to the urbanized continuum area that includes Torino and 14 neighboring municipalities: this area currently has about 1,3 million inhabitants.

This research was previously published in Spatial Planning in the Big Data Revolution; pages 113-137, copyright year 2019 by Engineering Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 18
Teleworking and a Green Computing Environment: A Conceptual Model

Iheanyi Chuku Egbuta
University of South Wales Business School, UK

Brychan Thomas
University of South Wales Business School, UK

Said Al-Hasan
University of South Wales Business School, UK

ABSTRACT

This paper considers strategic green issues of teleworking in terms of the environment, transport, location, office space and resource use for modern organisations and business sectors and formulates a conceptual model of the processes involved. Teleworking technologies are variously implemented for green computing initiatives and many advantages include lower greenhouse gas emissions related to travel, greater worker satisfaction and, as a result of lower overhead office costs, increased profit margins. The paper initially investigates the appropriateness of a working definition of teleworking with regard to green computing and explores the benefits, and barriers, of teleworking in a green computing environment. Theoretical frameworks and models of teleworking are considered and a conceptual model of the contribution of teleworking to green computing is formulated. The application of the model is considered in terms of teleworking concepts, the organisational environment and driving forces. It is the intention of the paper to identify, and articulate, those teleworking concepts that will be useful to academicians, scientists, business entrepreneurs, practitioners, managers and policy makers, and to indicate future directions for research scholars and students with similar interests.

DOI: 10.4018/978-1-7998-7297-9.ch018

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

The aim of the paper is to consider the strategic green issues of teleworking in terms of the environment, transport, location, office space and resource use (Goodman et al., 2004) for modern organisations and business sectors. The research has attempted to understand factors and processes through which organisations have adopted teleworking in relation to green computing. The study has surveyed and built upon the body of knowledge concerning teleworking and green computing, including applications and practice in the business research literature. In these terms the key benefits and barriers of "green teleworking" in contemporary organisations have been considered and the definitions and models of teleworking and green computing have been analysed. A review of the processes and dynamics of green teleworking as an innovative practice in modern organisations has been undertaken. Preliminary research questions for this study which arise out of the literature include:

- How do organisations overcome the barriers to adopting green teleworking?
- To what extent does teleworking, and specifically green telework, contribute towards a green computing environment?

In many respects, green teleworking is emblematic of recent changes in our ideas of work and the workplace (Bailey & Kurland, 2002). Information technology has facilitated the rapid growth of teleworking in recent times because modern telecommunication and computer technology allows workers to perform their duties at home or in remote locations instead of requiring them to travel to and from far-away workplaces (Ndubisi, 2003).

Most studies have attempted to reveal why the practice and application of telework has been slow among organisations and the main finding is that the interests among managers is low. According to Huws et al. (1990) in their survey of a poll of 4,000 European managers, reached the conclusion that telework 'is still very much a minority interest' among European managers. The research results showed that managers gave two major reasons for their disinterest in telework and these are: the lack of interest in the need for change, and the organisation and secondly, that the implementation of such programmes is difficult. The managers in large firms expressed concerns about controlling staff who work away from the conventional office environment. The smaller firms anticipated costs of managing and implementing telework programmes as a greater managerial issue (Bailey and Kurland, 2002).

Changes in order to organise work from different and remote locations with the use of hardware such as home and mobile computer, mobile phones and fax machines and software technologies such as the use of e-mails and group ware is what teleworking is about (Perez et al., 2004). Perez et al. (2004) believe that teleworking is not an all or nothing activity because only a small percentage of employees may be involved in teleworking. In addition, it can be viewed as a work pattern that can be imbibed in degrees ranging from less than one work day per week to all five work days per week.

Following identification of contemporary benefits and barriers of the adoption of green teleworking (Matthews & Williams, 2012), a model that highlights the importance of the factors for organisations has been developed to highlight the processes involved. Teleworking technologies are variously implemented for green computing initiatives and the many advantages include lower greenhouse gas emissions related to travel, greater worker satisfaction and, as a result of lower overhead office costs, increased profit margins. The paper initially investigates the appropriateness of a working definition of teleworking (USOPM, 2013) with regard to green computing and explores the benefits, and barriers,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of teleworking in relation to a green computing environment. Theoretical frameworks and models of teleworking are considered and a conceptual model of the contribution of teleworking to green computing is formulated. It is the intention of the paper to identify, and articulate, those teleworking concepts useful to academicians, scientists, business entrepreneurs, practitioners, managers and policy makers, and to indicate future directions for research scholars and students with similar interests.

The research methodology involved an extensive literature review into the fields of Teleworking and Green Telework. The literature review has identified journals, articles and documents that define, describe, test and analyse the concepts of Teleworking and Green Telework. Various definitions of Teleworking have been analysed from research papers and articles in contemporary journals and a definition of Green Telework has been given. The review has illustrated various trends and research gaps and has assisted in the formulation of a conceptual model of the contribution of Teleworking towards Green Computing. The research design has involved a logical sequence from the thematic literature review to the study's research questions, theoretical frameworks and models of Teleworking. This has been followed by formulation of the conceptual model, discussion of the usefulness of the model, future research directions and conclusions (Yin, 2012).

BACKGROUND

Teleworking Definitions

The definition of telework proposed by the European Commission reads as follows: "Telework is a form of organising work, using information technology, in the context of an employment contract/relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises on a regular basis" (Krzyskow, 2006). The role of technology (Ellison, 2004) is reinforced by the definition used in the Polish legislations labour code which defines telework as:

…work done on a regular basis from the workplace, using means of electronic communication, i.e. technical solutions, including information technology devices and appropriate software tools, which enable individual communication over a distance while transferring data between information technology systems. A teleworker is a person who performs telework and passes the result of their work to the employer by means of electronic communication, especially by means of e-mail (Krzyskow, 2007).

The Australian Telework Advisory Committee (2005) adopted a working definition of telework to include work undertaken, either on a full-time, part-time or occasional basis, by an employee or self-employed person, which is performed away from the traditional office environment. This includes working from home, and which is enabled by ICT, such as mobile telephony or the internet. Australian Telework Advisory Committee (2006) research findings show that owing to the lack of a consistent definition of telework, it is difficult to assemble authoritative data when measuring the uptake of telework across industry sectors and between countries. Notwithstanding the difficulties in assembling comparable statistics, there is a surprising level of consistency in the conclusions of researchers who have studied telework, including the capacity of these arrangements to support business productivity and efficiency improvements, and their ability to broaden workforce participation. Daniels et al. (2001) define mobile telework as multi-location or nomadic telework as a brand of work that usually involves travel and/or

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

spending time on the customer's work location with the teleworker probably utilising laptop computers and mobile phones to support their mobile work. Mobile telework is classed as a form of working where those carrying out this work pattern work at a range of locations, spending a considerable amount of time away from home and office locations.

In an analysis of Daniel's definition of mobile teleworking, Hislop & Axtell (2007) suggest that the technology element of the definition leaves out jobs such as lorry driving, which involves considerable amounts of mobility however in some way necessitates minimal use to be made of information and communication technologies. Perez et al. (2004) views teleworking as the organisation of work through the utilisation of communication and information technologies that facilitate managers and employees to access their work activities (Golden & Fromen, 2011) from distant locations (Morganson et al., 2010) including hotels, airports and other remote locations (mobile teleworking), managers and employees' homes (home-based teleworking) and branch offices set up solely for the intention of lightening the employee's daily commute (telecentres or teleworking centres).

Niles' (1994) definition of teleworking concurs with the work of Perez et al. (2004), by defining telework as working outside the conventional work place and communicating with it by way of telecommunications or computer-based technology. Sullivan & Lewis (2001) encapsulate most of the above definitions of telework in a brief definition which states that telework is work practice that takes place anywhere and anytime. Ndubisi and Kahraman (2005) define teleworking as 'an information and communication technology aided work arrangement concerned with the use of personal computers, dedicated word processors or terminals, telephone, fax, e-mail, modem, etc., for work-related purposes from the employee's home, a satellite or neighbourhood work centre or any flexible work location outside the traditional work place will be adopted'. Building upon these definitions we define green teleworking as 'work undertaken away from the conventional office location using computer and telecommunications technologies involving green considerations of the environment, transport, location, office space and resource use'.

Benefits of Teleworking

Teleworking nowadays is considered as a flexible way to organize work and no longer as a technological innovation (Bridoux & Taskin, 2005). Teleworking represents an alternative work arrangement facilitated by information and communication technologies that allow the employee to work physically outside the conventional workplace, and, therefore, brings work to the worker (Fairweather, 1999) (Lake, 2013). This includes working away from the company premises (e.g. at home, in travel, in tele-centres), and is buttressed by the works of Watad and DiSanzo, 2000; Nilles, 1992; Olsen, 1983; that view telework as the inclusion of opportunities that employees are given to work from home rather than reporting to a centralised office site. Flexible, and in most cases unregulated, work time is another trait of teleworking which, according to Feldman and Gainey (1997), involves many workers making use of telecommunications technology to extend the workday after they arrive home, which in conventional terms will be classed as after office hours' time.

Scott and Timmerman (1999) evaluated issues concerned with teleworking including communication technologies options and their role on virtual work and assorted workplace classification. The conclusion of the evaluation was that telephone is the most used technology and they further discovered that there are a number of differences between the telecommunication technologies teleworkers used for communication and interface with a range of other parties (Scott and Timmerman, 1999).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Work involving processing data such as text, graphics, video, etc., (ENTER, 2007) are active teleworking mediums and these technologies are the backbone of any telecommuting programme and managing them is critical in the support of all teleworking programmes and initiatives (Siha et al., 2006). Byrd and Gulbro (1998) examined the significance of e-mail as a distributor and disseminator of information. However, they caution that e-mail should not be used to resolve employee crisis or to convey disapproval and they advise, that guidelines should be offered so that employees know when they should use face-to-face or telephone interactions (Byrd & Gulbro, 1998, Golden et al., 2008). Gornall et al. (1999) highlighted the need for video conferencing and its unique benefits over emails and phone conversations in organisations which can be very beneficial to the Green Teleworking concept.

Telework allows employees flexibility and control over their schedules (Strum, 2001; Hill et al., 1998). There have been different definitions of teleworking, however, summarizing all dimensions and conceptual criteria used by different authors, and admitting Qvortrup's (1998) claims that there is no reason to believe that an ambiguous and restrictive definition can be established for such a diverse phenomenon as teleworking. Huws et al. (1990) argue that three components are mandatory to recognize somebody as a teleworker: working in a remote location from employer or contractors' premises; use of IT technologies to complete work; and use of communications technologies to communicate for work purposes (with employer, colleagues, clients, etc.). According to Kamerade and Burchell (2004), there are three basic dimensions along with the different types of telework that can vary in addition to the three mandatory components: the location of remote work (Lim and Teo, 2000), combining home and traditional office, in satellite offices, telecentres (Bussing, 1998); the proportion of working time spent on remote working (Daniels et al., 2001); permanent or occasional work at home (Bussing, 1998); and employment status e.g. freelancer, employed, self-employed etc. (Daniels et al., 2001). There can be a wider variety of different types of teleworkers flexible enough to meet diverse analytical purposes and to concentrate on the teleworking specifics in different contexts (Kamerade & Burchell, 2004).

Another empirical study primarily associated with work that is repetitive, measurable and structured performed by DuBrin (1991), showed an increase in telework work-at-home by practicing employees. Chevron and Primeau (1996) examined teleworkers' behaviour and workers' attitude and found that teleworkers appreciate the freedom and feel more efficient; however, they miss the socialisation aspect of the typical work arrangement. The average capacity utilisation for the centre is about 54 percent based on regular users (Alcott, 2001). Programmes can be designed to train and educate people with disabilities for work in knowledge-based sectors which may assist in overcoming limitations to employment possibilities for people with disabilities (Baker et al., 2006).

Ndubisi and Kahraman (2005) have chronicled a list of these potential benefits and these are the balance between work, family and leisure is an advantage that teleworking offers to individuals. The flexibility issue, of caring for young children or an elderly family member while working from home, is addressed in conjunction with the balance issue in the family (Siha et al., 2006). There are many flexible life scheduling methods to accommodate new tasks. Hill et al. (1998) discussed the results of an empirical study where the influence of the virtual office was examined and it was found that it has a great positive influence on productivity and flexibility.

Less commute travel and more effective use of work time which translates to increased productivity results from eliminating the wasted time that a real commute requires and as a benefit of teleworking that is highlighted in studies by Davies (1995), Hill et al. (1998) and Angove et al. (2007). A study by DuBrin (1991) showed an increase in productivity of work-at-home employees, this was primarily associated with work that is structured, repetitive and measurable.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bailey and Kurland (2002) conclude that work/life balance is indeed a benefit of telework but that the effect is primarily a benefit for "dual-career" families. Tietze (2002) reviewed a series of case studies of the UK teleworker that provided additional support for the benefits of dual-career spouses. One male spouse was able to take on more family duties including 'child rearing tasks' as a result of telework opportunities. Work–life balance has become increasingly important for a number of social and economic reasons which are making organisations think about how they work, government think about how people balance paid and unpaid work and care (USOPM, 2009; US Gov, 2010), and individuals think about the role work has and will have at different stages of their life. Broadly, this shift is influenced by changes in markets, ways of working, the labour market and expectations of work (Miller et al., 2008).

Hopkinson and James (2001) evaluated self-completion questionnaires from British Telecom (BT) employees who were in the process of registering for the BT options 2000 teleworking programme (a programme by BT to enable staff telework and reduce organisational cost). It was discovered that some employees were already working at home an average of 1.9 days a week and, considering overall, respondents anticipated that in future they will operate from home an average of 3.6 days per week (average car mileage saved by pre-existing teleworking was 95 miles per week per teleworker) (Hopkinson & James, 2001).

Internal research by Hewlett-Packard Ireland showed that teleworking can increase productivity by 25%. Relevant factors include reduced distractions and interruptions among teleworkers, as well as fewer commuting problems and a reduction in absenteeism (Sweeny, 1998). Productivity improves due to increased work efficiency in their work environment and the Telefutures report quoted figures of up to 50% reduction in sick leave (Bertin & O'Neill, 1996).

At an economic level, teleworking assists in the reduction of operational overheads especially accommodation and can provide a possible solution to the problems of rising office overheads, office expansion or situations where a high proportion of office desks are empty at any one time (National Advisory Council on Teleworking, 1999).

Barriers of Teleworking

The Sensis Report (2005) suggests that some businesses that did not have employees teleworking said that the main barrier was a belief that it was not suitable for their type of work. Also, in the Sensis report, 13 per cent of teleworkers report a negative impact of having to work longer hours (Sensis Report, 2005). Teleworkers may also think that their profession is being hampered by a lack of social contact with their contemporaries and managers and by being absent from the office (Australian Telework Advisory Committee, 2006).

In February 2005, the UK government announced a public consultation on extending the British flexible working laws that were introduced in April 2003 (DTI, 2005). In 2003, parents of children under six and disabled children under eighteen were given the right to request flexible working patterns, which included part-time working, variations in working hours and home working (DTI, 2005). Since employers have a duty to consider such requests seriously a government survey estimated that thirteen per cent of employees requested a change to working patterns in the first year of this law and eighty-six percent of those requests were wholly or partially accepted, meaning that around 80,000 people had new flexible working patterns (DTI, 2004). Ten per cent of those requests concerned working from home on a regular basis (DTI, 2004). If the home working ratio seen in the first year is a reliable predictor, this means perhaps 100,000 further people will be working from home on a regular basis (DTI, 2005).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

While the more formal aspects of teleworking are the subject of widely available advice concerning legal health and safety and some technology and work organization aspects (DTI, 2003), there are deeper unaddressed issues. These issues, as highlighted by Gundry and Slater (2005), are trust, work management, information management, social and team aspects, visibility and development, communications and time management and isolation (Angove et al., 2007). Technology is viewed as the backbone for any teleworking programme and managing it is critical in the sustainability and support of teleworking and technology is the enabler of teleworking (Siha et al., 2006).

There are several technology options to help implement telework and according to Viack Corporation (2005) the inherent technology needs for a teleworker are: a computer, internet connectivity, e-mail program, telephone and fax machine. The highest concern expressed from managements in organizations has been the fear of having less control over employees who work from home, ensuring that they remain productive and efficient. This particular concern can be addressed by introducing a richer medium for continuous communications, such as an online communication collaboration tool suite. By equipping teleworkers with high speed internet, a web camera, headset and an online communications solution, managers will be in touch with teleworkers at all times. An effective and useful tool, it should include such features as real-time video, telephone-quality audio and presence detection systems to allow better interaction between the main office and teleworkers. Using a combination of communication methods, such as online meetings, e-mail, fax and phone, will provide a comprehensive telework program.

In order to ensure that the basic elements of a successful teleworking scheme are in place, AT&T (2004) recommends that companies need to apply certain strategies to make it work. Positive outcomes such as improved productivity, organizational loyalty and belonging, job satisfaction, and employee retention and attraction often top lists of the advantages of teleworking (Bailey & Kurland, 2002) but an increasing number of people are teleworking to a large extent as an ordinary element of their job. In contemporary times it is unrepresentative of the true picture to study telework along any single factor or element, but rather in relation to varying working practices in general.

Theoretical Frameworks and Models of Teleworking

Research has shown that not all studies have supported teleworking. Von Glinow and Metzger (1988) attempted to offer an even-handed view by highlighting the problems experienced as a result of teleworking as a mode of work. Such problems highlighted are: social isolation, the presence of children, scarcity of non-financial incentives, career progression option, control mechanisms for efficient direction and governance, loyalty and commitment (Von Glinow & Metzger, 1988; Workman et al., 2003; Golden, 2006). Gainey et al. (1999) and Davenport and Pearlson (1998) also agree that social isolation is a problem in the teleworking work pattern in their research. Venkatesh & Vitalari (1992) cited teleworking inside the wider context of a non-synergised organisational structure. In their research, they consign to additional work done at home, in addition to the usual office based work. A focal input of Venkatesh and Vitalari's model is the merging of the three factors of the organisation work factor, the technology work factor and the household factor with emphasis on home-work relations.

There are several representations of teleworking however, according to an Australian telework advisory committee consultation paper (2002), telework has eight models and they are satellite centres, time-shifting, home-based telework, home shoring, mobile workers, virtual working, home-based self-employment and off-shoring. Different conceptual models for the adoption of telework and its uses have been proposed by many researchers and these are evidenced in the literature.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

There are several models worth exploring to develop a deeper appreciation of teleworking. For instance, the work of Gray (1997) adopted the supply/demand approach of telework; the relationship between different telework practices and organisational outcomes (Matthews & Williams, 2012) by Belanger and Collins (1998). The Siha and Monroe (2006) research model follows a top–down viewpoint that starts with a tactical organisational element controlled by the regulatory and competitive environment within which an organisation operates. The Siha and Monroe model advocates government regulation and competition because they present the momentum for organisations to consider telework work patterns (Siha & Monroe, 2006).

A CONCEPTUAL MODEL OF GREEN TELEWORKING

The conceptual model of green teleworking developed for the research is central to the research questions, methodology and survey work. It has been fashioned as a model that depicts the organisational adoption process of green teleworking and has been developed taking into consideration important stakeholders and defining the main concepts. The principal concepts concerning Green Teleworking identified in the literature are: 1) Environment, 2) Transport/travel, 3) Location of work, 4) Office space, and 5) Resource use (Goodman et al., 2004), and these are described below.

1. **Telework and the Environment:** Reduced environmental impacts is a major benefit of teleworking and according to the Department of the Environment and the Environmental Protection Agency in Ireland, motor vehicles are a significant source of greenhouse gases, air pollution, noise, and deterioration of the urban environment and health problems. This has led to their acknowledgement of the environmental benefits of teleworking such as reduced commuting that will lead to less gas consumption and less emissions, possible saving in energy usage in modern buildings, and reduced traffic congestion. Additional benefits to the teleworker include a reduction in commuting time and the increase in leisure/family time, health benefits, a reduction in stress levels and possible cleaner environment benefits and financial savings (National Advisory Council On Teleworking, 1999). Even though local air pollution has declined with the advent of catalytic converters and cleaner fuels, improvement in fuel efficiency for individual vehicles has been balanced by the growth in the volume of traffic (Department of Transport, 2002). Sometimes alternatively called 'telecommuting', teleworking has been presented as an answer to the inconvenience of traffic congestion and pollution with the supposition that travel will be reduced because of the eradication of commuting trips (Baines, 2002; Pyoria, 2003).
2. **Transport/Travel:** Teleworking using mobile networking devices could promote a general shift away from passenger car travel (Goodman et al., 2004) and recent European Commission research has underscored a scenario of simultaneously increasing road congestion and rapidly improving mobile computing. Since public transportation is more open and adaptable to mobile computing than the private car i.e. with wireless internet now frequently available on trains, the research envisages the prospect of a movement from the car to the bus, tram and train (Ndubuisi, 2012) (Erdmann et al., 2004). A study by Mitchell and Trodd (1994) observed the travel behaviour of a small sample of practicing UK teleworkers and found an average reduction in commute of 113 miles per week (even after creating allowances for remaining travel to work and additional non-work trips). A study by Flexibility Ltd (2000) and Angove et al. (2007), also support this, reporting that time wasted

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in traffic jams can represent a significant loss to the economy, as evidenced in the estimated net public loss to the UK economy at £20 billion. Environmental benefits from increased telework through reduced traffic congestion and carbon emissions will assist to address air quality and the quality of life in metropolitan areas (Lake, 2013) and business savings can be realized by providing flexible telework arrangements which improve worker productivity, efficiency and organizational effectiveness and reduce staff turnover and absenteeism (Sensis, 2005). Organizations that have established business cases and invested in telework, are reaping the benefits because they outweigh the costs (Sensis, 2005).

3. **Location of Work:** Improved flexibility and work-life balance is often mentioned in relation to teleworking (Wilks & Billsberry, 2007). Kurland and Bailey (1999) and Gurstein (2001) mention the supposition that doing work from home allows a more beneficial work-life balance even though Gurstein (2001) questions if it is truly the case. Tietze and Musson (2005) advise that the boundaries and discourses of work and home blur when people telework while it is suggested by Wilson and Greenhill (2005) that gendered identities and roles will be renegotiated because of the promised flexibility of telework. Tietze and Musson (2005) found that working from home was not an interruption-free method of work, however they found out from the teleworkers interviewed that they were able to make out time to benefit their families and themselves and these moments were much appreciated. Business productivity and cost savings advantages are evidence that indicate the positive consequences and cost of teleworking to employers (Jackson and van der Wielen, 1998; MITEL, 1998). Teleworking is viewed as an attractive working arrangement among employees generally, as increased flexibility of working hours and location of work can be used to meet the changing needs of people throughout their lives, and during human and natural disasters, the ability to work in a decentralized manner, away from central business locations, can allow businesses and governments to provide ongoing services (ATAC, 2006).
4. **Office Space:** Cost savings in office space are a major advantage of teleworking because people who telework do not use office space and do not create overheads and this advantage even covers part-time teleworking hot-desking because they still generate space savings (Baruch, 2001). Companies are now reducing office work space and streamlining work activities on the basis of room-sharing and remote working and traditional workplaces and central offices are going through fragmentations and shrinking in order to reduce office overheads and cost of facilities (Morelli, 2001).
5. **Resource Use:** Since the mid-1990s traditional 'nine-to-five' offices were replaced by flexible working solutions for employees such as virtual offices, hot desking, motelling, hotelling and campus-style organisations (Wood, 1997). Several studies especially those from Baruch and Nicholson, 1997; Hill et al., 1998; Leonard, 2000, and Lake, 2013 have highlighted employees' improved efficiency and effectiveness and even increased morale and satisfaction as some intangible benefits of teleworking. There is definitely a positive impact of telworking on individual performance (Golden et al., 2008), wellbeing and effectiveness (Atkinson, 1985; Baruch, 2000; Di Martino and Wirth, 1990). Increased workforce participation in teleworking and remote working is becoming more of an option for employers of labour because according to Hart (2008):

…employing staff to work from home gives employers access to staff with the skills they need, no matter where they may be based. And while our country's network has room for improvement, it does offer

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

many people the facilities to log onto company networks – just as though they were sitting at a desk on-site. And once the concept of staff working remotely has been accepted, it opens up the possibility of employing people with the skills a company needs no matter where in the world they may be.

Empirical studies indicate that in organisations the human resources department's flexible practices such as flextime; part-time work, compressed work week etc., contribute a great deal and positively impact on firm performance (Konrad & Mangel, 2000; Perry-Smith & Blum, 2000; Eaton, 2003; Watad & Jenkins, 2010).

Figure 1. A conceptual model of the contribution of Teleworking towards Green Computing (based on Goodman et al., 2004 and Egbuta, 2016)

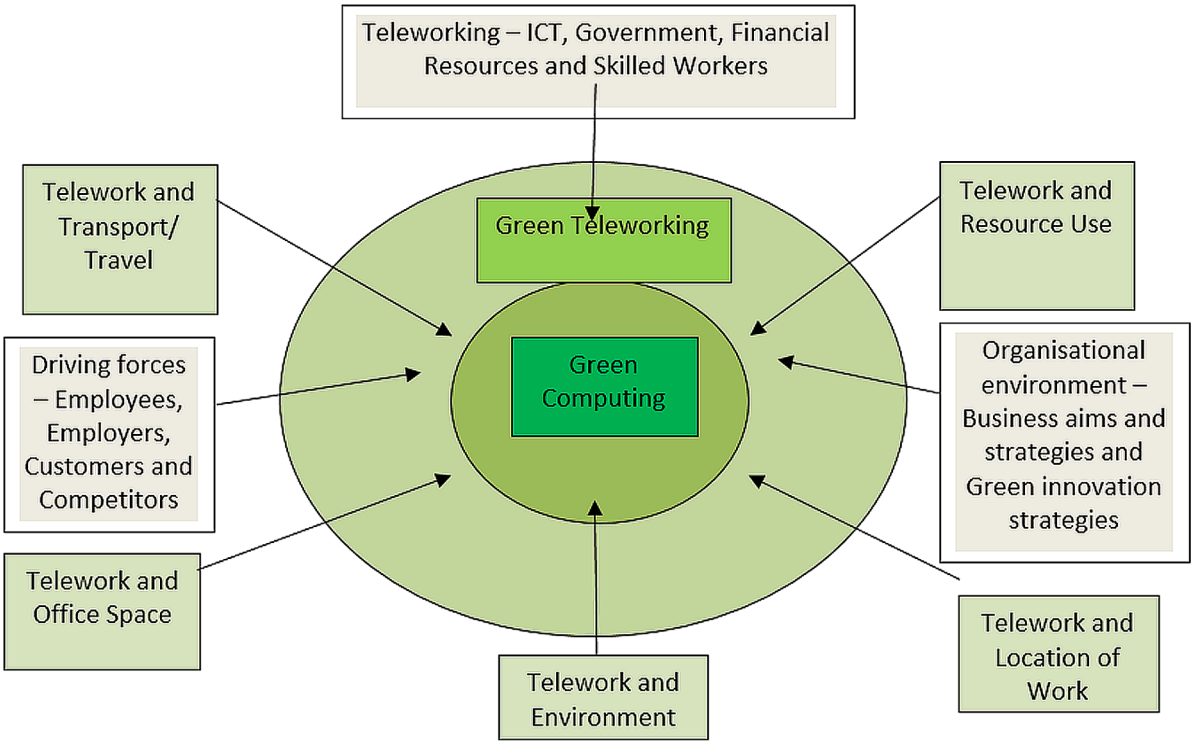


Figure 1 illustrates the conceptual model of the contribution of Teleworking towards Green Computing according to the main concepts (Goodman et al., 2004).

APPLYING THE MODEL

The application of the model can be through the ICT infrastructure, government, skilled workers and the green computing environment (Egbuta, 2016), and these are discussed below.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Teleworking

Information and Communications Technology (ICT)

ICT infrastructure refers to the facilities and networks employed to transmit and receive information by electrical or electronic means. For every country, the level of telecommunication infrastructure provided is different. Organisations need to know what telecommunication infrastructure is available in their area to have a better understanding of the type of teleworking that they can have access to and can make their business more efficient.

There are various types of teleworking through ICT infrastructure connection that is offered to organisations depending on the availability. Some examples of common ICT connections are Digital Subscriber Line (DSL), Wireless Internet Service Provider or Mobile Broadband. Each of the connections offers a different type of Internet speed and price. If the users have a reliable telephone connection, considering the DSL might be the best (most expensive). However, mobile broadband has the advantage that the users can use it to access the Internet anywhere (dependent on whether the users have access to the 3G, 4G and in recent times 5G network).

The other alternative to access the Internet is from a public access point, such as a tele-centre, places, Wi-fi zones that offer the Wi-fi or Internet cafés. These can be commonly found in nascent times on trains, buses, shops, hotels, holiday resorts, ships, boats, clubs, schools, and in diverse places where business takes place. This alternative is a common option for rural areas organisation users to get connected to the Internet in order for them to effectively have teleworking as a workplace practice.

Government

The government is the agency that can provide many kinds of support programmes and incentives to assist organisations in the adoption of teleworking. For example, government can introduce some major components of support programmes, which cover infrastructure, financing, advisory services and information, health and safety, technology, and human capital. These are some components created to assist and enhance the growth of teleworking in organisations.

These support programmes and incentives provide greater opportunities for organisations to gain an advantage. For instance, organisations may seek advice on adopting and using teleworking. In addition, organisations may consider the incentives offered by the government such as grants offered and given to start new businesses with little or no taxes paid on ICT equipment and workplace developmental programmes, skills growth and management skills development, which supports the adoption of teleworking. Government incentives, support bodies and business growth intervention programmes in some countries, these types of support programmes will not exist. Organisations can refer to business councils or chambers of commerce to identify what support programmes and incentives are being offered by the council or in their cities.

Financial Resources

The cost of the adoption of teleworking as an innovative work practice can be an issue for organisations. It will result in start-up costs that have to be borne by the organisations; however, in the long-run the adoption of teleworking will reduce operational costs drastically. For example, through teleworking

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

as an innovative workplace practice, organisations can reduce the cost of printing of materials (letters, brochures, pamphlets or forms), manage customer orders systematically remotely and from any location, and be able to answer any response from customers promptly (replying to e-mails). Below are a few recommendations that organisations could consider to reduce the cost of adopting teleworking as a workplace practice:

- Organisations practicing teleworking may utilize free services, like free website templates to design the website, free e-commerce checkout tools for payment facilities, free software for managing website content and free hosting packages. These free services allow organisations to create a business website with minimal cost. Organisations can slowly replace the website with high quality for-pay services as teleworking applications and practices, reduce the cost of business overheads and grows and generate profits.
- Organisations can adopt the use of skype, go to meetings, face time (i-phone facility), yahoo messenger, msn messenger which are all free services in order to reduce costs however still able to view clients, employees and customers through video conferencing regardless of location. This is one of the benefits of teleworking.
- Organisations could consider using collecting deals with telecommunication firms by using a bulk collective contract on phones, on internet and on online portals, the chances of reducing costs are higher as such deals most times, come at discounted rates thereby saving organisations valuable resources and ploughing it back into expanding the telework practice for better business.

For organisations in rural areas, collaborating in developing a superior joint teleworking portal or site can be an advantage for organisations (sharing the resources). Through this portal, organisations can work together to promote their business as they do not have to pay to promote themselves individually. This is an innovative way of enhancing teleworking and supporting each other.

Skilled Workers

There are certain issues to be considered before hiring skilled workers for teleworking to be practiced. Among these issues are:

- The cost of hiring skilled workers is expensive. Does it affect your organisation's expenses?
- Can hiring one skilled worker be an asset to the organisation as he/she would be able to train others in teleworking methods and application, thereby saving the organisation's resources?
- For rural areas, there is a possible shortage of skilled workers. Thus, it diminishes the option of the skilled workers to be selected.

Organisational Environment

Business Aims and Strategies

It is important to have appropriate business aims and strategies for each organisation. The business aims and strategies will determine the direction of the organisation and determine if the organisation is

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

driven by positive innovation thereby applying teleworking as a workplace practice. The aims guide the business in what to do and the strategies indicate how the business will do it.

Green Innovation Strategies

Green innovation strategies involve the process of promoting new ideas, products and services in a green computing environment, which allows the organization to increase sales and profits with limited available resources. It may also be seen to be the conversion of new knowledge into products or services thereby, creating value, increasing efficiency, and therefore growing a business.

Teleworking even though not very new can be classed as a green innovation strategy for organisations as it was formerly perceived to be just for technology enhanced organisations. Without innovation, new products, new ways of carrying out business and new service delivery plans for employees and customers would never materialise, making organisations remain entrenched doing things the same way without positive environment friendly change.

Driving Forces

Employees

Employees are the back bone of any organisation and most especially the employees that make up environment friendly enterprises. If the employees of an organisation are not happy with their conditions of service, work environment, direction of the business, innovative ideas for future business development, this will definitely affect the progress of such a business. Hence, the need for work practices such as teleworking to be implemented and sustained to ensure that working conditions are favourable as well as having the right workplace balance for healthy family life which if not managed properly will affect performance.

Employers

Employers employ labour and have the full power to transform the direction of their businesses and transform the innovative direction of their businesses completely. Teleworking is advocated and employers embracing this workplace practice will do a lot to boost employee satisfaction, customer happiness because of the bespoke nature and pro-customer and pro-business outlook of teleworking.

Customers

Every customer might have different needs. Every organisation has a target audience and once that audience called customers are not catered for, the business will begin to see problems that can affect its existence. This scenario needs to be considered by organisations as innovation through teleworking allows for flexibility with customers' needs in order to select an appropriate approach for the target market.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Competitors

It is important for organisations to identify their competitors in the market especially in an ever-changing world where needs and desires change every second and businesses and customers continue to seek better alternatives. The adoption of teleworking as a business practice can give an organisation a positive advantage over its competitors.

DISCUSSION OF THE USEFULNESS OF THE MODEL AND FUTURE RESEARCH DIRECTIONS

With regard to the usefulness of the conceptual model, the benefits include the provision of a framework that clearly specifies the main concepts associated with the adoption of a Green Telework approach by organisations and companies. The general nature of the model enables its use for a broad spectrum of organisational situations and through this it will be possible to evaluate the consequences of the adoption of a Green Telework approach. Further to the development of the model it will be possible to provide a clear direction for future research into Green Telework. This will address some of the existing gaps in the literature and provide an agenda for future research. A key success factor in terms of how well an organisation performs in terms of Green Teleworking is whether there is a positive environmental impact (Campbell & McDonald, 2009). One measure will be whether there is a significant reduction in travel leading to less pollution and congestion. Future research is therefore required to investigate this. Existing research into Teleworking, and specifically Green Teleworking, has tended to examine advantages and disadvantages. There is therefore a need to investigate the deeper issues of the various groups involved. Finally, with the development of the latest laptops and netbooks these will have a much smaller environmental impact buttressing the need for a more universal Green Computing environment and a future research strand could be to quantify the benefits of these.

CONCLUSION

The paper has considered the strategic green issues of teleworking in terms of the environment, transport, location, office space and resource use for modern organisations and business sectors and has formulated a conceptual model of the processes involved. This study contributes to the body of knowledge in respect of the use of teleworking in a green computing environment. It has been observed that more attention is needed to support organisations in adopting teleworking as a workplace practice (Egbuta, 2016). Many previous studies have focused on the use of teleworking on a larger scale, and ICT in general, by larger enterprises in developed countries. This study has involved the development of a conceptual model for the use of teleworking as an innovative tool and workplace practice in a green computing environment. The study has made an empirical contribution through providing greater insight to organisations in adopting teleworking as an innovative work practice in their business. The model offers benefits to researchers, development consultants, and policy makers. There are many ways to apply this model. From the perspective of organisations, this model can be applied to evaluate the performance of the adoption of teleworking. Organisations can revise their business aims and strategies, and innovation strategies if the adoption of green teleworking in the workplace does not contribute to the outcomes expected. The

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

model will provide better insights to professional consultants or development for assisting adopter and non-adopter organisations to focus on areas they need to concentrate on if any complexities arise. This model can be presented as an instructive manual for environmental policy makers. Through this model policy makers can determine the areas of teleworking innovation in a green computing environment that require support.

It has been found that teleworking technologies are variously implemented for green computing initiatives and the many advantages include lower greenhouse gas emissions related to travel, greater worker satisfaction and, as a result of lower overhead office costs, increased profit margins. The paper has investigated the appropriateness of a working definition of teleworking with regards to green computing and has explored the benefits, and barriers, of teleworking in a green computing environment. In relation to the research questions posited it has been found that organisations can overcome the barriers to the adoption of green teleworking by taking an informed approach to enable competitive advantage and cost savings. In these terms teleworking, and specifically green telework, can make a positive contribution towards a green computing environment. Following consideration of the theoretical frameworks and models of teleworking a conceptual model of the contribution of teleworking to green computing has been formulated. This has identified and articulated those teleworking concepts that are useful to both academics and practitioners and from this the future directions for research have been identified.

REFERENCES

Alcott, J.T. (2001, March 22). *Federal telecommuting programs*. FDCH Congressional testimony.

Angove, M., Egbuta, I. C., & Naat, E. (2007). Comparative Study of the Concept and Practice of Teleworking in Estonia, Ireland and Wales-UK. Equinex Project, University of Wales, Newport Centre for Community and Lifelong Learning.

ATAC. (2006). *Telework for Australian Employees and Business Report of the Australian Telework Advisory Committee to the Australian Government. AT&T (2004) The Remote working Revolution. Point of new/remote networking*. AT&T. November.

Atkinson, W. (1985). Homework. *The Personnel Journal*, *64*, 104–109.

Australian Telework Advisory Committee. (2002). *Consultation Paper: Teleworking in Australia.*

Australian Telework Advisory Committee. (2005). *Consultation Paper: Telework for Employees and Businesses: Maximising the economic and social benefits of flexible working practices.*

Bailey, D. E., & Kurland, N. B. (2002). A Review of telework research: Finding new directions and lessons for the study of modern work. *Journal of Organizational Behavior*, *23*(4), 383–400. doi:10.1002/job.144

Baines, S. (2002). New Technologies and Old Ways of working in the home of the self employed teleworker. *New Technology, Work and Employment*, *12*(2), 89–101. doi:10.1111/1468-005X.00096

Baker, P. M. A., Moon, N., & Ward, A. C. (2006). Virtual Exclusion and Telework: Barriers and Opportunities of Technocentric Workplace Accommodation Policy. *Work (Reading, Mass.)*, *27*(4). PMID:17148880

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Baruch, Y. (2000). Teleworking: Benefits and Pitfalls as perceived by professionals and managers. *New Technology, Work and Employment*, *15*(1), 34–39. doi:10.1111/1468-005X.00063

Baruch, Y. (2001). The Status of Research on Teleworking and the Agenda for Future Research. *International Journal of Management Reviews*, *3*(2), 113–129. doi:10.1111/1468-2370.00058

Baruch, Y., & Nicholsen, N. (1997). Home, sweet Work: Requirements for Effective Home-working. *Journal of General Management*, *23*, 15–30.

Bertin, I., & O'Neill, G. (1996). *Telefutures - a study on teleworking in Ireland. Dublin*. Forbairt/Telecom Eireann.

Bridoux, F., & Taskin, L. (2005). *Telework: A challenge to knowledge creation and transfer*. CRECIS Center for Research in Change Innovation and Strategy, Louvain School of Management.

Bussing, A. (1998). Teleworking and Quality of Life. In P. J. Jackson & J. M. Van Der Wielen (Eds.), *Teleworking: International perspectives. From Telecommutingto the virtual organisation* (pp. 144–166). London: Routledge.

Byrd, K., & Gulbro, R. (1998). E-mail and the organisation of tomorrow. *Ivey Business Quartely*, *63*(1), 14–15.

Campbell, J., & McDonald, C. (2009). Defining a conceptual framework for telework and an agenda for research in accounting and finance. *International Journal of Business Information Systems*, *4*(4), 387–402. doi:10.1504/IJBIS.2009.024502

Chevron, J., & Primeau, M. (1996). The telecommuting innovation opportunity. *Journal of Consumer Marketing*, *13*(4), 40–48. doi:10.1108/07363769610124537

Cresswell, J. W. (2007). *Qualitative Inquiry and Research Design – Choosing among Five Approaches*. Thousand Oaks: Sage Publications.

Daniels, K., Lamond, D., & Standen, P. (2001). Teleworking: Frameworks for Organisational Research. *Journal of Management Studies*, *38*(8), 1151–1186. doi:10.1111/1467-6486.00276

Davenport, T., & Pearlson, K. (1998). Two cheers for the virtual office. *Sloan Management Review*, *39*(4), 51–65.

Davies, E. (1995). Have modem, won't travel. *Management Review*, *84*(4), 7–9.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly*, *13*(3), 319–340. doi:10.2307/249008

Department for Transport (2002). *Transport Trends 2002.*

Di Martino, V., & Wirth, L. (1990). Telework: A New Way of Working and Living. *International Labour Review*, *129*, 529–554.

DTI. (2003, August). *Telework Guidance*. UK Department of Trade and Industry.

DTI. (2004, April). *Results of the first flexible working employee survey*. UK Department of Trade and Industry.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

DTI. (2005, February). *Work and Families, choice and flexibility, A consultation document.* UK Department of Trade and Industry.

Dubrin, A. J. (1991). Comparison of the job satisfaction and productivity of telecommuters versus in-house employees: A research note on work in progress. *Psychological Reports*, *68*(3c), 1223–1234. doi:10.2466/pr0.1991.68.3c.1223

Eaton, S. (2003). If you can use them: Flexibility policies, organizational commitment, and perceived performance. *Industrial Relations*, *42*(3), 145–167. doi:10.1111/1468-232X.00285

Egbuta, I. C. (2016). *The Adoption of Teleworking as an innovative work practice by Small Business Enterprises in South Wales* [PhD Thesis]. University of South Wales, Pontypridd.

Ellison, N. B. (2004). *Telework and Social Change: how technology is reshaping the boundaries between home and work*. Westport, Connecticut: Praeger.

ENTER. (2007). *A Guide to Telework*. Warsaw: European Social Fund and EQUAL Community Initiative.

Erdmann, Lorenz; Hilty, Lorenz; Goodman, J., & Arnfalk, P. (2004). *The Future Impact of ICTs on Environmental Sustainability*.

Fairweather, N. B. (1999). Surveillance in employment: The Case of Teleworking. *Journal of Business Ethics*, *22*(1), 39–49. doi:10.1023/A:1006104017646

Feldman, D., & Gainey, T. (1997). Patterns of telecommuting and their consequences: Framing the research agenda. *Human Resource Management Review*, *7*(4), 369–388. doi:10.1016/S1053-4822(97)90025-5

Fields, A. (2005). *Discovering statistics using SPSS*. London: Sage.

Flexibility Ltd. (2000). *Telecommuting 2000: The Costs of Congestion and Commuting.*

Flick, U. (2002). *An Introduction to Qualitative Research*. London: Sage.

Gainey, T.W., & Kelley, D.E. (1999). Telecommuting's impact on corporate culture and individual workers. *SAM Advanced Management Journal*, *64*(4), 4.

Golden, T. D. (2006). Avoiding depletion in virtual work: Telework and the intervening impact of work exhaustion on commitment and turnover intentions. *Journal of Vocational Behavior*, *69*(1), 176–187. doi:10.1016/j.jvb.2006.02.003

Golden, T. D., & Fromen, A. (2011). Does it matter where your manager works? Comparing managerial work mode (traditional, telework, virtual) across subordinate work experiences and outcomes. *Human Relations*, *64*(11), 1451–1475. doi:10.1177/0018726711418387

Golden, T. D., Viega, J. F., & Dino, R. N. (2008). The impact of professional isolation on teleworker job performance and turnover intentions: Does time spent on teleworking, interacting face-to-face, or having access to communication-enhancing technology matter? *The Journal of Applied Psychology*, *93*(6), 1412–1421. doi:10.1037/a0012722 PMID:19025257

Goodman, J., Alakeson, V., & Jorgensen, B. (2004). *Encouraging Green Telework, Forum for the Future, Sun Microsystems Report.*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gornall, L., Pengelly, S., & Shearn, D. (1999). *Videoconferencing in the Valleys: A case study of the ALPS project*. Pontypridd: University of Glamorgan.

Gray, P. (1997). A demand-side approach to telecommuting: The integrated workplace strategies concept. *Information Systems Management*, *14*(4), 21–28. doi:10.1080/10580539708907071

Gundry, J., & Slater, S. (2005). *Flexible Working: Can home workers and their managers make it work?* (White Paper).

Gurstein, P. (2001). *Wired to the world, chained to the home*. Vancouver: UBC Press.

Hart, J. (2008, March 26). Is it possible to work from home. *Home-based business*.

Hill, E. J., Miller, B. C., Weiner, S. P., & Colihan, J. (1998). Influences of the Virtual office on aspects of work and work/life balance. *Personnel Psychology*, *51*(3), 667–683. doi:10.1111/j.1744-6570.1998.tb00256.x

Hislop, D., & Axtell, C. (2007). The neglect of spatial mobility in contemporary studies of work: The case of telework. *New Technology, Work and Employment*, *22*(1), 34–51. doi:10.1111/j.1468-005X.2007.00182.x

Hopkinson, P., & James, P. (2001). *Sustainable Telework – Assessing and Optimising the ecological and Social Benefits of Teleworking*. SUSTEL Case Study UK.

Huws, U., Korte, W. B., & Robinson, S. (1990). *Telework, towards the elusive office*. New York: John Wiley & Sons.

Irish Business and Employers Confederation IBEC. (2002). *Family friendly/work-life balance policies.*

Jackson, P. J., & Van der Wielen, J. M. (1998). *Teleworking: International Perspectives. From Telecommuting to the Virtual Organisation*. London: Routledge.

Kamerade, D., & Burchell, B. (2004). Teleworking and participatory capital: Is Teleworking an isolating or community friendly form of work? *European Sociological Review*, *20*(4), 345–361. doi:10.1093/esr/jch030

Konrad, A., & Mangel, R. (2000). The impact of work-life programs on firm productivity. *Strategic Management Journal*, *21*(12), 1225–1237. doi:10.1002/1097-0266(200012)21:12<1225::AID-SMJ135>3.0.CO;2-3

Krzyskow, B. (2006). *Analysis of legal regulations a regards the conditions and organisation of teleworking in Poland and the European Union*. Warsaw: Central Institute for Labour Protection – National Research Institute.

Krzyskow, B. (2007). The Act of August 24, 2007 on the change of the Labour Code Act, concerning hiring of employees under the framework of telework. ENTER – Partnership for telework, entrepreneurship and equality, Warsaw.

Kurland, N., & Bailey, D. (1999). Telework: The advantages and challenges of working here, there, anywhere and anytime. *Organizational Dynamics*, *28*(1), 53–68. doi:10.1016/S0090-2616(00)80016-9

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lake, A. (2013). *Smart Flexibility: Moving smart and flexible working from theory to practice*. Gower Publishing Company.

Leonard, B. (2000). Telework has many advantages. *HRMagazine*, *45*(1), 23–24.

Lim, V., & Teo, T. (2000). To work or not to work at home: An Empirical Investigation of factors affecting attitudes towards teleworking. *Journal of Managerial Psychology*, *15*(6), 560–583. doi:10.1108/02683940010373392

Maruyama, T., & Tietze, S. (2012). From anxiety to assurance: Concerns and outcomes of telework. *Personnel Review*, *41*(4), 450–469. doi:10.1108/00483481211229375

Matthews, H.S., & Williams, E. (2012). Telework Adoption and Energy Use in Building and Transport Sectors in the United States and Japan. *Journal of Infrastructure Systems*, *11*.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis*. Beverly Hills: Sage Publications.

Miller, C., Packham, G., & Pickernell, D. (2008). Work Life Balance: Putting the economy back on track. University of Glamorgan and Federation of Small Businesses.

Mitchell, H., & Trodd, E. (1994). *An Introductory Study of telework based transport – telecommunications substitution*. Research project for the Department of Transport. Retrieved from www.virtual-mobility.com

MITEL. (1998). *The MITEL Report*. Retrieved from www.mitel.com

Morelli, N. (2001). The space of telework; physical and virtual configurations for remote work. In D. Holmes (Ed.), *Virtual Globalization: Virtual Spaces/Tourist Spaces*. London: Routledge.

Morganson, V. J., Major, D. A., Oborn, K. L., Verive, J. M., & Heelan, M. P. (2010). Comparing telework locations and traditional work arrangements: Differences in work-life balance support, job satisfaction and inclusion. *Journal of Managerial Psychology*, *25*(6), 578–595. doi:10.1108/02683941011056941

National Advisory Council on Teleworking (1999). *New Ways of Living and Working: Teleworking in Ireland.*

Ndubisi, N. O., & Kahraman, C. (2005). Teleworking adoption decision-making progress. Multinational and Malaysian firms comparison. *The Journal of Enterprise Information Management*, *18*(2), 150–168. doi:10.1108/17410390510579891

Ndubuisi, E. (2012). Is your smartphone making you less productive? *Harvard Business Review*, (April): 6.

Ndubuisi, N. O. (2003, January). Teleworking adoption decision process: multinational-Malaysian forms comparison. Proceedings of the International Conference on operations and quantitative management proceeding, Taiwan (pp. 333-340).

Niles, J. M. (1994). *Making Telecommuting Happen: A Guide for Telemanagers and Telecommuters*. New York: Van Nostrand Reinhold.

Olson, M. H. (1983). Remote office work: Changing work patterns in space and time. *Communications of the ACM*, *26*(3), 182–187. doi:10.1145/358061.358068

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Oppenheim, A. N. (1992). *Questionnaire design, interviewing and attitude measurement* (1st ed.). London, New York: Continuum.

Perez, M. P., Sanchez, A. M., Carnicer, P. D., & Jimenez, M. J. V. (2004). A technology acceptance model of innovation adoption: The case of teleworking. *European Journal of Innovation Management*, *7*(4), 280–291. doi:10.1108/14601060410565038

Perry-Smith, J., & Blum, T. (2000). Work-family human resource bundles and perceived organisational performance. *Academy of Management Journal*, *43*(6), 1107–1117. doi:10.2307/1556339

Pyoria, P. (2003). Knowledge work in Distributed Environments: Issues and illusions. *New Technology, Work and Employment*, *18*(3), 166–180. doi:10.1111/1468-005X.00119

Qvortrup, L. (1998). From Teleworking to Networking: Definitions and Trends. In P. J. Jackson & J. M. Van der Wielen (Eds.), *Teleworking: International perspectives from telecommuting to the virtual organisation* (pp. 21–39). London: Routledge.

Research Day. (2009, April 30). University of Glamorgan, Pontypridd.

Salisbury, J. (2009). Framing Research Questions. *Paper presented to the Working Lives*.

Saunders, M., Lexis, P., & Thornhill, A. (2007). Research Methods for Business Students (4th ed.). London: Prentice Hall.

Scott, C. R., & Timmerman, C. E. (1999). Communication technology use and multiple workplace identifications among organisational teleworkers with varied degrees of virtuality. *IEEE Transactions on Professional Communication*, *42*(4), 240–260. doi:10.1109/47.807961

Sensis. (2005, June). *Sensis Insights Teleworking Reports*. Australia: Telstra Corporation Ltd.

Shin, B., Higa, K., & Sheng, O. R. L. (1997). An Adoption Model of Teleworking for Organisations. *Proceedings of the Thirteenth Annual Hawaii International Conference on systems Sciences*. 10.1109/HICSS.1997.663369

Siha, S. M., & Monroe, R. W. (2006). Telecommutings Past and Future: A Literature Review and Research Agenda. *Business Process Management Journal*, *12*(4), 455–482. doi:10.1108/14637150610678078

Strum, M. (2001). Redefining the 9-5 routine. *AFP Exchange*, *21*(3), 36.

Sullivan, C., & Lewis, S. (2001). Home-based telework, gender and the synchronisation of work and family: Perspectives of teleworkers and their co-residents. *Gender, Work and Organization*, *8*(2), 123–145. doi:10.1111/1468-0432.00125

Sweeny, P. (1998). *The Celtic Tiger: Ireland's Economic Miracle Explained*. Dublin: Oak Tree Press.

Tietze, S. (2002). When work comes home: Coping strategies of teleworkers and their families. *Journal of Business Ethics*, *41*(4), 385–397. doi:10.1023/A:1021236426657

Tietze, S., & Musson, G. (2005). Recasting the Home-work Relationship: A case of mutual adjustment? *Organization Studies*, *26*(9), 1331–1352. doi:10.1177/0170840605054619

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

United States Government (USGov). (2010). Telework Enhancement Act of 2010. Public Law 111-292. Washington: United States Government.

United States Office of Personnel Management (USOPM). (2009). *Status of Telework in the Federal Government, Report to the Congress*. Washington: United States Office of Personnel Management.

United States Office of Personnel Management (USOPM). (2013). *What is the definition of telework?* Washington: United States Office of Personnel Management.

Velvet Projects Ltd. (2007). *Teleworking Skills Gap Training Study Report.*

Venkatesh, A., & Vitalari, N. P. (1992). An Emerging Distributed Work Arrangement: An Investigation of Computer-Based Supplemental Work at Home. *Management Science*, *38*(12), 1687–1706. doi:10.1287/mnsc.38.12.1687

Von Glinow, M. A., & Metzger, R. O. (1998). Offsite Workers: At home and abroad. *California Management Review*, *30*(3), 101–111.

WAG. (2005, November). Wales: A Vibrant Economy. The Welsh Assembly Governments Strategic Framework for Economic Development (Consultation document).

Watad, M., & DiSanzo, F. (2000). Case study. The synergism of telecommuting and office automation. *Sloan Management Review*, *41*(2), 85–97.

Watad, M. M., & Gregory, T. J. (2010). The Impact of Telework on Knowledge Creation and Management. *Journal of Knowledge Management Practice*, *11*(4).

Wilks, L. J., & Billsberry, J. (2007). Should we do away with teleworking? An examination of whether teleworking can be defined in the new world of work. *New Technology, Work and Employment*, *22*(2), 168–177. doi:10.1111/j.1468-005X.2007.00191.x

Wilson, M., & Greenhill, A. (2005). Gender and The Work Balance: Marxist Theory Applied to at-home telework. *Proceedings of the 4th International Interdisciplinary Conference on Gender, Work and Organisation*.

Wood, J. (1997). Telework an Intelligent Managerial initiative. In P. Droege (Ed.), *Intelligent Environments: Spatial Aspects of Information Revolution*. London: Elsevier.

Workman, M., Kahnweiler, W., & Bommer, W. (2003). The effects of cognitive style and media richness on commitment to telework and virtual teams. *Journal of Vocational Behavior*, *63*(2), 199–219. doi:10.1016/S0001-8791(03)00041-1

Yin, R. K. (2012). *Case Study Research: Design and Methods* (3rd ed.). London: Sage.

This research was previously published in the International Journal of Information Communication Technologies and Human Development (IJICTHD), 9(1); pages 48-65, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 3
Tools and Technologies

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 19
Accessibility Compliance for E-Government Websites: Laws, Standards, and Evaluation Technology

Lourdes Moreno
Advanced Databases Group, Department of Computer Science, Universidad Carlos III de Madrid, Madrid, Spain

Paloma Martínez
Department of Computer Science, Universidad Carlos III de Madrid, Madrid, Spain

ABSTRACT

Barriers to web accessibility exist that deny the rights of people with disabilities to access content on public sector websites even though equal access is mandatory on e-government websites in most countries. In order to achieve web accessibility, specific standards and technology are essential for ensuring compliance with accessibility laws. In order to support the implementation of accessibility standards facilitating compliance with laws and methodological approaches exist which can play an important role in making e-government websites more accessible. The purpose of this article is to present the regulatory framework regarding accessibility, a survey of the technology and a proposal of good practices concerning technology which evaluates accessibility as a support resource. Recently, standards have been updated which make compliance with accessibility standards mandatory in the upcoming years. Faced with this situation, this work provides support resources to this new regulatory framework such as approaches to accessibility monitoring and evaluation technology.

INTRODUCTION

We continually use information and communications technology (ICT) for everyday tasks. Through the Internet, individuals can access an ever-increasing number of services. A digital society can only be complete when all citizens have access; this access must include persons with disabilities (PWDs).

DOI: 10.4018/978-1-7998-7297-9.ch019

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

There is a wide range of PWDs, including blindness, low vision, deafness, hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities and combinations of these. Moreover, some people may have disabilities due to an illness or they may develop impairments with age. Given this situation, we must all face the fact that, at some point in our lives, we all may be forced to deal with either a temporary or permanent disability. One billion people, or, in other words, 15% of the world's population, experience some form of disability (WHO, 2011). Furthermore, the population in Europe is becoming increasingly older, and the proportion of senior citizens who need assistance in their daily life will continue to rise in the coming years. Between 2016 and 2080, the elderly will account for an increasing percentage of the total population. Those aged 65 years or older will account for 29.1% of the EU-28's population by 2080, compared with just 19.2% in 2016 (Eurostat, 2017).

PWDs configure standard software and hardware according to their needs, and use assistive technologies that help them perform tasks. Assistive technologies include screen readers that read webpages aloud for blind, screen magnifiers for people with certain types of low vision and selection switches for people who cannot use a keyboard or mouse. Using technology in a way that supports accessibility means that it works with assistive technologies. This condition is satisfied if accessibility standards are followed (W3C WAI, 2017). Therefore, in order to prevent the exclusion of PWDs, it is essential that public government websites be accessible. They must follow accessibility standards so that any citizen, with our without disabilities, can access a website. These standards are referenced in the laws and regulatory framework regarding accessibility in the different countries. In most cases, it is mandatory for all e-government websites. Despite numerous efforts made by various governments, the Internet is not completely accessible. Studies indicate that there are many websites which continue to present accessibility barriers (Olsen, 2010) (Moreno, 2018). Currently, there are still research challenges which must be overcome.

Several factors positively influence compliance with web accessibility. Some of these are the integration of accessibility requirements into website development processes and the definition of accessibility policies for the organizations (De Andres et al., 2010). During all stages of web development, accessibility must be taken into consideration. In addition, the accessibility integrated into the development processes must be sustainable throughout the life cycle of the application, something that is difficult to achieve. The research has identified occasions in which the incorporation of accessibility has been possible via its integration into User-Centered Design processes (Baguma et al., 2009; ISO, 2010; Rusu et al., 2015), web engineering approaches (Moreno et al., 2013), design tools (Xiong et al., 2007), authoring tools (Power et al., 2007), evaluation tools (Abascal et al., 2004) and monitoring tools (Mirri et al., 2011).

Assessment technology is fundamental for creating accessible products as it is essential for developers to evaluate their web prototypes as soon as possible in the development process. Due to the fact that problems with web accessibility may arise during any stage of development, continuous support for accessibility testing is needed (Trewin et al., 2010). Evaluation methodologies and automatic validators play a key role in ensuring the accessibility of e-government public administration websites. Public policies for web accessibility should take such tools into account, regulating and promoting their use (Paternò and Schiavone, 2015).

For this purpose, an exploratory study has been carried out to detect the existing weaknesses found in the implementation of accessibility in policies in both the organization and development processes. To this end, a study of the regulatory framework regarding accessibility has been carried out, indicating which standards must be met and if there are guides and support on how to apply these standards. Subsequently, a study is presented in which accessibility assessment technology is analyzed as this evaluation technology is an essential element affecting compliance with accessibility standards process.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Additionally, a proposal of accessibility assessment tools is presented. This technology is analyzed to determine whether it provides sufficient support, or, on the other hand, if it may be the reason for the existing challenges related to non-compliance with accessibility standards. Finally, a discussion is presented in which some of the best practices in evaluation technology advancing accessibility development processes are provided.

The structure of the paper is as follows. Section 2 presents an overview of the legislative framework and standards for public policies on web accessibility, as well as several studies regarding the accessibility of e-governments websites and services. Methodological approaches on accessibility assessment technology which is essential to ensuring compliance with the legislative framework concerning accessibility are presented in Section 3. Additionally, a survey of automated accessibility tools is presented as a support resource for choosing an accessibility assessment tool. Finally, some conclusions are presented in Section 4.

BACKGROUND

Laws and standards regarding accessibility and studies of the accessibility level of e-governmental websites are presented in this section.

Accessibility Laws for ICTS

Since the late 1990s, several countries began to enact laws adopting computer system accessibility for technology supported or provided by the government. One of the first countries was the U.S. with the Section 508 of the Rehabilitation Act of 1973 modified in 1998, (Access-board, 2017). Many other countries have also passed similar legislation (Putnam et al., 2012) as the Disability Discrimination Act (DDA) of U.K.

The European Council also began to address the issue with several action plans such as eEurope 2000, eEurope 2002, eEurope 2005 and Europe 2020 strategy. The "United Nations Convention on the Rights of Persons with Disabilities was ratified by the European Union and its Member States in 2010 (United Nations, 2006). It recognizes that disability is an outcome of the interaction between the person and the physical, technological and economic barriers, as well as other aspects that prevent their participation in society. Several countries began to enact national laws on the accessibility of information systems as Germany with the BITV in 2002, Italy with the Stanca Act in 2004, etc. A lot of these laws have updated and referenced standards as is shown in Table 1.

In January 2017, the US Access Board released their latest proposal to update (ICT) Standards and Guidelines related to Section 508 called "The Refresh" (Access-board, 2017 b). These updates also contain revised guidelines for Section 255 of the Communications Act that apply to manufacturers of telecommunications products and services. In October 2016, a European Directive on Web Accessibility for Public Sector Websites by European Parliament has been approved. This new situation means that PWDs will have better access to the Websites and mobile applications of public services (European Commission, 2016).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Accessibility Guidelines and Standards for ICTs

In order to achieve compliance with the legislation, numerous initiatives and standards exist which identify accessibility problems and suggest new accessible designs. As regards accessibility standards, special mention must be made of the World Wide Web Consortium (W3C) with the Web Accessibility Initiative (WAI).

The WAI has been working since 1997 on accessibility guidelines. The most relevant guidelines are the Web Content Accessibility Guidelines (WCAG), first published as version 1.0 in 1999, then updated to version 2.0 in 2008 (W3C WAI, 2008) and it was recently updated to WCAG 2.1 (W3C WAI, 2018). WCAG is internationally recognized as the reference standard for Web accessibility and is referenced in the regulations of several countries that mandate accessibility of public Websites such as is indicated in Table 1. Since 2012 the WCAG 2.0 is an international standard through standard ISO/IEC 40500:2012 (Information technology -- W3C Web Content Accessibility Guidelines (WCAG) 2.0).

WCAG 2.0 covers a broad range of recommendations for making Web content more accessible. Regarding its structure, WCAG 2.0 contains three main layers of guidance: principles, guidelines and success criteria that provide the basic goals that Web designers should work toward in order to make content more accessible for PWDs. These criteria allow WCAG 2.0 to be used where requirements and conformance testing are necessary, such as in design specification, purchasing, regulation and contractual agreements. To meet the needs of different groups and different situations, three levels of conformance are defined: A (lowest), AA, and AAA (highest). In general terms, one of the levels of conformance is met in full on a Web Page. In most regulatory frameworks that have adopted the WCAG 2.0, it is mandatory conformance level AA. In order to comply with WCAG 2.0, it is essential that evaluation technology is provided to developers such as is presented in Section "Evaluation technology in the context of accessibility standards".

WCAG 2.0 is mandatory in many countries for public Websites and, in some cases, even for privately owned sites. Apart from that, there are other relevant standards, very similar to WCAG 2.0, which are entirely or partly related to Web accessibility, such as guidelines and technical standards such as shows Table 1.

Accessibility Standards for ICTs Development Process

Organizations must address the needs of PWDs throughout the ICTs development processes holistically in the organization. There are accessibility-related standards that offer a guide to integrating accessibility into the process by the Organizations. These standards are best practices to implementing accessibility for the organizations and public policies. However, only these standards can be followed if there is a support of technology from the technical and methodological point of view.

In the United States, an example is The Twenty-First Century Communications, and Video Accessibility Act (CVAA) (Federal Communications Commission, 2011) which indicates that 'Manufacturers and service providers must consider performance objectives at the design stage as early as possible and must implement such performance goals, to the extent that they are achievable'.

Likewise, according to Section 508 Refresh, product developers are required to incorporate accessibility throughout the entire design and development stages. Other standards are aimed to the standard process of accessible technology. It is the case of BS 8878 that was launched in the UK in 2010 (British Standards Institute, 2010). While technical, design or testing aspects of accessibility are focused on by

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Regulatory framework on web accessibility

Country	Standards and Guidelines	Legislation/Directives
Australia	WCAG 2 AA	Disability Discrimination Act
Canada	WCAG 2 AA (implemented as the Standard on Web Accessibility)	Human Rights Act 1977
EU	WCAG 1 AA (on going WCAG 2 AA)	European Parliament Resolution (2002) Ongoing new European Directive
France	RGAA 3 (based on WCAG 2.0 AA)	Law No 2005-102, Article 47
Germany	BITV 2 (based on WCAG 2 AA, but not identical.)	Federal Disabled Equalization Law (BGG)
Ireland	Universal Design Guidance for Online Public Services 2.10 (Included WCAG 2.0)	The Disability Act 2005
Italy	Technical Rules of Law 4/2004 (updated to WCAG 2 in September 2013)	Law No. 4/2004 (Stanca Law)
Japan	X 8341-3:2016 (Identical to WCAG 2.0) AA	Government Directive
Netherlands	Guidelines, which include WCAG 2.0 AA.	Government Directive
New Zealand	New Zealand Government Web Standards 2.0 (Identical WCAG 2.0 AA)	Human Rights Amendment Act 2001
Norway	WCAG 2 AA (with exceptions)	LOV 2008-06-20 nr 42
Ontario	SGQRI 008 (based on WCAG 2.0 AA)	Ontarians with Disabilities Act (AODA)
Spain	Standard UNE 139803:2012 (Identical WCAG 2 AA)	Law 34/2002, Law 51/2003, Royal Decree 1/2013
United Kingdom	WCAG 2 AA	Equality Act 2010
USA	Section 508 Refresh references WCAG 2.0 Level AA	Section 508 of Rehabilitation Act. (Refresh)

the WAI web accessibility standards, this standard specifies commissioning and implementing procedures for accessible websites regardless of whether said websites are developed for internal use by an organization or are subcontracted and focused more on users (Cooper et al., 2012).

In Europe, the European Commission published in 2005 a Mandate, M/376, to the three European Standard Organizations CEN, CENELEC, and ETSI to work on the development of functional accessibility requirements to be used in public procurement of ICT products and services. The result is the European standard EN 301 549 with the functional accessibility requirements, accompanied by guidance material and an online toolkit supporting the work of public procurers (see Figure 1).

With the aim of providing support for the implementation of accessibility standards, ISO launched in 2015 the standard ISO/IEC Guide 71 (Guide for Addressing Accessibility in Standards) that contains approaches to addressing accessibility in standards to fit with the different social policy models in different countries.

WAI has a documentation to help companies realize the benefits outlined for integrating accessibility into their development. Within it, guides which help to integrate accessibility throughout the Web production process have been developed (W3C WAI, 2016) and developing Organizational Accessibility Policies (W3C WAI, 2018b).

As previously stated, these standards are more focused on the processes that help organizations in their attempt to adopt holistic support resulting in an accessible user experience in addition to building in accessibility from the earliest stages. By keeping PWD's specific user experiences in mind through-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Screenshot of the online toolkit of the European standard EN 301 549 (http://mandate376.standards.eu/)



out the entire process, it will be easier to achieve the established requirements and better processes and products will be produced, improving the resulting outcome for everyone (Horton and Sloan, 2014).

Such as it has been observed, there is a lack of consensus on accessibility standards. This situation is not conducive to compliance with the accessibility standards. Currently, there is a trend for harmonization consisting of standards and guidelines as Section 508 Refresh and the Europe standard EN 301-549 with the WCAG 2.0.

After reviewing laws and standards on accessibility for e-government Websites, it is essential as is shown in Section "Evaluation technology in the context of accessibility standards" that technology be aligned with the needs presented by these regulatory frameworks in accessibility.

Studies of the Evaluation of E-Governmental Websites With Regards to Accessibility

The existence of legislation shows that web accessibility is a global issue. Despite these legislative efforts, many public organizations' websites present accessibility barriers (Paternò and Schiavone, 2015). Access to e-government services must be a priority due to the fact that access to services can give PWDs equal access to the vast potential job market, information and services in addition to promoting their social inclusion in the digital society (Carter and Markel, 2001; Bonacin et al., 2010; Moreno et al, 2018).

To date, several studies on web accessibility, at both the national and international level, have already been carried out. Several studies have revealed issues with accessibility to government websites around the world. They indicated that government websites do not comply with current laws. Some examples of these studies are the Government Website Accessibility in Australia and China (Shi, 2006), Alabama (Potter, 2002; Bridgett, 2016), Italy (Gambino, 2016) or Dubai (Kamoun, 2014) or Africa (Formunyuy & De Wet, 2017). A study of the accessibility issues of the UK e-government sites revealed that the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

websites display similar non-compliance issues with regards to the guidelines included in accessibility laws (Kuzma, 2010). Several papers have pointed out that compliance with the Section 508 law in the US remains low among Federal government websites regardless of the fact that the law has been in effect for nearly ten years (Jaeger, 2006; Lazar and Olalere, 2011). In all of these research works, evaluation technology has been used. However, the majority of the studies only evaluate websites by considering the compliance of their home pages with WCAG 2.0 (Youngblood, 2014; Shi, 2006; Potter, 2002; Kuzma, 2010). They do not provide support to evaluate a large-scale website or to monitor accessibility throughout the entire life cycle of the website.

Some of these are dedicated to using national and/or international guidelines in order to assess, identify and monitor the level of accessibility found on a variety of websites (governmental, public administration). These studies are mostly based the evaluation of activities carried out by human operators which monitor accessibility with the help of both automatic and semi-automated evaluation tools. There has been a number of large-scale geospatial assessment activities carried out, such as the "DG Information Society and Media", which focused on a variety of regions. Another example is the "Measuring progress in e-Inclusion Riga Dashboard" which studied a total of 34 European countries. A small sample of websites was used in the evaluations so that they could be manually checked (European Commission, 2007). The "United Nations Global Audit of Web Accessibility" was commissioned by the United Nations in 2006 (Nomensa, 2006). According to their report, just a mere 3% of the websites studied, all of which belonged to the European Public Sector, actually met WCAG 1.0 Level A standards. The "Assessment of the Status of eAccessibility in Europe", a subsequent study commissioned by the European Community, was done in 2007 (Cullen et al., 2007). Furthermore, the primary objective of the MeAC (Measuring progress of eAccessibility in Europe) is to track research that was previously carried out in addition to assisting the development of European policies on eAccessibility in the future. In order to do this, websites from different areas (newspapers, library websites, bank website and government websites, among others) were chosen from all EU member states, in addition to sites from the USA, Canada, and Australia, in order to have a representative sample. A total of 336 websites, from both the public and private sectors, were evaluated with automated and manual testing methods in order to ensure their compliance with WCAG 1.0 Level A standards. 25 pages were gathered from each website using an automated method. They were then analysed with both automatic and manual procedures. There were only a few countries in which the majority of the public websites analysed met these standards. On the other hand, in most of the countries investigated, none of the websites evaluated were found to be in compliance with these standards.

In 2008, the European Internet Accessibility Observatory (EIAO), an implementation of the Unified Web Evaluation Methodology's automated monitoring application scenario (Wabcluster, 2007), carried out an additional study to monitor European websites (Bühler et al., 2008). This study set out a comparison of both the EIAO and MeAC results. It found that there was an overall upward trend in the levels of accessibility found on e-governmental websites in Europe, although the general level was still considered to be quite poor.

A study was also done in 2009 in order to assess WCAG 2.0 compliance as far as web accessibility is concerned in European countries (Cullen et al., 2009). This study reported that absolutely none of the evaluated websites was in full compliance with the WCAG 2.0 standards. Even more troubling was the fact that these websites did not even fully comply with the WCAG 1.0 standards. Both automatic and manual testing methods were considered in this assessment.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Going above and beyond any type of regulation, institutions have to ensure that they have access to the appropriate tools which allow for the control and support of accessibility when, as is typically the case, they are faced with large amounts of both content and resources (Mirri et al., 2011). As previously stated, the research shows that evaluation technology is essential no matter if the studies are of government websites that provide public services, large-scale evaluations or monitoring activities. Governments should more actively promote both their use and the procedures regarding how to use.

There are tools which can assist the compliance with accessibility laws and standards. However, these laws do not make explicit reference to such tools or describe how the tools should be utilized in implementing public policies. A few examples of governments and public organisations that have successfully adopted automated testing are found in Sweden (Gulliksen et al., 2010) and the US. Nevertheless, guidance and best practices for the proper use of the automated validators are essential (Lazar & Olalere, 2011). Standards such as EN 301-549 and BS 8878 have taken these best practices into account. Some countries have created guidelines such as the e-Government Service Design Manual in the UK which recommends the use of automated validators in implementing accessibility in online e-Government and public services (Gov. of UK, 2016).

DISCUSSION

A review of accessibility standards has been made, including which standards are needed to comply with regulations such as WCAG 2.0 for web content and standard EN 301-549 for all types of ICT. Furthermore, a review of related works in which the level of accessibility of e-government websites is analysed has also been carried out. They show that government websites do not know how to implement accessibility because they do not fully comply with standards. While evaluation tools are used on all of them, it has been observed that, in the majority of cases, only the home page is evaluated. They do not follow the methodologies established to evaluate the accessibility of a complete website. In addition, works where accessibility monitoring is done have not been found. This exploratory study reveals challenges as it does not know how to carry out processes for the evaluation of accessibility successfully. In this respect, evaluation methodologies, as well as a proposal of evaluation tools, are shown in the following sections.

Evaluation Technology in the Context of Accessibility Standards

In all the studies seen concerning monitoring technology, automated tools, and manual evaluation support tools are necessary. Faced with the demand for technology as a support for the implementation of accessibility in public policies, this Section presents evaluation technology as seen within the context of accessibility standards.

Methodological Approaches for Assessing Accessibility

In accordance with the W3C Web Accessibility Initiative (WAI), the evaluation must "validate accessibility with automated tools and human review. Automated methods are rapid and convenient but cannot identify all accessibility issues. The human review can help ensure clarity of language and ease of navigation". In this way, web accessibility can be evaluated using different methods.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Roughly more than half of the provisions found in most of the accessibility standards make it mandatory for human judgment to be involved in the evaluation of compliance (King et al., 2005). Despite these inherent limitations, automated tools still play a significant role in ensuring the accessibility of websites (Paternò and Schiavone, 2015).

There are different accessibility evaluation methods which verify web accessibility guidelines. These are categorised using both qualitative methods such as standards review (Abou-Zahra, 2008), user testing (Lawton, 2007), barrier walkthrough (Brajnik, 2008), among others, and quantitative methods such as metrics (Vigo et al., 2007). A single method alone is not enough to guarantee full accessibility. Many studies combine these qualitative and quantitative methods in order to ensure better results.

In response to the demand, according to the regulatory framework, methodologies exist for assessing accessibility based on the WCAG such as the UWEM (Unified Web Evaluation Methodology) (wabcluster, 2007). The UWEM describes methods for gathering evaluation samples, testing processes in accordance to WCAG 1.0 level AA requirements and several different reporting alternatives. Another methodological approach is provided by the WAI which establishes the Accessibility Conformance Evaluation Methodology (WCAG-EM) and offers a methodological approach for determining how well a website conforms to WCAG 2.0 (W3C WAI, 2014) standards. PWDs must be taken into consideration in the accessibility evaluation processes of all web development stages, following user-centred design approaches such as those recommended by the WAI (W3C WAI, 2010).

To support the new European directive, a study monitoring methodologies for web accessibility in the European Union (SMART 2014-0061) has been launched (European Commission, 2016b; Funka, 2016). This study is aimed at providing an up-to-date description of the situation of web accessibility monitoring in the corresponding countries, validating the monitoring methodologies used to verify compliance with national provisions on web accessibility and presenting a recommended monitoring methodology for the proposal for a Directive on the accessibility of public sector entities' websites. This study has analysed different European methodologies: the "State of Affairs in the Kingdom" (Status i riket) in Norway, "Mapping of web accessibility on public websites" in Denmark, "Acessibilidade dos Conteúdos Web na Administração Pública Central (Web Content Accessibility in the Central Public Administration)" in Portugal, "Simply Accessible (Gewoon toegankelijk)" in the Netherlands and the "Web Accessibility Observatory" in Spain. To validate this set of existing national monitoring methodologies and verify how they actually measure web accessibility, a comparison with the WCAG-EM has been carried out. The results have shown that the most comprehensive initiative with regards to both quantity and quality of the analysed methods is that from Norway. In the implementation of these methodologies, the combined use of both automatic and manual assessment methods is seen most frequently.

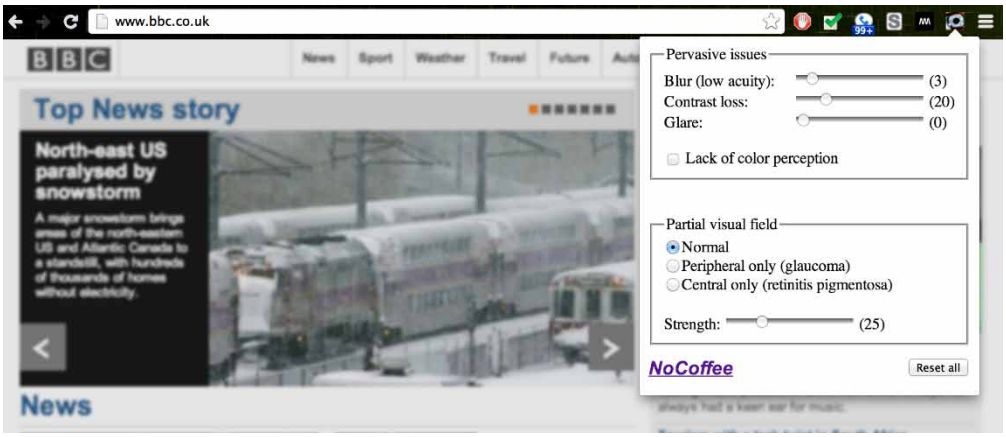
Automated Web Accessibility Evaluation Tools

In order to adhere to accessibility standards and evaluation methods, a variety of automated tools may be used. WAI maintains a comprehensive list of automated tools which help designers, developers, and testers create accessible websites and applications and makes this list available to all interested parties (W3C WAI, 2016 b). This list of web accessibility evaluation tools may also be searched and sorted.

A wide range of accessibility evaluation tools can be found: from specialised browser add-ons to sites that evaluate a particular element, such as colour contrast. In this example, the colour contrast can be evaluated using a tool (Colour Contrast Analyser [1]) or a colour blindness simulator (Color Oracle [2]). This simulator shows how webpages might be viewed by users who are blind, colour blind or have

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Screenshot NoCoffee vision simulator tool



are visually impaired (IBM aDesigner [3], NoCoffee Vision Simulator [4] (see Figure 2)). Identification of seizure risks via Photosensitive Epilepsy Analysis of their web content and software (Photosensitive Epilepsy Analysis Tool [5]) may be carried out or tools that can be helpful in determining how readable content is (Juicy Studio Readability Tests [6]) may also be used.

In order to analyse, detect, repair and monitor accessibility issues, several automatic and semiautomatic tools exist called accessibility validators. These include online services or software that offer support to determine if a website meets accessibility criteria and are usually encoded with accessibility guidelines such as the WCAG, required by most countries' regulatory frameworks.

Table 2 shows a survey of accessibility validators that offer assistance in complying with current standards such as WCAG. Distinctive factors of the various accessibility validators have been taken into consideration in order to provide a resource which helps developers who need to select a tool to evaluate the accessibility of a website. Some of these factors include whether the tool has been designed and implemented to ascertain the accessibility level of websites according to different guidelines and regulations; if it can only evaluate a single web page or website or if it permits the monitoring of a website with large-scale evaluations; if it is an online checker, desktop software or web service and the guidelines and standards used to carry out the checks, etc.

Additionally, it is also necessary to distinguish between the support and assistance that is provided. The support tools can provide an evaluation, but it is also possible to modify the layout of webpages in order to show how the content can meet the success criteria of the guidelines or display information (errors, alerts) within webpages, as shown in Figure 3. As assistance and guided support, the tools can be used to provide large-scale evaluations when one or more websites must be managed simultaneously.

A few automated validators that evaluate dynamic websites and WAI-ARIA, such as FAE, MAUVE or WAVE (see Table 2), have been found. On the other hand, there are accessibility developer tools such as browser extensions that can be used as a complement to automatic validators in order to provide the accessibility evaluation of dynamic webpages. Some examples are the Firefox Accessibility Extension[7] and ARIA Validator[8]. These tools access the content and show the changes that take place during the interaction as well as how this information is transmitted to users via their assistive technology.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Screenshot displaying information (error, alerts, features, etc.) within webpage from wave tool



Most of the tools analysed allow for the validation of a single web page or, in fewer cases, a single website. There are a few automated validators that evaluate dynamic websites. While these tools are useful, it would be helpful to have more tools available that evaluate the accessibility of groups of websites or large-scale websites and that monitor or track the evolution of their accessibility over time such as a Siteimprove Accessibility tool and Compliance tool. Accessibility policies and new guidelines on web accessibility require constant monitoring of many details across many pages. Accessibility monitoring technology is necessary for e-government websites to be able to comply with the regulatory framework.

CONCLUSION

The exploratory study shown in this article identifies critical information that identifies future directions for research.

There is an extensive legislative framework for web accessibility and the right of PWDs to access the Internet. However, studies indicate that e-government websites do not fully comply with these regulations. These laws reference standards to which are to be followed. Some of them are more oriented to meeting success criteria with regards to web content, such as is the case of WCAG 2.0 which is the mandatory standard in most countries. On the other hand, new standards have appeared that provide guidance in implementing accessibility which understands it as a process in an organization. One example of this is to guide the process used in public procurement of ICT products and services by public administrations as the European standard EN 301 549.

As support for the implementation of these standards, different technologies have been presented. Among these, tools oriented at evaluation are essential. As has been shown, while there are many evaluation tools, they are insufficient due to the fact that they can be used to evaluate a page or a group of pages but not to monitor the accessibility of one or more websites. Moreover, the technology should minimize human intervention in the evaluation process. There is a demand for this type of technology and is needed by the websites of public administrations due to the recent European Directive. The public administrations have the duty to provide support to all citizens, giving everyone the same quality of services.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. WCAG 2.0 web accessibility evaluation tools (elaborated from (W3C WAI, 2016b) and other sources)

Name	Standards	Languages	Support	Assistance	License	Automatically Checks	Service Type
AChecker[9]	WCAG 2.0 (A, AA, AAA), Section 508, Stanca, BITV	English German Italian	Evaluation	Generating reports of evaluation results	Free Software, Open Source	Single webpages Restricted or password protected pages	Web service (Rest API), Online checker
A11Y Compliance Platform[10]	WCAG 2.0 (A,AA,AAA), Section 508, RGAA)	English	Evaluation Modifying the presentation of webpages Displaying information within Webpages,	Generating reports of evaluation results Providing step-by-step evaluation guidance	Commercial, Enterprise	Single Webpages Groups of webpages or websites Restricted or password protected pages	Web service (Rest API) Online checker
Cynthia[11]	WCAG 2.0 (A, AA, AAA), Section 508,	English	Evaluation	Generating reports of evaluation results	Free Software	Single Webpages	Online checker
DYNO Mapper[12]	WCAG 2.0 (A,AA,AAA), Section 508, Stanca Act, BITV	English	Evaluation	Generating reports of evaluation results	Trial or Demo, commercial, enterprise	Groups of webpages or websites Restricted or password protected pages	Online checker
examinator[13]	WCAG 2.0 (A, AA, AAA),	Spanish	Evaluation displaying information within webpages	Generating reports of evaluation results metric	Free Software	Single Webpages	Online checker
Functional Accessibility Evaluator (FAE)[14]	WCAG 2.0 (A, AA, AAA)	English	Evaluation	Generating reports of evaluation results	Open Source	Groups of Webpages or Websites	Web service (Rest API)
MAUVE [15]	WCAG 2.0 (A, AA, AAA), Stanca Act	English	Evaluation	Generating reports of evaluation results	Free Software	Single Webpages	Online checker Browser plugin
Pa11y by Nature Publishing Group[16]	WCAG 2.0(A, AA, AAA), Section 508, US federal procurement standard	English	Evaluation	Generating reports of evaluation results	Open Source	Single webpages Groups of webpages or websites Restricted or password protected pages	Online checker Server installation

continues on following page

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Continued

Name	Standards	Languages	Support	Assistance	License	Automatically Checks	Service Type
Site improve Accessibility [17] (Web Governance Suite)	WCAG 2.0 (A, AA, AAA)	Danish English German Swedish Spanish	Evaluation Displaying information within webpages	Generating reports of evaluation results Providing step-by-step evaluation guidance Monitoring y reporting	Trial or Demo, Commercial	Single webpages, Groups of webpages or websites, Restricted or password protected pages	Online Service Hosted service
SortSite[18]	WCAG 2.0 (A, AA, AAA), Section 508	English	Evaluation	Generating reports of evaluation results	Trial or Demo, Commercial	Single webpages Groups of webpages or websites Restricted or password protected pages	Desktop Online checker
Tanaguru[19]	WCAG 2.0 (A, AA, AAA), RGAA, AccessiWeb	English French Spanish	Evaluation	Generating reports of evaluation results Providing step-by-step evaluation guidance	Free Software, Open Source	Single webpages Groups of webpages or websites Restricted or password protected pages	Online checker
WAVE [20]	WCAG 2.0 (A, AA, AAA), Section 508, US federal procurement standard	English	Evaluation Modifying the presentation of Webpages Displaying information within Webpages	Generating reports of evaluation results	Free Software, Trial or Demo, Commercial	Single webpages Groups of webpages or websites Restricted or password protected pages	Web service (Rest API) Online checking Browser plugins
WorldSpace/ Amaze / aXe / Comply [21]	WCAG 2.0 (A, AA), Section 508,	English	(Amaze) Modifying the presentation of Webpages	Generating reports of evaluation results (Comply) monitoring y reporting	(WorldSpace, Amaze) Commercial, Enterprise (aXe) License: Free Software, Open Source	(WorldSpace) Single webpages Groups of webpages or websites Restricted or password protected pages	(WorldSpace) Online Service (Amaze) Browser plugins: Browser plugins

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

As a contribution to the research, the following best practices are proposed for evaluation tools:

- The tool should cover the widest possible scope of accessibility guidelines and regulation requirements. Moreover, upgradeability must be considered with regards to the accessibility guidelines that are checked;
- The tool should be able to support technological diversity and be aligned with the latest technology. For example, there may be specific versions of each site for various kinds of devices (mobile and desktop versions) or a single version of the site that adapts its user interface according to the resolution of the device (responsive design);
- The tool should be able to check dynamic websites that can change both the web page's user interface and content automatically or in response to user interaction;
- The tool should be able to maximize the number of checks which may be automatically conducted;
- The tool should facilitate a more in-depth manual evaluation. An application for monitoring a website's accessibility must be extremely effective in such a context since it provides significant assistance to human evaluators when evaluating a huge number of webpages;
- The tool should be able to check a large set of URLs, provide an in-depth evaluation of a single website and carry out comparisons from the different perspectives;
- The tool should provide the ability to effectively perform monitoring activities. An automatic monitoring technology must provide support for several factors such as adapting the verifications to groups of URLs, a variety of classification criteria that must be controlled, different guidelines and accessibility requirements, the frequency of reports on evaluation processes and analysis of results;
- The tool should integrate tests to monitor guidelines related to language in order to enhance legibility and understandability issues;
- The tool should be able to generate effective and versatile reports. These reports must provide clear information clear specifying the main problems and how to address them. Additionally, they must be able to be understood by a variety of people in different positions such as developers, designers, public officers, etc.

Public policy stakeholders should consider both the progress that has been made and shortcomings which have been identified in this area of research. Future work should move in this direction, in the definition of methodological approaches according to standards that support the correct implementation of accessibility and the use of automated evaluation and monitoring tools. This technology plays an important role in making public websites more accessible.

ACKNOWLEDGMENT

This work is supported by the DeepEMR project (TIN2017-87548-C2-1-R) and the Spanish Subtitling and Audio Description Centre (CESyA).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

W3C WAI. (2004). W3C, Web Accessibility Initiative (WAI). Retrieved from https://www.w3.org/WAI/

W3C WAI. (2008). Web Content Accessibility Guidelines (WCAG) 2.0. Retrieved from https://www.w3.org/TR/WCAG20/

W3C WAI. (2010). Involving Users in Evaluating Web Accessibility. Retrieved from https://www.w3.org/WAI/eval/users.html

W3C WAI. (2013). Applying WCAG 2.0 to Non-Web Information and Communications Technologies (WCAG2ICT). WCAG2ICT Task Force. Retrieved from https://www.w3.org/WAI/GL/WCAG2ICT-TF/

W3C WAI. (2014). Overview: Web Site Accessibility Conformance Evaluation Methodology. https://www.w3.org/WAI/eval/conformance

W3C WAI. (2016). Planning and Managing Web Accessibility. Retrieved from https://www.w3.org/WAI/impl/

W3C WAI. (2016b). Web Accessibility Evaluation Tools List. Retrieved from https://www.w3.org/WAI/ER/tools/index.html

W3C WAI. (2017). How People with Disabilities Use the Web: Overview. Retrieved from https://www.w3.org/WAI/intro/people-use-Web/

W3C WAI. (2018). Web Content Accessibility Guidelines (WCAG) 2.1. Retrieved from https://www.w3.org/TR/WCAG21/

W3C WAI. (2018b). Planning and Managing Web Accessibility. Retrieved from http://www.w3.org/WAI/planning-and-managing/

Abascal, J., Arrue, M., Fajardo, I., Garay, N., & Tomás, J. (2004). The use of guidelines to automatically verify Web accessibility. *Universal Access in the Information Society*, (3): 71–79. doi:10.100710209-003-0069-3

Abou-Zahra, S. (2008). Web Accessibility Evaluation. In Web Accessibility (pp. 79–106). Springer. doi:10.1007/978-1-84800-050-6_7

Access-board. (2017), The Rehabilitation Act Amendments. Retrieved from https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards

Access-board. (2017b), "Proposed Refresh of the Section 508 Standards and Section 255 Guidelines for Information and Communication Technology", Retrieved from https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh

AInspector Sidebar http://ainspector.github.io/

ARIA Validator https://chrome.google.com/webstore/detail/aria-validator/oigghlanfjgnkcndchmnlnmaojahnjoc?hl=en

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Baguma, R., Stone, R. G., Lubega, J. T., & van der Weide, T. P. (2009, July). Integrating accessibility and functional requirements. In *Proceedings of the International Conference on Universal Access in Human-Computer Interaction* (pp. 635-644). Springer.

Bonacin, R., Melo, A. M., Simoni, C. A., & Baranauskas, M. C. C. (2010). Accessibility and interoperability in e-government systems: Outlining an inclusive development process. *Universal Access in the Information Society*, *9*(1), 17–33. doi:10.100710209-009-0157-0

Brajnik, G. (2008). A comparative test of Web accessibility evaluation methods. In *Proceedings of the 10th international ACM SIGACCESS conference on Computers and accessibility (Assets '08)* (pp. 113-120). New York: ACM. 10.1145/1414471.1414494

Bridgett, A. (2016). E-government in Alabama: An analysis of county voting and election website content, usability, accessibility, and mobile readiness. *Government Information Quarterly*, *33*(4), 715–726. doi:10.1016/j.giq.2016.09.001

British Standards Institute. (2010). Code of practice BS 8878:2010. Retrieved from http://shop.bsigroup.com

Bühler, C., Heck, H., Nietzio, A., Goodwin Olsen, M., & Snaprud, M. (2008). Monitoring Accessibility of Governmental Web Sites in Europe. In *Proceedings of the International Conference on Computers Helping People with Special Needs (ICCHP 2008)* (pp. 410-417). Springer. 10.1007/978-3-540-70540-6_59

Bureau of Internet Accessibility. A11Y Compliance Platform, http://www.boia.org/?wc3

Carlos Benavidez, examinator, http://examinator.ws/

Carter, J., & Markel, M. (2001). Web accessibility for people with disabilities: An introduction for web developers. *Professional Communication, IEEE Transactions on*, *44*(4), 225–233. doi:10.1109/47.968105

Chisholm, W., & May, M. (2009). *Universal Design for Web Applications*. Sebastopol, CA, USA: O'Reilly Media, Inc.

Color Oracle http://colororacle.org/

Colour Contrast Analyser https://www.paciellogroup.com/resources/contrastanalyser/

Cooper, M., Sloan, D., Kelly, B., & Lewthwaite, S. (2012). A challenge to Web accessibility metrics and guidelines: putting people and processes first. In *Proceedings of the International Cross-Disciplinary Conference on Web Accessibility (W4A '12)*. New York: ACM. 10.1145/2207016.2207028

Cullen, K., Kubitschke, L., Boussios, T., Dolphin, C., & Meyer, I. (2009). "Web accessibility in European countries: level of compliance with latest international accessibility specifications, notably WCAG 2.0, and approaches or plans to implement those specifications. European Union. Retrieved from http://ec.europa.eu/information_society/activities/einclusion/library/studies/docs/access_comply_main.pdf

Cullen, K., Kubitschke, L., & Meyer, I. (2007). Assessment of the status of eAccessibility in Europe. European Union. Retrieved from http://ec.europa.eu/information_society/activities/einclusion/library/studies/meac_study/index_en.htm

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

De Andrés, J., Lorca, P., & Martínez, A. B. (2010). Factors influencing Web accessibility of big listed firms: An international study. *Online Information Review*, *34*(1), 75–97. doi:10.1108/14684521011024137

Deque Systems, products (WorldSpace/ Amaze / aXe / Comply) http://www.deque.com/products/

ENDNOTES

European Commission. (2007), "DG Information Society and Media. Measuring progress in e-Inclusion Riga Dashboard", Retrieved from http://ec.europa.eu/information_society/activities/einclusion/docs/i2010_initiative/rigadashboard.pdf

European Commission. (2016). The adoption of a directive on the accessibility of the sector bodies' websites and mobile apps. Retrieved from https://ec.europa.eu/digital-single-market/en/news/adoption-directive-accessibility-sector-bodies-websites-and-mobile-apps

European Commission. (2016b). SMART 2014/0061, Monitoring methodologies for Web Accessibility in the European Union. Retrieved from https://ec.europa.eu/digital-single-market/en/news/monitoring-methodologies-web-accessibility-european-union

Eurostat. (2017). People in the EU - population projections. Retrieved from https://ec.europa.eu/eurostat/statistics-explained/index.php/People_in_the_EU_-_population_projections

Federal Communications Commission. (2011). 21st Century Communications and Video Accessibility Act (CVAA). Retrieved from https://www.fcc.gov/consumers/guides/21st-century-communications-and-video-accessibility-act-cvaa

Formunyuy Verkijika, S., & De Wet, L. (2017). Determining the Accessibility of e-Government Websites in Sub-Saharan Africa Against WCAG 2.0 Standard. *International Journal of Electronic Government Research*, *13*(1).

Funka. (2016). SMART 2014-0061, Monitoring methodologies for web-accessibility in the European Union. Retrieved from http://monitor-wa.eu/

Gambino, O., Pirrone, R., & Di Giorgio, F. (2016, June). Accessibility of the Italian institutional web-pages: A survey on the compliance of the Italian public administration webpages to the Stanca Act and its 22 technical requirements for web accessibility. *Universal Access in the Information Society*, *15*(2), 305–312. doi:10.100710209-014-0381-0

Gov.UK. (2016). Government Digital Service, Helping people to use your service. Making your service accessible: an introduction. Retrieved from https://www.gov.uk/service-manual/helping-people-to-use-your-service/making-your-service-accessible-an-introduction

Gulliksen, J., von Axelson, H., Persson, H., & Göransson, B. (2010, May). Accessibility and public policy in Sweden. *Interaction*, *17*(3), 26–29. doi:10.1145/1744161.1744168

HiSoftware. Cynthia, http://www.cynthiasays.com/

Horton, S., & Sloan, D. (2014). Accessibility in Practice: A process-driven approach to accessibility. In *Proceedings of the 7th Cambridge Workshop on Universal Access and Assistive Technology (CWUAAT '14). Academic Press.* 10.1007/978-3-319-05095-9_10

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Human Interfaces in Information Systems Laboratory - ISTI-CNR. MAUVE, http://giove.isti.cnr.it/tools/MAUVE/home

IBM aDesigner https://www.eclipse.org/actf/downloads/tools/aDesigner/l

Inclusive Design Research Centre. AChecker, http://achecker.ca/

Indigo Design Company. LLC DYNO Mapper, http://www.indigodesigncompany.com/portfolio/14-software-development/21-dyno-mapper

Jaeger, P. T. (2006). Assessing Section 508 compliance on federal e-Government Web sites: A multi-method, user-centered evaluation of accessibility for persons with disabilities. *Government Information Quarterly*, *23*(2), 169–190. doi:10.1016/j.giq.2006.03.002

Juicy Studio Readability Tests http://juicystudio.com/services/readability.php

Kamoun, F., & Almourad, M. B. (2014). Accessibility as an integral factor in e-government website evaluation: The case of Dubai e-government. Information. *Technology & People*, *27*(2), 5.

King, M., Thatcher, J., Bronstad, P., & Easton, R. (2005). Managing usability for people with disabilities in a large Web presence. *IBM Systems Journal*, *44*(3), 519–535. doi:10.1147j.443.0519

Kuzma, J. M. (2010). Accessibility design issues with UK e-government sites. *Government Information Quarterly*, *27*(2), 141–146. doi:10.1016/j.giq.2009.10.004

Lawton, H. (2007). *Just Ask: Integrating Accessibility throughout Design*. Lulu.com.

Lazar, J., Dudley-Sponaugle, A., & Greenidge, K. (2004). Improving Web accessibility: A study of Webmaster perceptions. *Computers in Human Behavior*, *20*(2), 269–288. doi:10.1016/j.chb.2003.10.018

Lazar, J., & Olalere, A. (2011). Investigation of best practices for maintaining Section 508 compliance in U.S. federal Web sites. In *Proc. of the 2011 Human Computer Interaction International Conference* (pp. 498–506). Academic Press. 10.1007/978-3-642-21672-5_55

Lazar, J., & Olalere, A. (2011). Investigation of Best Practices for Maintaining Section 508 Compliance in U.S. Federal Web Sites. In *HCII. Design for All and eInclusion - 6th International Conference UAHCI 2011* (pp. 498-506). Springer. 10.1007/978-3-642-21672-5_55

Mirri, S., Muratori, L. A., & Salomoni, P. (2011). Monitoring accessibility: large scale evaluations at a Geo political level. In *Proceedings of the 13th international ACM SIGACCESS conference on Computers and accessibility (ASSETS '11)* (pp. 163-170). New York: ACM. 10.1145/2049536.2049566

Moreno, L., Martínez, P., Muguerza, J., & Abascal, J. (2018). Support resource based on standards for accessible e-Government transactional services. *Computer Standards & Interfaces*, *58*, 146–157. doi:10.1016/j.csi.2018.01.003

Moreno, L., Valverde, F., Martínez, P., & Pastor, O. (2013). Supporting Accessibility in Web Engineering Methods: A Methodological Approach. *Journal of Web Engineering*, *12*(3&4), 181–202.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Nahon, K., Benbasat, I., & Grange, C. (2012). The Missing Link: Intention to Produce Online Content Accessible to People with Disabilities by Non-Professionals. In *Proceedings of the 45th Hawaii International Conference on System Sciences*. Academic Press. 10.1109/HICSS.2012.578

NoCoffee vision simulator, https://chrome.google.com/webstore/detail/nocoffee/jjeeggmbnhckmgdhmgdckeigabjfbddl

Nomensa. (2006). United Nations global audit of Web accessibility. Retrieved from http://www.un.org/esa/socdev/enable/documents/fnomensarep.pdf

Olsen, M. G. (2010). How Accessible is the Public European Web? MortenGoodwin. Retrieved from http://www.mortengoodwin.net/publicationfiles/how_accessible_is_the_european_Web.pdf.1

Pa11y by Nature Publishing Group http://pa11y.org/

Paternò, F., & Schiavone, A. G. (2015). The role of tool support in public policies and accessibility. *Interaction*, *22*(3), 60–63. doi:10.1145/2745395

Photosensitive Epilepsy Analysis Tool. http://trace.umd.edu/peat

Potter, A. (2002). Accessibility of Alabama government Web sites. *Journal of Government Information*, *29*(5), 303–317.

Power, C., & Petrie, H. (2007). Accessibility in non-professional Web authoring tools: a missed Web 2.0 opportunity? In *Proceedings of the 2007 International Cross-Disciplinary Conference on Web Accessibility (W4A)* (pp. 116-119). Academic Press. 10.1145/1243441.1243468

Powermapper Software. SortSite, http://www.powermapper.com/

Putnam, C., Wozniak, K., Zefeldt, M. J., Cheng, J., Caputo, M., & Duffield, C. (2012). How do professionals who create computing technologies consider accessibility? In *Proceedings of the 14th international ACM SIGACCESS conference on Computers and accessibility (ASSETS '12)* (pp. 87-94). New York: ACM. 10.1145/2384916.2384932

Rusu, C., Rusu, V., Roncagliolo, S., & González, C. (2015, July). Usability and User Experience: What Should We Care About? *International Journal of Information Technologies and Systems Approach*, *8*(2), 1–12. doi:10.4018/IJITSA.2015070101

Shi, Y. (2006). E-Government Web Site Accessibility in Australia and China. A Longitudinal Study. *Social Science Computer Review*, *24*(3), 378–38. doi:10.1177/0894439305283707

Tanaguru, https://my.tanaguru.com

Trewin, S., Cragun, B., Swart, C., Brezin, J., & Richards, J. (2010). Accessibility challenges and tool features: an IBM Web developer perspective. In *Proceedings of the 2010 International Cross Disciplinary Conference on Web Accessibility (W4A) (W4A '10)*. New York: ACM. 10.1145/1805986.1806029

United Nations. (2006). Nations Convention on the Rights of Persons with Disabilities (UNCRPD). Retrieved from http://www.un.org/disabilities/convention/conventionfull.shtml

University of Illinois. Functional Accessibility Evaluator, http://fae20.cita.illinois.edu/

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Vigo, M., Arrue, M., Brajnik, G., Lomuscio, R., & Abascal, J. (2007). Quantitative metrics for measuring Web accessibility. In Proceedings of the 2007 International Cross-disciplinary Conference on Web Accessibility (pp. 99-107). Academic Press. 10.1145/1243441.1243465

wabcluster, (2007). UWEM, Unified Web Evaluation Methodology version 1.2. Retrieved from http://www.wabcluster.org/uwem1_2/

Web Governance Suite. Siteimprove, https://siteimprove.com/

WebAIM WAVE. http://wave.Webaim.org/

World Health Organization (WHO). (2011). World report on disability. Retrieved from http://www.who.int/disabilities/world_report/2011/en/

Xiong, J., Farenc, C., & Winckler, M. (2007, December). Analyzing tool support for inspecting accessibility guidelines during the development process of web sites. In *Proceedings of the International Conference on Web Information Systems Engineering* (pp. 470-480). Springer.

Youngblood, N. E. (2014). Revisiting Alabama state website accessibility. *Government Information Quarterly*, *31*(3), 476–487. doi:10.1016/j.giq.2014.02.007

This research was previously published in the International Journal of Electronic Government Research (IJEGR), 15(2); pages 1-18, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 20
Ensuring Quality of Web Portals Through Accessibility Analysis

Amar Ranjan Dash
Berhampur University, India

Manas Ranjan Patra
Berhampur University, India

ABSTRACT

With the increase in number of electronic services being delivered through web portals, a lot of emphasis is being given to ensure the quality of web portals in terms of contents and associated design aspects. This has led to studies investigating various requirements of web users and to guidelines for quality enhancement in order to make web portals accessible to all irrespective of one's age, physical challenges, ethnicity, and level of literacy. In this chapter, the authors address the accessibility issues of web portals based on ongoing research. They analyze the accessibility in three levels (i.e., at the levels of authoring tool, web component, and user-agent). The contents of this chapter can throw light on the design aspects of web portals, web browsers, and media players to make them more suitable for users in general.

INTRODUCTION

Over the last couple of years, web portals are being considered as excellent means of information dissemination and visibility. At the initial stages web portals were used as a source of information but with the passage of time organizations have begun to extend a plethora of services electronically. Analysis reveals that due to inadequacies in the content, presentation, and online assistance available in those web sites, users are not very much attracted towards web portals. Therefore, we need to understand user requirements to make web portals accessible for all, irrespective of their age, physical challenges, ethnicity, and levels of literacy. The World Wide Web consortium has recommended WCAG 2.0, UAAG 2.0, and ATAG 2.0 guidelines to analyze web portals at web component, user-agent, and authoring tool levels.

DOI: 10.4018/978-1-7998-7297-9.ch020

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Since 1997, the initializations of web accessibility initiatives, the web technology researchers have been carried out some studies to evaluate the accessibility of web portals and user agents. Abanumy, Al-Badi and Mayhew (2005) evaluated the accessibility of the government web portals of Saudi Arabia and Oman, using WCAG 1.0 guidelines and Multiweb, Lynx, and W3C Validation as software tools to find error percentages. They have used Assistive technologies and haptic devices for users having problems like total blindness and mobility. But, they have not addressed the issue of persons with color blindness. Ceaparu and Shneiderman, (2002) analyzed the home pages of 50 US state Web sites. The analysis was done manually and initial recommendations were made with 10 rules which did not include any recommendation for disable people.

Kuzma, Yen and Oestreicher, (2009) examined the accessibility of government web portals from different continent that is European Union, Asia, and Africa with respect to the guidelines of WCAG 1.0 using TAW as software tool. Similarly, Al-Radaideh, Nurser and Wahbeh, (2011) have evaluated 25 Government websites of jordan by considering TAW with respect to WCAG 1.0 Guideline. Similarly, Malaysian researchers, Latif and Masrek, (2010) have used WCAG 1.0 priority 1 and Bobby as automatic tool, to evaluate 9 websites. They have provided only the number of errors of different portals instead of computing the percentage of error. Thus, it doesn't give an exact picture of the overall error percentage which can be used as a comparative measure among different web portals. Carter and Markel, (2001) classify disable peoples into four categories and demonstrate tools made for them by different company.

Kamoun, Mourad and Bataineh, (2013) have made a comparative analysis of web sites in Dubai using both WCAG 1.0 and WCAG 2.0; and recommend the use of WCAG 2.0 for e-Governments. In [Patra, Dash, Mishra, 2014, IJCSEA], the accessibility features of fifteen Indian web portals have been analyzed with respect to the WCAG 2.0 guideline. Accessibility of these web portals have been checked both manually and with the help of some tools. This work has been further extended to analyzing fifteen government web portals of Asian countries in Patra, Dash, Mishra, (2014) ICEGOV. In that work, the accessibility of four embedded media players also have been analyzed using UAAG 2.0.

Ismail and Kuppusamy, (2015) evaluate the accessibility of 302 Indian universities using ACHEKER on the basis of WCAG 2.0. Ismailova and Inal, (2016) analyses the accessibility of government websites of four countries viz, Kyrgyzstan, Azerbaijan, Kazakhstan and Turkey. In Baazeem and Al-Khalifa, (2015) authors investigate 23 accessibility evaluation studies. They analyze different type of methodology and tools used during last five years for analyzing the accessibility of web components.

Till 2004 in most research works the researchers have looked into the accessibility of web components. Then in 2005, Chisholm and Henry, (2005) have classified the web accessibility guidelines into three categories, viz., WCAG (Web Content Accessibility Guideline), ATAG (Authoring Tool Accessibility Guideline), UAAG (User Agent Accessibility Guideline) and describe how these three guidelines can control three different aspects of a web portal. After that the researchers also focus on the accessibility features of the user agents and authoring tools. Gonzalez et al. (2011) and Moreno et al., (2011) have analyzed the accessibility requirements of YouTube, BBC iplayer and CCplayer based on UAAG 2.0 guideline.

Souley and Sambo (2014) analyze Mozilla Firefox, Internet Explorer, Netscape and Opera based on their Performance, Usability, Accessibility and Security. Babu and Sekharaiahm, (2014) have described different types of assistive software and their integration with user agents to make them more accessible for physically challenged people. They have also classified the types of disabilities causing problem in accessing websites. Patra and Dash, (2017) have evaluated accessibility of 10 PC web browsers based on UAAG 2.0. Mahmud, Borodin, and Ramakrishnan, (2007) designed a context driven non-visual web

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

browser "CSurf". Borodin, Mahmud, Ramakrishnan, and Stent, (2007) designed HearSay, a non-visual web browser with cognitive directed browsing with extensible Voice XML dialog. Patra and Dash, (2017) have evaluated accessibility of 15 web browsers used in android mobiles based on UAAG 2.0.

GUIDELINES

Today web portals are major sources of information for varieties of electronic services. Thus, it is necessary that, those should be accessible to all types of users, irrespective of age, level of literacy, physical disability in persons, etc. Accessibility to web portals refers to the degree to which it is available to as many people as possible. In order to achieve this, the World Wide Web Consortium (W3C) has launched Web Accessibility Initiative (WAI) in April 1997. The Web Accessibility Initiatives consist of several working groups (Authoring Tool Accessibility Guide-lines Working Group [ATAG WG, 2015], User Agent Accessibility Guidelines Working Group [UAWG, 2015], Web Content Accessibility Guidelines Working Group [WCAG WG, 2015], etc.) each with their specific focus. The working groups have introduced three standardizations to ensure accessibility of web portals at three levels.

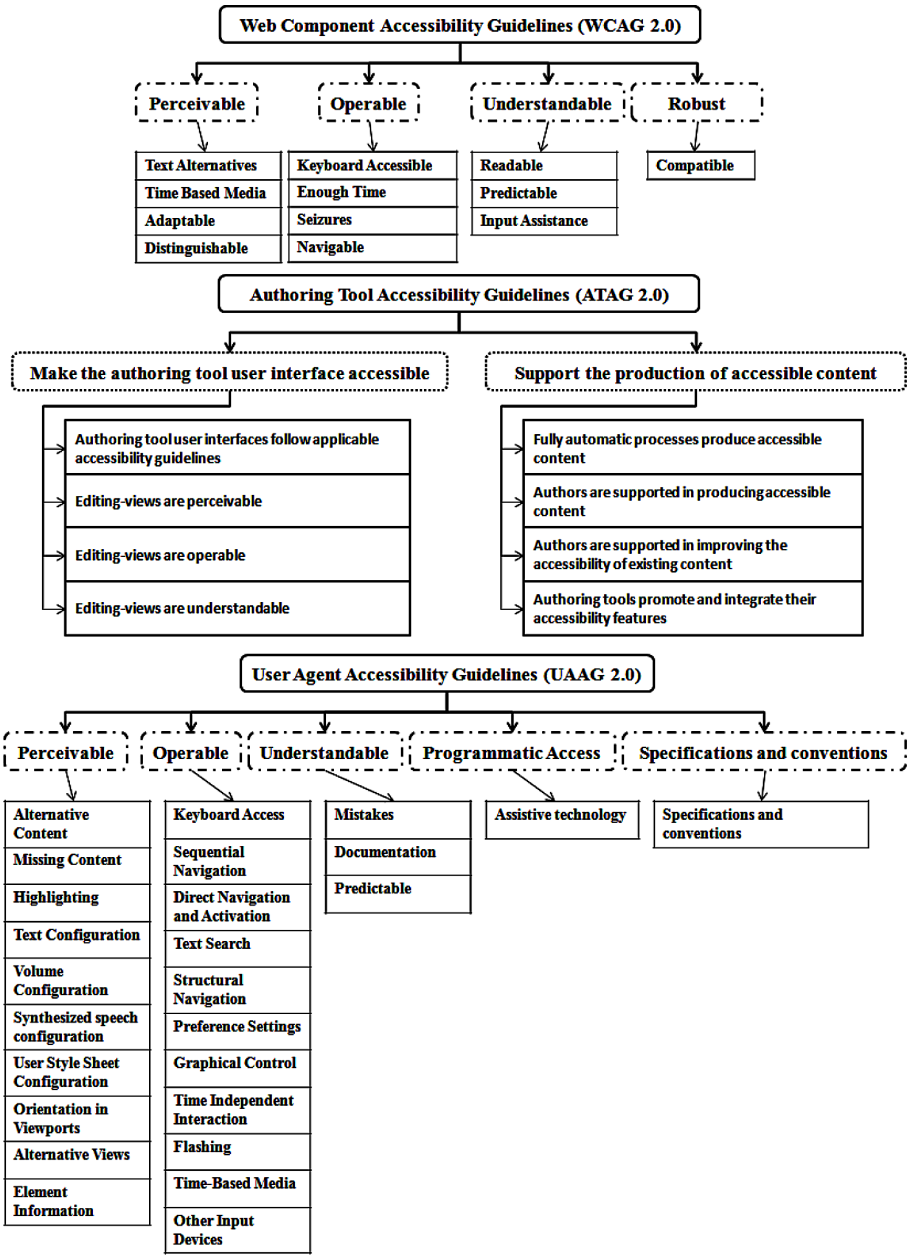
Web Component Accessibility Guideline [WCAG, 2008] has been recommended by the WCAG working group to verify accessibility of web contents. WCAG is an international standard for maintaining and verifying accessibility of the contents of a web portal. The first version of WCAG came out in the form of WCAG 1.0 on 5th May 1999. Subsequently, by adding new features (guidelines needed to be technology-neutral and guidelines needed to be worded as testable) a new version, WCAG 2.0 was recommended by W3C on 11 December 2008. Now, WCAG has been approved by ISO as an international standard (ISO/IEC40500:2012) on October 2012. WCAG 2.0 recommends twelve guidelines based on four basic principles, viz., perceivable, operable, understandable, and robust. A comparative study of WCAG 1.0 and WCAG 2.0 has been done by Termens et al., (2009).

Authoring Tool Accessibility Guideline [ATAG, 2015] has been recommended by the ATAG working group to ensure accessibility of authoring tools. ATAG is an international standard for maintaining and verifying accessibility of authoring tools. The first version of ATAG came out in the form of ATAG 1.0 on 3rd February 2000 and later by adding extra features and removing some of the limitations, a new version of ATAG, ATAG 2.0, was recommended by W3C on 24th September 2015.

User Agent Accessibility Guideline [UAAG, 2013] has been recommended by the UAAG working group to verify accessibility of user agents and assistive technologies. UAAG is an international standard for maintaining and verifying accessibility of different user agents (like web browsers, media players) and assistive technologies (like text to speech synthesizer). The first version of UAAG came out in the form of UAAG 1.0 on 17th December 2002 and later by adding extra features and removing some of the limitations a new version is underway. The last working draft of UAAG (UAAG 2.0) was published by W3C on 15th December 2015 which has 26 guidelines based on five principles, namely, perceivable, operable, understandable, programmatic access, specifications and conventions. A schematic representation of the guidelines included in WCAG 2.0, ATAG 2.0, and UAAG 2.0 is presented in Figure 1.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. A schematic representation of WCAG 2.0, ATAG 2.0, UAAG 2.0



ACCESSIBILITY OF WEB COMPONENTS

WCAG (Web Component Accessibility Guideline) is an international standard for maintaining accessibility of different web portals. The latest version of WCAG, WCAG 2.0 was recommended by W3C on 11 December 2008.WCAG defines some features to evaluate and maintain the accessibility of different components of websites, considering different disable persons.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- As WCAG defines some colour contrast features for colour blind peoples.
- WCAG describe the text alternative and caption related features in case of the audio or video files available in websites for deaf persons.
- WCAG point out some restriction in case of flash files to avoid causing seizerus in users.
- WCAG prescribe that every web page, frame, and table should have proper title and headers for better usability.
- WCAG prescribe "maintenance of location", "maintenance of identical web frame", and "different navigational alternatives" for easier navigation of user within website.

A schematic representation of the guidelines included in WCAG 2.0 is presented in Figure 2 which in short describes the following:

- Web portals should provide text alternatives for all non text contents.
- Reading and navigation order should be logical and intuitive.
- Text and images of text should have a contrast ratio more than the value prescribed by WCAG 2.0.
- Web portals should provide image alternatives wherever text contents are hard to understand.
- All functionality of website should be available through keyboard.
- Web portals should not contain flashes/flickering that can cause seizures.
- While filling a form proper error messages should be prompted whenever there is an error.

Evaluation of Indian Web Portals

Methodology

In Patra, Dash, Mishra, (2014, IJCSEA), we have considered three different categories of websites for evaluating their accessibility. Under each category we have selected five web portals which are frequently used by the public, thus a total of 15 websites are used in our study. The testing parameters are based on WCAG 2.0 guidelines. The accessibility parameters are checked both manually and by using some tools. Figure 3 indicates the adopted methodology.

Table 1 shows some of the tools used in the measurement of different accessibility parameters in the websites. For checking the colour contrast of links we used "Check my colour". For checking the colour contrast of text and images of text we used two tools. In order to obtain the hexadecimal colour code we used "Colour Scheme studio" and then the colour contrast was checked with the help of the online tool "Colour Contrast Check". Different web browsers like Aurora, Comodo Dragon, and Google Chrome were used for accessing the web sites. We also used the "AChecker" tool for checking some of the parameters as per the WCAG 2.0 Guidelines.

Evaluation

This research is intended to provide an accessibility evaluation of 15 Indian websites based on WCAG 2.0. The data taken for our analysis is gathered during the period 15th Sep 2013 to 9th Oct 2013. Table 2 contains list of Indian web portals selected for evaluation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. A schematic representation of WCAG 2.0 guideline

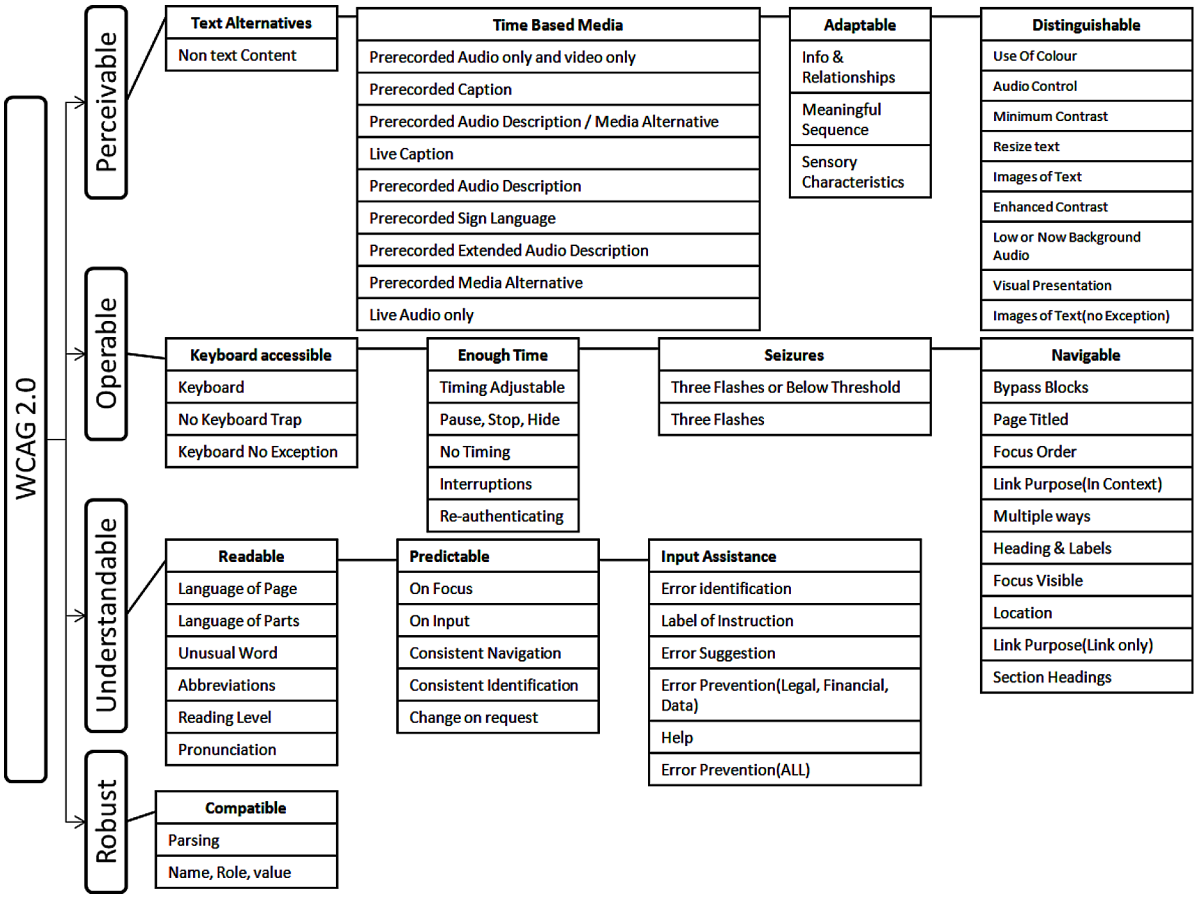
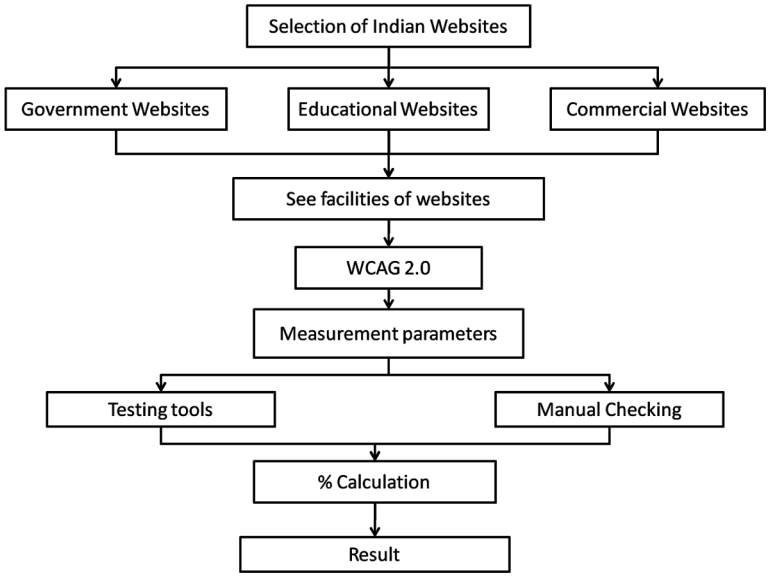


Figure 3. Methodology adopted for accessibility evaluation of Indian websites



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. List of tools adopted for evaluating accessibility of Indian web portals

SL No.	Target	Tools	URL
1.	Colour Contrast (link)	Check my colour	http://www.checkmycolours.com/
2.	Colour Contrast (image's Text)	Colour Scheme studio	
		Colour Contrast Check	http://snook.ca/technical/colour_contrast/colour.html
3.	Web Browser	Aurora	
		Chomodo Dragon	
		Google Chrome	
4.	Rule Wise Checker	Achecker	http://achecker.ca/checker/index.php

Table 2. List of selected Indian web portals

Government Websites	Educational Websites	Commercial Websites
India.gov.in	www.iitb.ac.in	www.irctc.co.in
www.nic.in	www.iitd.ac.in	www.ebay.in
www.csc.gov.in	www.uohyd.ac.in	www.amazon.in
www.incometaxindia.gov.in	www.ugc.ac.in	www.flipkart.com
www.passportindia.gov.in	www.dheorissa.in	www.makemytrip.com

Figure 4(a) describes the overall average percentage violation per rule as provided in WCAG 2.0. In the following graph we analyze each accessibility issue for the Indian Government websites. The guideline where the % is 0 it means that either the web component which deals with that guideline is absent or there is no error for that web component.

While analyzing the Perceivable features of the government websites, it is found that the maximum violated guideline is guideline 1.3 (Adaptable) in which government websites indicate 44.20% violation. Violations with respect to guideline 1.1 (Text Alternative), guideline 1.2 (Time Based Media), and guideline 1.4 (Distinguishable) were found to be 23.89%, 34.67%, and 34.23% respectively. Although the percentage is little less but this rule is violated by approximately all websites, so we provide a separate point by point graphical analysis in Figure 4(b).

While evaluating for the Operable principles, the maximum violated guideline is guideline 2.2 (Enough Time) in which government websites indicate 40.00% violation. But, for guideline 2.1 (Keyboard Accessible), guideline 2.3 (Seizures), and guideline 2.4 (Navigable) the violation percentages are 37.00%, 30.00%, and 16.98% respectively. Although the percentage is less but this rule is violated by approximately all websites, so we give a separate point by point graphical analysis in Figure 4(c).

With respect to Understandable principle in government websites, the maximum violated guideline is guideline 3.3 (Input Assistance) with 57.05% violation. Government websites indicate 34.60% and 15.96% violation in guideline 3.1 (Readable) and Guideline 3.2 (Predictable) respectively. This rule is violated by approximately all websites, so we give a separate point by point graphical analysis in Figure 4(d). According to our analysis the Indian Government Websites does not contain Robust error.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 4. Overall average percentage violation done by selected Indian Government websites with respect to (a) WCAG 2.0, (b) Perceivable principle of WCAG, (c) Operable principle of WCAG, (d) Understandable Principle of WCAG

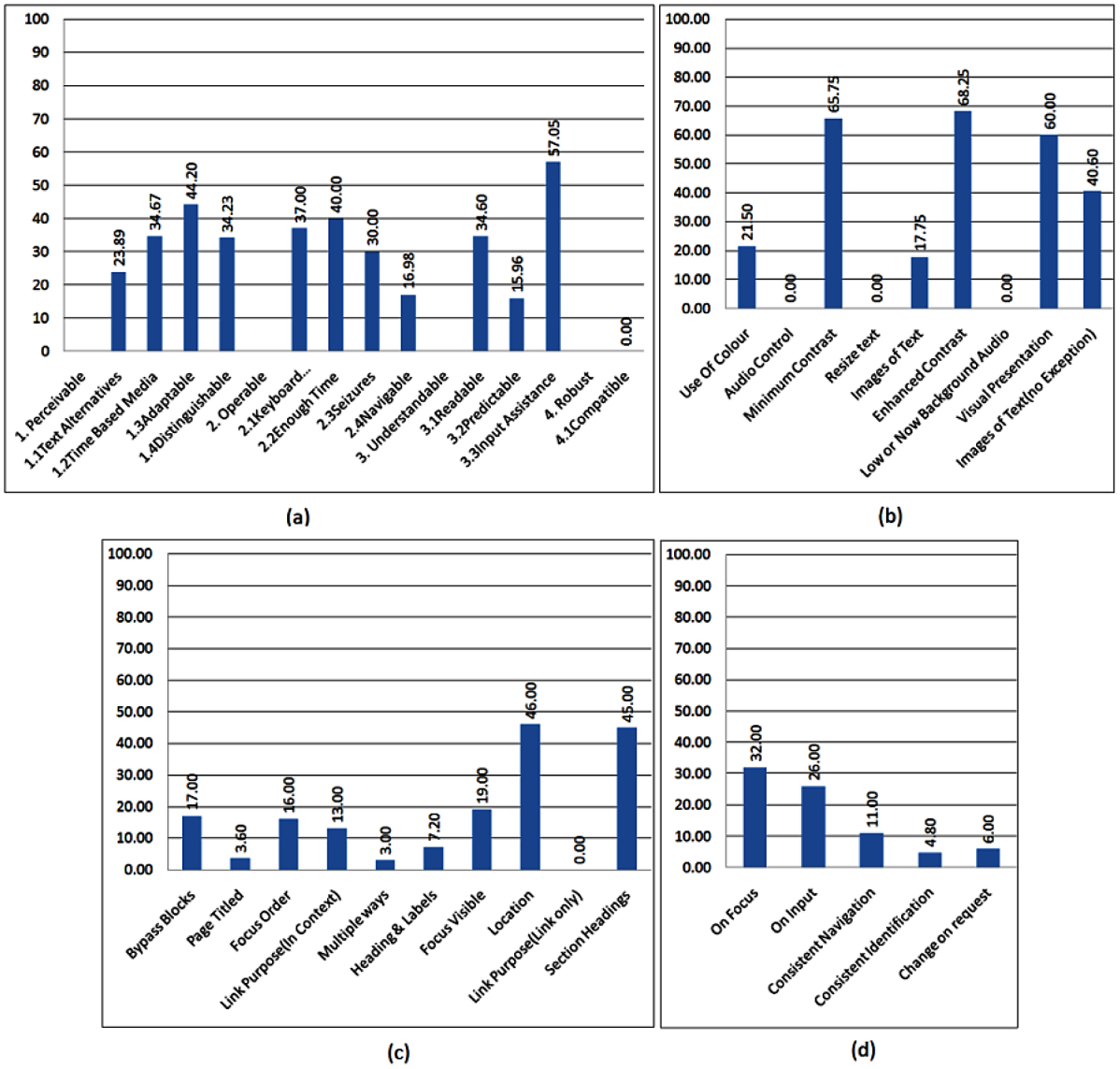
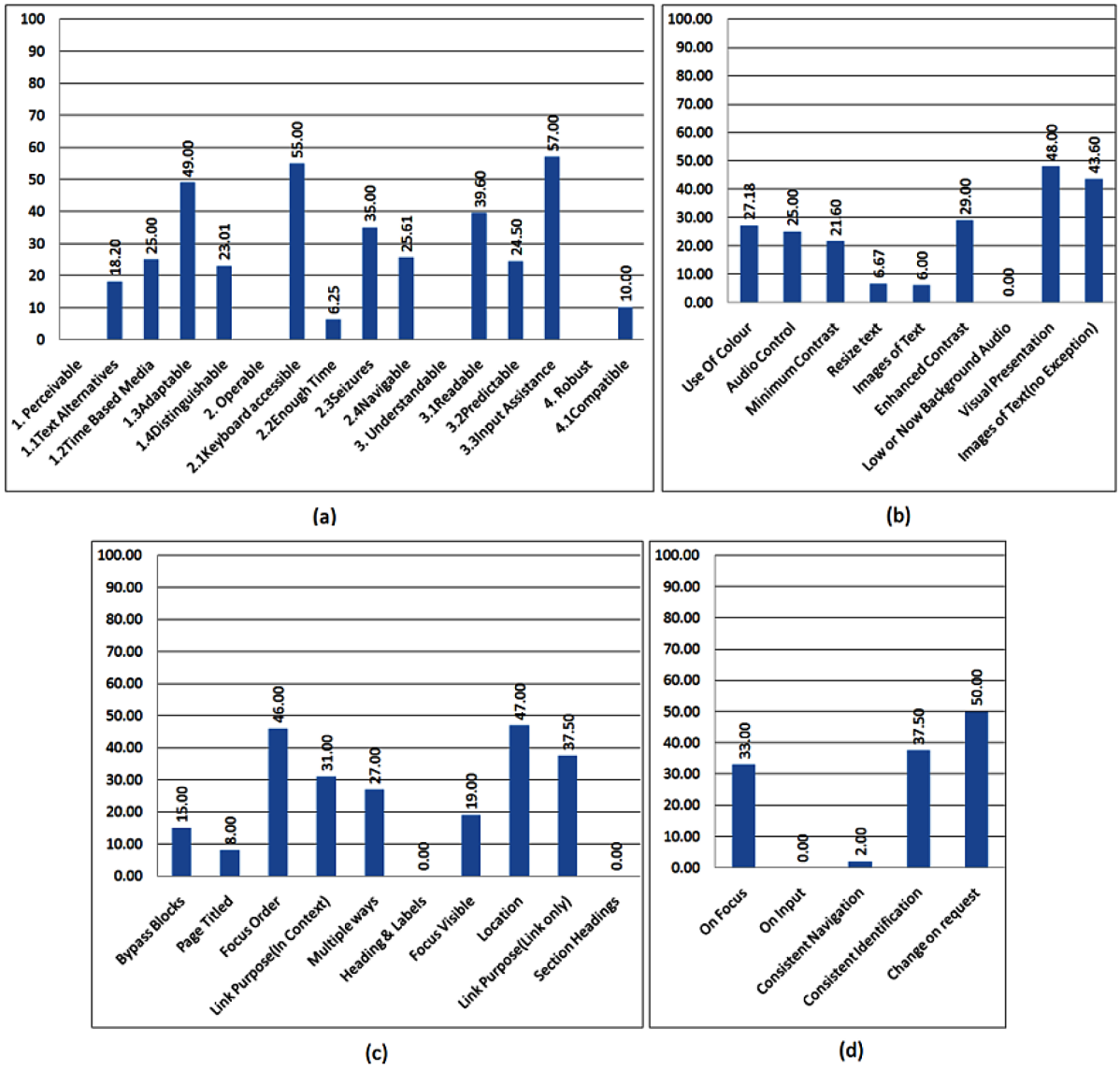


Figure 5(a) describes the overall average percentage violation results per each rule of WCAG 2.0. In the following Graph we analyze each accessibility principle in Indian Educational websites. In respect of Perceivable principle in educational websites, the maximum violated guideline is guideline 1.3 (Adaptable) in which educational websites indicate 49.00% violation. Educational websites indicate 18.20%, 25.00%, and 23.01% violation in respect of guideline 1.1 (Text Alternative), guideline 1.2 (Time Based Media), and guideline 1.4 (Distinguishable) respectively. We represent a separate point by point graphical analysis in Figure 5(b).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Overall average percentage violation done by selected Indian Educational websites with respect to (a) WCAG 2.0, (b) Perceivable principle of WCAG, (c) Operable principle of WCAG, (d) Understandable Principle of WCAG



While considering Operable principle in educational websites, the maximum violated guideline is guideline 2.1 (Keyboard accessible) in which educational websites indicate 55.00% violation. Educational websites show 6.25%, 35.00%, and 25.61% violation in guideline 2.2 (Enough Time), guideline 2.3 (Seizures), and guideline 2.4 (Navigable) respectively. We represent a point by point graphical analysis in Figure 5(c).

While considering Understandable principle in educational websites, the maximum violated guideline is guideline 3.3 (Input Assistance) in which educational websites indicate 57.00% violation. Educational websites show 39.60% and 24.50% violation in guideline 3.1 (Readable) and Guideline 3.2 (Predict-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

able) respectively. We give a separate point by point graphical analysis in Figure 5(d). According to our analysis the In Indian Educational Websites Guideline 4 (Robust) gives 10.00% violation.

Figure 6(a) describes the overall average percentage violation results for each rule of WCAG 2.0, when applied to some of the Indian Commercial websites. With respect to the Perceivable principle in case of commercial websites, the maximum violated guideline is guideline 1.2 (Time Based Media) in which commercial websites show 72.00% violation. Commercial websites indicate 36.00%, 43.20%, and 24.73% violation in guideline 1.1 (Text Alternative), guideline 1.3 (Adaptable), and guideline 1.4 (Distinguishable) respectively. We represent a separate point by point graphical analysis in Figure 6(b).

In case of Operable principle for commercial websites, the maximum violated guideline is guideline 2.1 (Keyboard accessible) in which commercial websites show 70.00% violation. Commercial websites indicate 45.75%, 50.00%, and 34.86% violation in guideline 2.2 (Enough Time), guideline 2.3 (Seizures), and guideline 2.4 (Navigable) respectively. We introduce a separate point by point graphical analysis in Figure 6(c).

While considering the Understandable principle in commercial websites, the maximum violated guideline is guideline 3.3 (Input Assistance) in which commercial websites show 71.00% violation. Commercial websites indicate 52.80% and 36.52% violation in guideline 3.1 (Readable) and Guideline 3.2 (Predictable) respectively. We represent a separate point by point graphical analysis in Figure 6(d). The Indian Commercial Websites considered in our study indicated 30.00% violation in case of Guideline 4 (Robust).

Result Analysis

A comparative view of the violations with respect to the guidelines on Perceivable, Operable, Understandable, Robust for the three different categories of web portals considered in our study, namely, Government, Educational & commercial is presented in the pie charts of Figure 7.

Evaluation of Asian Government Websites

Methodology

The objective of Patra, Dash, Mishra, (2014, ICEGOV) is to study the accessibility of government web portals of some Asian countries. For our analysis, we have considered three different categories of web portals and five sample portals under each category. Facilities provided by each of the websites are checked both manually and by using certain tools based on the testing parameters as per the WCAG 2.0 guidelines. More or less the same methodology and tools, as described above, have been used for evaluating accessibility of selected government websites.

Evaluation

This research is intended to provide an accessibility evaluation of 15 Asian websites based on WCAG 2.0. Table 3 contains list of Government web portals selected for evaluation. The analysis is based on the data available during 1st May 2014 to 21st June2014.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 6. Overall average percentage violation done by selected Indian Commercial websites with respect to (a) WCAG 2.0, (b) Perceivable principle of WCAG, (c) Operable principle of WCAG, (d) Understandable Principle of WCAG

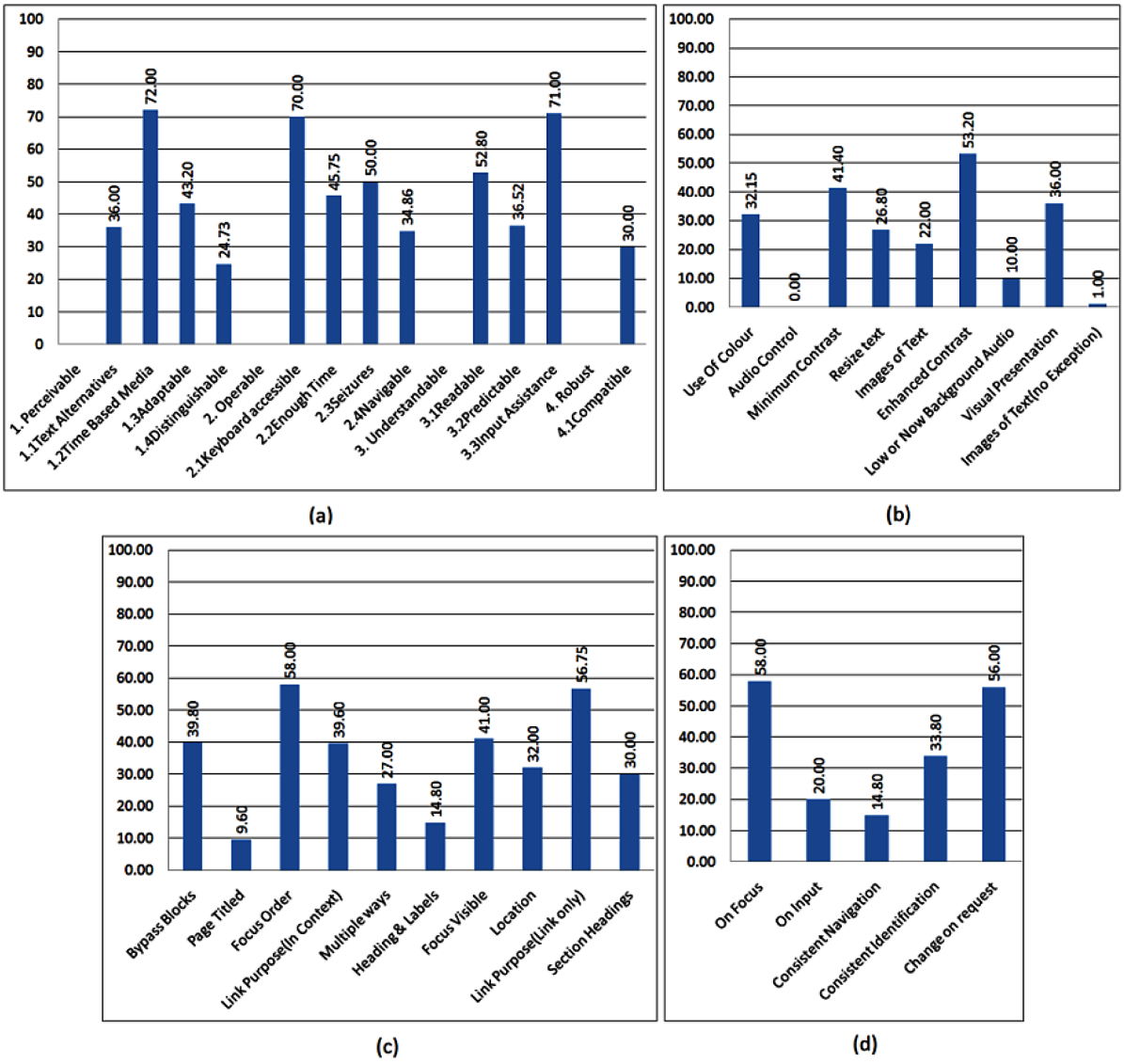


Figure 9 describes the average percentage of WCAG 2.0 guideline violation in Government websites of highly populated Asian countries. The Perceivable principle states that Web contents should be made available to the senses. While analyzing the Perceivable features of the web portals of this category, it is observed that the maximum violated guideline is guideline 1.3 in which web portals indicates 40% violation. Violations with respect to guideline 1.1, 1.2, and 1.4 were found to be 24.1%, 13.33%, and 30.04% respectively.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 7. Percentage of accessibility violation done by websites of different category with respect to four principles of WCAG 2.0

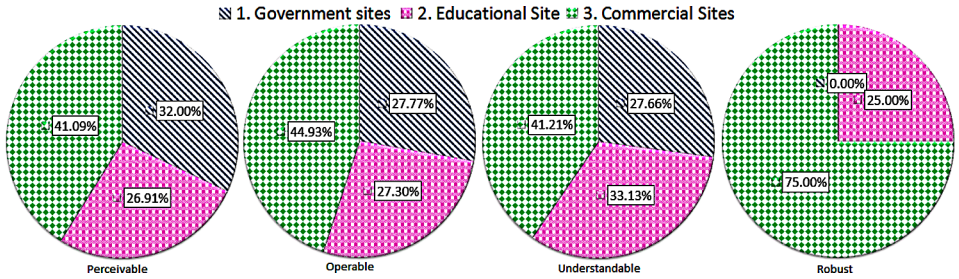


Figure 8. Methodology adopted for accessibility evaluation of Asian Government Websites

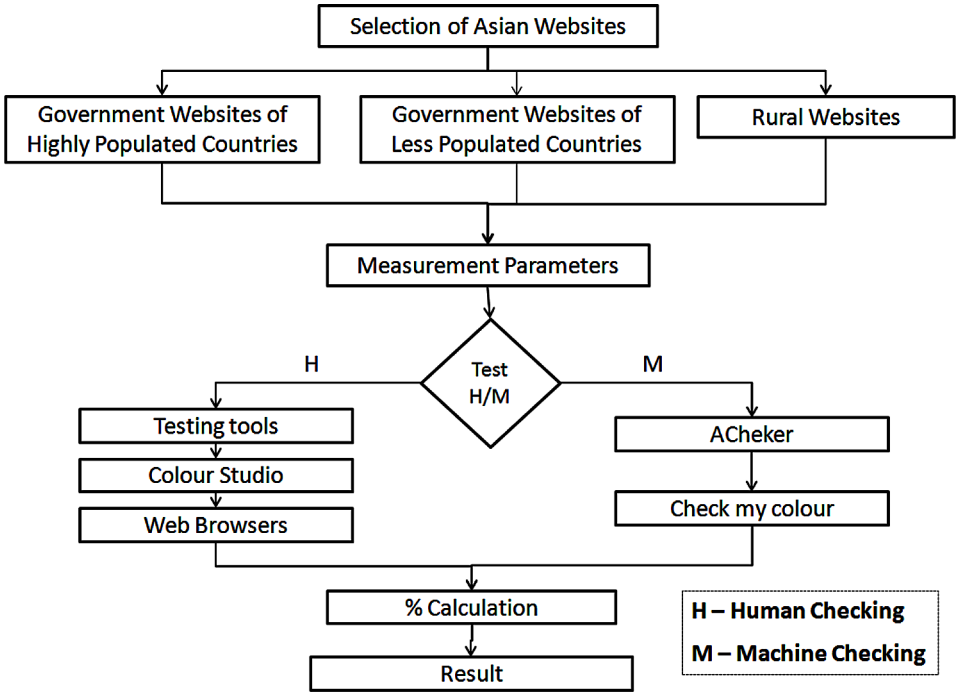
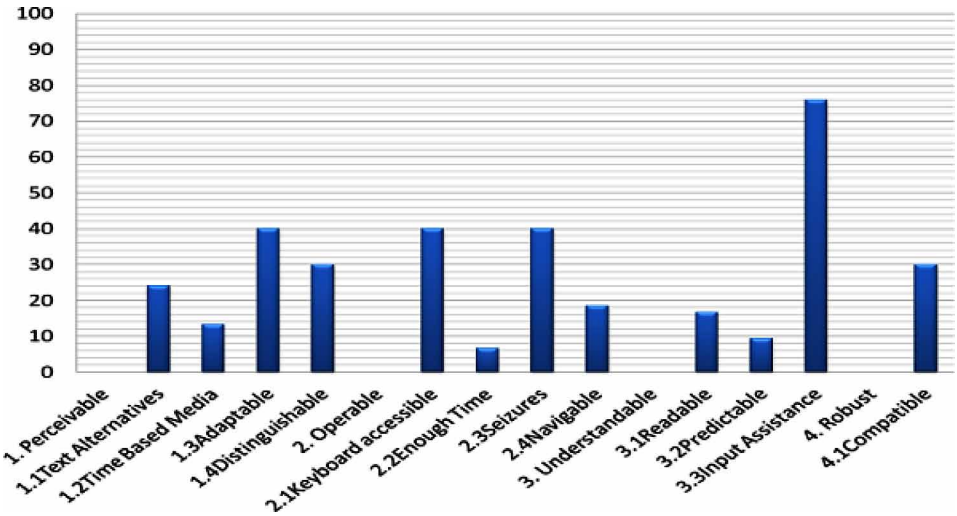


Table 3. List of selected Asian government web portals

Government Websites of Highly Populated Country	Government Websites of Less Populated Country	Government Websites of Rural Countries
http://www.ebeijing.gov.cn/	http://www.southkoreagovernment.com/	http://www.nspafghanistan.org
http://india.gov.in/	https://www.malaysia.gov.my/en	http://www.rmdcnepal.com/front/index.php
http://www.mofa.go.jp/	http://www.saudi.gov.sa/	http://www.bard.gov.bd
http://www.gov.ph/	http://www.taiwan.gov.tw/mp.asp?mp=1	http://www.rrdtc.org/
http://www.thaigov.go.th/en.html	http://www.priu.gov.lk/	http://www.crdt.org.kh/

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 9. Violation of guideline in government web portals of highly populated Asian countries



The Operable principle states that the interface forms, controls, and navigation should be easily operable. While evaluating the Operable principles, the most violated guidelines are guideline 2.1and 2.3both with 40% violation. But, for guideline 2.2and 2.4 the violation percentages are 6.67% and 18.44% respectively. The Understandable principle requires that Content and interface of web portals are easy to understand by all. With respect to the Understandable principle web portals of this category, we found that the maximum violated guideline is guideline 3.3 with 75.95% violation. Further, the violations in case of guideline 3.1 and 3.2 are16.67% and 9.4% respectively.

Figure 10. Test results of government web portals of highly populated Asian countries

Country	**China**	**India**	**Japan**	**Philipines**	**Thailand**	
Websites	www.ebeijing.gov.cn/	india.gov.in/	www.mofa.go.jp/	www.gov.ph/	www.thaigov.go.th/en.html	**Avg**
1. Perceivable						
1.1. Text Alternatives	16.67%	30.00%	16.67%	28.57%	28.57%	**24.10%**
1.2. Time Based Media	22.22%	0.00%	0.00%	11.11%	33.33%	**13.33%**
1.3. Adaptable	33.33%	50.00%	33.33%	33.33%	50.00%	**40.00%**
1.4. Distinguishable	36.71%	35.56%	29.75%	25.95%	22.26%	**30.04%**
2. Operable						
2.1. Keyboard accessible	75.00%	25.00%	0.00%	75.00%	25.00%	**40.00%**
2.2. Enough Time	33.33%	0.00%	0.00%	0.00%	0.00%	**6.67%**
2.3. Seizures	0.00%	50.00%	50.00%	50.00%	50.00%	**40.00%**
2.4. Navigable	21.83%	20.20%	3.83%	32.83%	13.50%	**18.44%**
3. Understandable						
3.1. Readable	16.67%	50.00%	0.00%	16.67%	0.00%	**16.67%**
3.2. Predictable	20.00%	27.00%	0.00%	0.00%	0.00%	**9.40%**
3.3. Input Assistance	85.71%	85.00%	57.14%	-	-	**75.95%**
4. Robust						
4.1.Compatible	0.00%	0.00%	50.00%	50.00%	50.00%	**30.00%**

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The Robust principle requires that content of a web portal can be used reliably by a wide variety of user agents. Our analysis shows that there is 30% violation of guideline 4 is found in web portals of this category. In Figure 10 wherever the web component dealing with a particular guideline is absent in the web site, it is indicated by "-" in the corresponding column and when there is no violation, it is indicated by"0.00%".

Figure 11 shows the average percentage of WCAG 2.0 guidelines violations in Government web portals of less populated Asian countries. While analyzing the Perceivable features of the web portals of this category, it is observed that the maximum violated guideline is guideline 1.3 in which web portals indicates 33.33% violation. Violations with respect to guideline 1.1, 1.2, and 1.4 were found to be 30.82%, 27.78%, and 25.25% respectively.

Figure 11. Violation of guideline in government web portals of less populated Asian countries

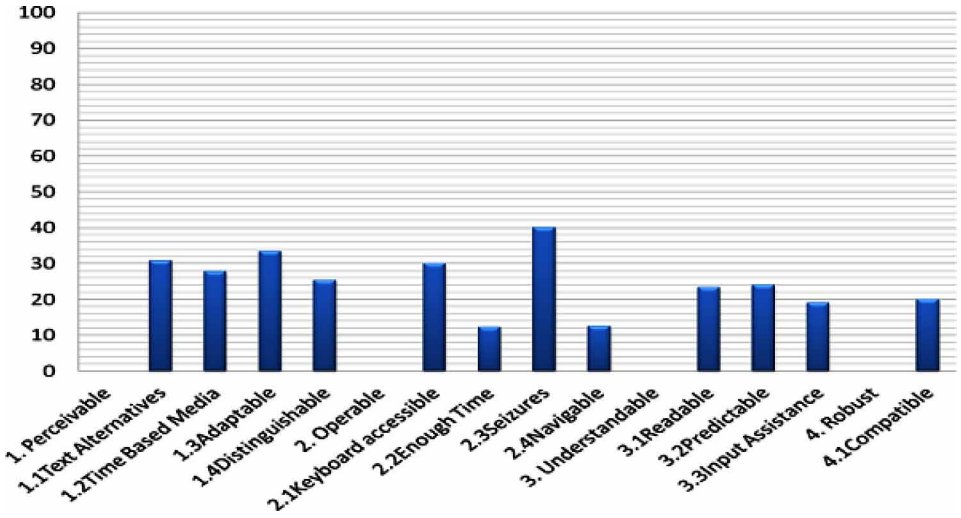


Figure 12. Test results of government web portals of less populated Asian countries

Country	Korea	Malaysia	Saudi Arabia	Taiwan	Srilanka	
Websites	www.southkoreagovernment.com/	www.malaysia.gov.my/en	www.saudi.gov.sa/	www.taiwan.gov.tw/mp.asp?mp=1	www.priu.gov.lk/	Avg
1. Perceivable						
1.1. Text Alternatives	66.00%	16.67%	28.57%	14.28%	28.57%	**30.82%**
1.2. Time Based Media	-	-	33.33%	22.22%	-	**27.78%**
1.3. Adaptable	50.00%	33.33%	16.67%	16.67%	50.00%	**33.33%**
1.4. Distinguishable	14.40%	38.72%	23.28%	24.80%	25.03%	**25.25%**
2. Operable						
2.1. Keyboard accessible	0.00%	0.00%	50.00%	50.00%	50.00%	**30.00%**
2.2. Enough Time	-	0.00%	20.00%	16.67%	-	**12.22%**
2.3. Seizures	50.00%	50.00%	50.00%	50.00%	0.00%	**40.00%**
2.4. Navigable	9.00%	7.50%	9.06%	13.00%	22.95%	**12.47%**
3. Understandable						
3.1. Readable	50.00%	0.00%	0.00%	50.00%	16.67%	**23.33%**
3.2. Predictable	40.00%	20.00%	0.00%	20.00%	40.00%	**24.00%**
3.3. Input Assistance	-	0.00%	0.00%	57.14%	-	**19.05%**
4. Robust						
4.1.Compatible	0.00%	50.00%	50.00%	0.00%	0.00%	**20.00%**

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

While evaluating the Operable principles, the maximum violated guideline is guideline 2.3 in which these websites indicate 40.00% violation. But, for guideline 2.1, 2.2, and 2.4 the violation percentages are 30%, 12.22%, and 12.47% respectively.

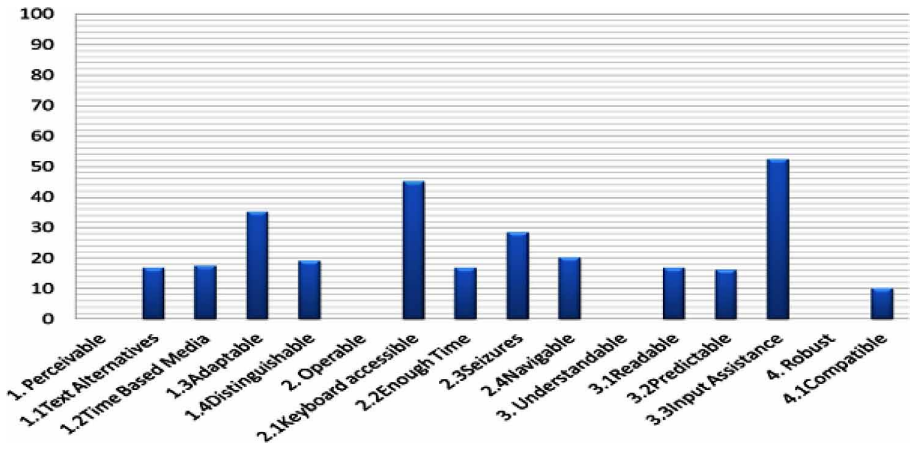
With respect to Understandable principle in these websites, the maximum violated guideline is guideline 3.2 with 24% violation, whereas guideline 3.1 and 3.3 indicate 23.33% and 19.05% violation respectively. According to our analysis we found 20% violations according to guideline 4(Robust) in these government websites.

Figure 13 describes the average percentage of WCAG 2.0 guideline violation in websites pertaining to rural development. While analyzing the Perceivable features of the web portals of this category, it is observed that the maximum violated guideline is guideline 1.3 in which rural websites indicates 35% violation. Violations with respect to guideline 1.1, 1.2, and 1.4 were found to be 16.67%, 17.41%, and 18.99% respectively.

While evaluating the Operable principles, the maximum violated guideline is guideline 2.1 in which rural websites indicate 45% violation. But, for guideline 2.2, 2.3, and 2.4 the violation percentages are 16.67%, 28.33%, and 20.11% respectively.

With respect to Understandable principle in rural websites, the maximum violated guideline is guideline 3.3 with 52.37% violation. Further, rural websites indicate 16.67% and 16% violation in guideline 3.1 and 3.2 respectively. Our analysis shows that the Asian rural websites violate guideline 4 by almost 10%.

Figure 13. Violation of guideline in government web portals of rural countries



Result Analysis

Figure 15 and 16 provides a comparative view of guideline violations in case of perceivable, operable, understandable, and robustness with respect to the three categories of websites.

While evaluating the chosen 15 websites of Asia we observe that there is an urgent need to improve the web portals in order to make them really accessible. However, countries like Japan and Saudi Arabia have already taken initiatives to improve their web sites. The Japanese government has begun its mission since last five years, whereas the Saudi Arabian government has already obtained WAI-A certification (certificate of conformance level A) from W3C (World Wide Web Consortium).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 14. Test results of government web portals of rural countries

Country	Afghanistan	Nepal	Bangladesh	Laos	Cambodia	
Websites	www.nspafghanistan.org	www.rmdcnepal.com/front/index.php	www.bard.gov.bd	www.rrdtc.org/	www.crdt.org.kh/	Avg
1. Perceivable						
1.1. Text Alternatives	16.67%	33.33%	16.67%	0.00%	16.67%	**16.67%**
1.2. Time Based Media	0.00%	-	30.00%	-	22.22%	**17.41%**
1.3. Adaptable	33.33%	50.00%	50.00%	25.00%	16.67%	**35.00%**
1.4. Distinguishable	10.22%	15.74%	21.72%	19.19%	34.07%	**18.99%**
2. Operable						
2.1. Keyboard accessible	0.00%	75.00%	75.00%	0.00%	75.00%	**45.00%**
2.2. Enough Time	0.00%	0.00%	33.33%	-	33.33%	**16.67%**
2.3. Seizures	0.00%	16.67%	50.00%	25.00%	50.00%	**28.33%**
2.4. Navigable	16.53%	28.09%	19.59%	30.00%	15.75%	**20.11%**
3. Understandable						
3.1. Readable	16.67%	16.67%	16.67%	33.33%	0.00%	**16.67%**
3.2. Predictable	20.00%	0.00%	0.00%	0.00%	60.00%	**16.00%**
3.3. Input Assistance	71.40%	-	42.85%	-	42.85%	**52.37%**
4. Robust						
4.1.Compatible	0.00%	0.00%	0.00%	0.00%	50.00%	**10.00%**

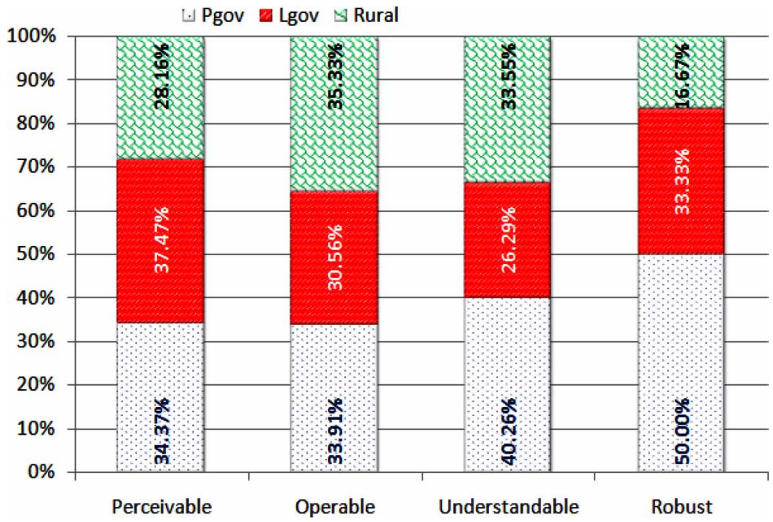
Figure 15. Category wise total result analysis Asian government websites

WCAG (Web Content Accessibility Guidelines) 2.0	Pgov	Lpgov	Rural
1. Perceivable			
1.1. Text Alternatives	24.10%	30.82%	16.67%
1.2. Time Based Media	13.33%	27.78%	17.41%
1.3. Adaptable	40.00%	33.33%	35.00%
1.4. Distinguishable	30.04%	25.25%	18.99%
2. Operable			
2.1. Keyboard accessible	40.00%	30.00%	45.00%
2.2. Enough Time	6.67%	12.22%	16.67%
2.3. Seizures	40.00%	40.00%	28.33%
2.4. Navigable	18.44%	12.47%	20.11%
3. Understandable			
3.1. Readable	16.67%	23.33%	16.67%
3.2. Predictable	9.40%	24.00%	16.00%
3.3. Input Assistance	75.95%	19.05%	52.37%
4. Robust			
4.1.Compatible	30.00%	20.00%	10.00%

Pgov : Highly populated government websites
Lpgov : Less populated government websites
Rural : Rural websites

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 16. Percentage of accessibility violation done by government websites of different category of countries with respect to four principles of WCAG 2.0



ACCESSIBILITY OF USER AGENTS

Evaluation of PC Web Browsers

According to UAAG, user agents are tools used to access websites (from the client side). Media players and web browsers are examples of such user agents which are widely used to access websites. Besides this, UAAG also provides accessibility guidelines for assistive technologies (like text to speech synthesizers). This research is intended to evaluate the accessibility feature of web browser.

By using an effective web browser we can improve the accessibility of web. When we click by typing an URL of a website in the address bar of the web browser, it only gets the source code of that website from the server, and represents it in its own way taking into account the size of the display and by using DOM (Document Object Model). Thus, a website can be represented in different ways in different web browsers. The following features of a web browser can be evaluated by using UAAG:

- **Colour Contrast:** The colour of the text, link and background can be decided during the creation of a web portal using its source code. But if the colour is not mentioned for text, link and background then it uses the default colour provided by the web browser. Thus, we can control the colour contrast by controlling the colour provided in the web browser.
- **Default Navigation:** Web browser should allow direct and sequential navigation between its elements. A web browser should allow all keyboard accessibility features. It should also allow the hierarchical and structural navigation. User must be able to reverse navigation between web addresses.
- **Controlling and Customizing the Shortcuts:** Web browser should provide the list of keyboard and mouse shortcuts used in it. It should allow customization of shortcuts (except conventional shortcuts).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Control Focus:** Web browsers should be able to control and restrict the unpredictable change of focus (like pop-up and adware).
- **Controlling the Viewports and Top-Level Viewports:** The websites are represented in the viewports of a web browser. Web browser should allow easy navigation between the view ports (tab) or top-level viewports (window). Web browser should able to control the zooming percentage of the viewport. Viewports should maintain the point of regard of its elements during resizing of the viewport or changing the zoom. Viewport should be able to indicate the position of view and should be able to provide scrollbar. When clicking on a link user should be able to choose whether to open the new link in new viewport or in top-level viewport or in the same viewport. Web browser should be able to control the change of focus during creation of a new viewport or top-level viewport. Viewports should be resizable.
- **Controlling the View:** Web browser should be able to provide the outline view, source view of a web portal. Web browser should be able to show the related element and the element hierarchy in the source code of a website.
- **Default Alternative Contents:** Web browser should be able to provide the alternative text content provided by the source code of the website for respective non-text content (image, video etc). Web browser should also be able to indicate the absence of alternative text.
- **Highlight:** Web browser should be able to differentiate mouse focus, keyboard focus, and activated element. Web browser should be able to customize their highlighting method (by controlling the size, blink rate, and controlling the foreground, back ground colour).Web browser should be able to differentiate the highlighted viewports among other. The web browser should be able to control different methods of highlighting (by colour contrast of highlighted viewport with others, size, specific borders, by any blink rate).
- **Making the Form Usable and Predictable:** Web browser should be able to make the form usable and predictable. Web browser should be able to provide the spelling assistance for editable text. User should be able to reverse recognized navigation between forms (unless there is any authentication). Web browser must be able to store the local version of a website. User should be able to specify whether or not recognized form submissions must be confirmed. Web browser should be able to provide auto fill option for some repeatedly used harmless data.
- **Retrieval Progress:** Web browser should be able to show the state of content retrieval activity.
- **Controlling the Input Devices and Input Methods:** Web browser should be able to interact with any input device, which is able to interact with the platform (the Operating System of the device). Web browser must be able to access and activate different input methods.
- **Controlling the Configuration Settings:** Web browser should be able to confirm or reverse the configuration setting. Settings must be applicable to all viewports.
- **Good Documentation:** A good documentation can help the user to understand the features provided by the web browser. The documentation of the web browser should also contain the assistive features of the web browser. It should contain the version-wise additional features provided by the web browser.
- **Transferable Preferences: Web** browser should allow the user to construct multiple preferences. Web browser should be able to transfer the preference setting between the devices.
- **Controlling the Style Sheets:** Web browser should be able to control and customize different style-sheets.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 17. Effect of colour contrast setting of web browser

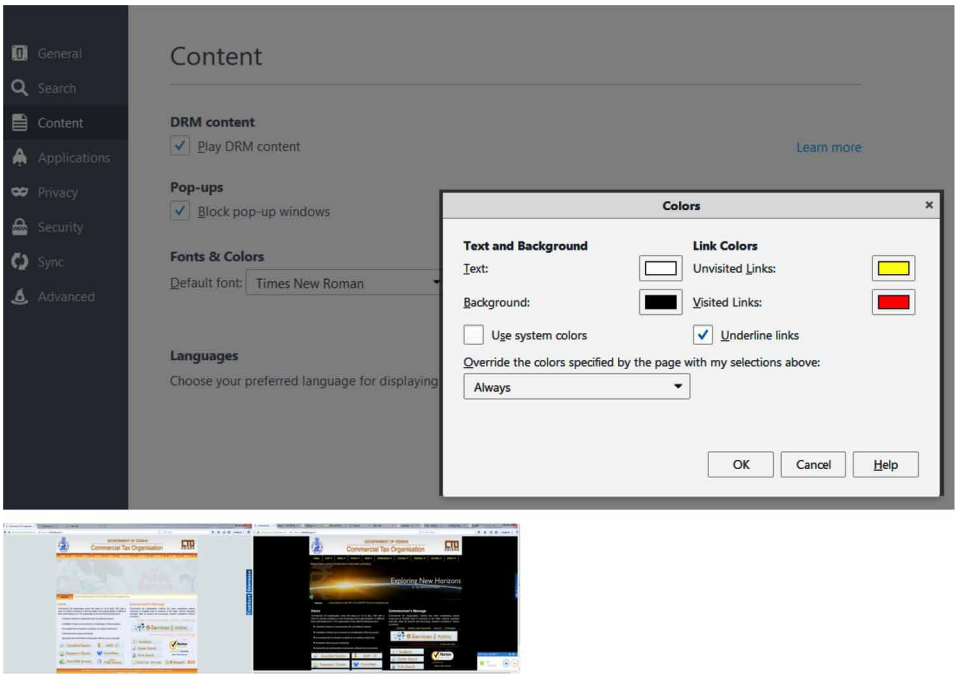
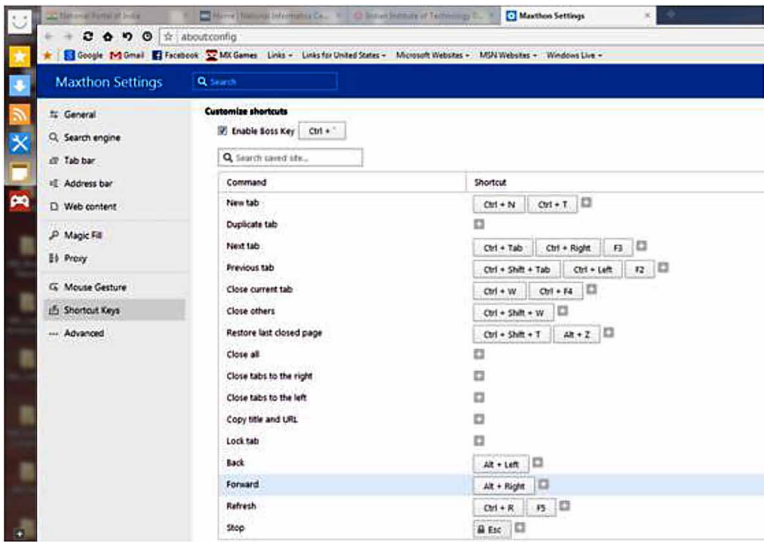


Figure 18. Shortcut key control menu provide by the web browser



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Methodology

UAAG 2.0 contains the accessibility features for the user agents (media-players and web browsers) and the assistive technologies. The objective of this section is to study the accessibility of web browsers. First of all, we classify the UAAG 2.0 guidelines and choose the accessibility guidelines that are applicable to web browsers. For our analysis, we have considered top ten web browsers commonly used across the world. Facilities provided by each of the web browsers are checked manually based on the testing parameters as specified in the UAAG 2.0 guidelines. We have checked the features of web browsers with the help of 20 top websites that satisfy most of the accessible criteria as per WCAG 2.0. A schematic representation of the methodology adopted in our work is depicted in Figure 19. Table 4 shows the guidelines, which are extracted from UAAG2.0, for accessibility analysis of web-browsers.

Figure 19. Methodology for accessibility analysis of web browsers

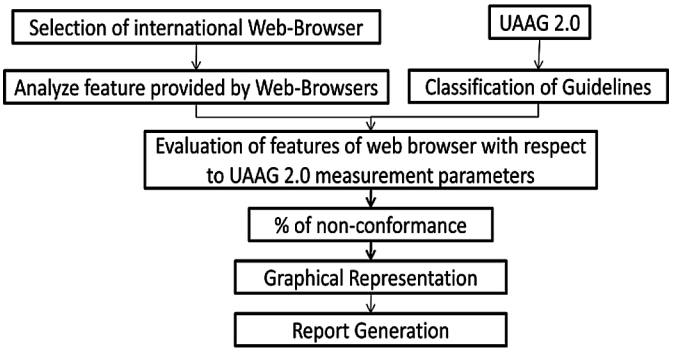


Table 4. Selected guidelines of UAAG 2.0 that are used for accessibility analysis of web-browsers

Guidelines Applicable to Web-Browsers			
1.1.1	Render Alternative Content	2.2.2	Sequential Navigation Between Viewports
1.1.2	Indicate Unrendered Alternative Content	2.2.3	Default Navigation Order
1.1.3	Replace Non-Text Content	2.2.4	Options for Wrapping in Navigation
1.1.4	Provide Configurable Alternative Content Defaults	2.3.1	Allow Direct Navigation to Enabled Elements
1.2.1	Support Repair by Assistive Technologies	2.3.2	Allow Direct Activation of Enabled Elements
1.2.2	Repair Missing Structure	2.3.3	Present Direct Commands from Rendered Content
1.3.1	Highlighted Items	2.3.4	Present Direct Commands in user interface
1.3.2	Highlighting Options	2.3.5	Allow Customized Keyboard Commands
1.4.1	Basic text formatting (Globally)	2.4.1	Text Search
1.4.2	Basic text formatting (by Element)	2.4.2	Search Direction
1.4.3	Blocks of text (Globally)	2.4.3	Match Found
1.4.4	Configured and Reflowed Text Printing	2.4.4	Alert on Wrap or No Match
1.4.5	Advanced text formatting (Globally)	2.4.5	Alternative Content Search
1.7.1	Support User Stylesheets	2.5.1	Show Location in Hierarchy

continues on following page

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Continued

Guidelines Applicable to Web-Browsers			
1.7.2	Apply User Stylesheets	2.5.2	Provide Structural navigation by heading and Within Tables
1.7.3	Disable Author Stylesheets	2.5.3	Configure Structural navigation and Views
1.7.4	Save copies of Stylesheets	2.6.1	Allow Access and activation of input Methods
1.8.1	Highlight Viewport	2.7.1	Allow Persistent Accessibility Settings
1.8.2	Move Viewport to Selection and Focus	2.7.2	Allow Restore All to Default
1.8.3	Provide Viewport Scrollbars	2.7.3	Allow Multiple Sets of Preference Settings
1.8.4	Indicate Viewport position	2.7.4	Allow Preference Changes from outside the user Interface
1.8.5	Allow Zoom	2.7.5	Make Preference Settings Transferable
1.8.6	Maintain Point of Regard	2.8.1	Customize Display of controls for User Interface Commands, Functions, and Extensions
1.8.7	Customize Viewport Highlighting	2.9.1	Adjustable Time Limits
1.8.8	Allow Viewport Resize	2.12.1	Platform Text Input Devices
1.8.9	Provide Viewport History	2.12.2	Operation With Any Devices
1.8.10	Allow Top-Level Viewport Open on Request	2.12.3	Text Input With Any Device
1.8.11	Allow Top-Level Viewport Focus Control	3.1.1	Text Entry Undo
1.8.12	Allow Same User Interface	3.1.2	Settings Changes can be Reversed or confirmed
1.8.13	Multi-Column Text Reflow	3.1.3	Retrieval Progress
1.8.14	Ignore Absolute Layout Dimensions	3.1.4	Spell Check
1.8.15	Linearize Content	3.1.5	Back Button
1.8.16	Provide Web Page Bookmarks	3.1.6	Form Submission Confirm
1.9.1	Outline View	3.1.7	Form Auto-Fill
1.9.2	Source View	3.1.8	Save Form Entries
1.10.1	Show Related Elements	3.2.1	Accessible Documentation
1.10.2	Show Element Hierarchy	3.2.2	Describe Accessibility Features
2.1.1	Provide Full Keyboard Functionality	3.2.3	Document All Features
2.1.2	Show Keyboard Focus	3.2.4	Changes Between Versions
2.1.3	Avoid keyboard Traps	3.2.5	Centralized View
2.1.4	Separate Selection from Activation	3.3.1	Avoid Unpredictable Focus
2.1.5	Follow Text Keyboard Conventions	5.1.1	comply With WCAG
2.1.6	Make Keyboard Access Efficient	5.1.2	Implement Accessibility Features of content Specifications
2.2.1	Sequential Navigation Between Elements	5.1.6	Enable Reporting of user Agent Accessibility Faults

Evaluation

This research is intended to provide an accessibility evaluation of 10 Web browsers based on UAAG 2.0. For our analysis, we have considered the latest version of top 10 web browsers, as shown in Table 5. These browsers are the mostly widely used web browsers across the world. The data taken for our analysis is gathered during the period 1st November 2014 to 21st July 2015.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. List of selected web browsers of Android mobiles

Web Browsers	Source Link
Mozilla Firefox 35.0	http://filehippo.com/download_firefox/59773/
Google Chrome 40.22	http://filehippo.com
Opera 27.0	http://www.androidapksfree.com/apk/opera-27-0-1698-89115-apk-download/
Comodo Dragon 36.1	http://xetbox.com/programs/internet/browsers/673-comodo-dragon
Internet Explorer 8	http://internet-explorer-8.en.softonic.com
Avant 12.5	http://avant-browser.software.informer.com/12.5/
Flock 2.6.1	http://filehippo.com/download_flock/
Safari 5.34.57	http://www.4shared.com/rar/gZ8rCymt/Safari_53457.html?locale_en
SeaMonkey 2.32	http://www.seamonkey-project.org/releases/2.32
Maxthon 4.4	http://maxthon-cloud-browser.software.informer.com/4.4

In order to measure all the dictum of UAAG 2.0 for different web browsers, first we check all the elements and features provided by the web browsers. Next, we evaluate the web browsers by browsing varieties of web-sites with different peculiarities (Assistive facilities). We have documented our findings in a tabular form by indicating '✓' when a web browser passes the test, and '✗' when a web browser fails the test. Based on this, we have calculated the error percentage which is a ratio of the number of failed features to the total number of features. The guidelines marked with red colour are violated by all tested web browsers. Similarly, the guidelines marked with green colour are regarded by all tested web browsers.

Table 6(a) provides the result of accessibility evaluation of web browsers with respect to the Perceivable guidelines of UAAG 2.0. According to Perceivable principle of UAAG, a web browser should be able to make its component and websites component available to human senses. During analysis of the perceivable feature, we test the web browser's ability to control text formatting. Web browsers can regulate the text-formatting by operating on text colour, text size, and font of the text. We observe that web browsers are able to control text formatting of rendered text and links, but unable to control it for block of text. Mozilla-Firefox, Flock, and SeaMonkey provide the best text formatting mechanism.

We checked whether the web browsers are able to differentiate between the elements selected by keyboard or mouse and activated element through its highlighting features. We also analyzed the methods provided by the web browsers to customize the highlighting feature. These two accessibility features are well organized by Mozilla-Firefox, Internet-explorer, Flock, and SeaMonkey. Web browser should be able to provide the outline view, source view, and off-line view of a website. This accessibility feature is properly managed by all the web browsers.

We analyzed all features of viewport and top-level viewport of a web browser. The viewports of a web browser should be resizable and contain the zooming and scrolling features. Web browser should be able to control the bookmark features. We also evaluated the web browser's ability for text reflow. All these viewport and top-level viewport related accessibility features are mostly confirmed by Google-Chrome, Opera, and Avant web browsers. We tested the ability of web browsers to control the text alternative for all non-text web components. Web browsers should also be able to find the absence of text alternatives.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 6. Result of accessibility evaluation of web browsers with respect to (a) Perceivable guideline, (b) Operable guideline

	mozilla Firefox 35.0	Google Chrome 40.22	Opera 27.0	Comodo Dragon 36.1	Internet Explorer 8	Avant 12.5	Flock 2.6.1	Safari 5.34.57	SeaMonkey 2.32	Maxthon 4.4
1.1.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.1.2	✗	✓	✗	✓	✓	✗	✗	✗	✗	✗
1.1.3	✗	✓	✗	✓	✓	✓	✗	✗	✗	✗
1.1.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.2.1	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.2.2	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.3.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.3.2	✓	✗	✗	✗	✓	✗	✓	✗	✓	✗
1.4.1	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗
1.4.2	✓	✗	✗	✗	✗	✗	✓	✗	✓	✗
1.4.3	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.4.4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.4.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.7.1	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓
1.7.2	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓
1.7.3	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓
1.7.4	✓	✓	✓	✓	✗	✗	✗	✗	✓	✓
1.8.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.8.5	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
1.8.6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.7	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗
1.8.8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.9	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
1.8.10	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓
1.8.11	✗	✓	✓	✗	✗	✗	✗	✓	✓	✓
1.8.12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.13	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.8.14	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.8.15	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.8.16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.9.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.9.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.10.1	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗
1.10.2	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗

(a)

	mozilla Firefox 35.0	Google Chrome 40.22	Opera 27.0	Comodo Dragon 36.1	Internet Explorer 8	Avant 12.5	Flock 2.6.1	Safari 5.34.57	SeaMonkey 2.32	Maxthon 4.4
2.1.1	✓	✓	✗	✓	✓	✓	✓	✗	✗	✗
2.1.2	✓	✓	✗	✓	✓	✗	✓	✗	✓	✓
2.1.3	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓
2.1.4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.1.5	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗
2.1.6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.2.1	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓
2.2.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.2.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.2.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
2.3.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.3.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.3.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.3.4	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓
2.3.5	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓
2.4.1	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
2.4.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.4.3	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
2.4.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
2.4.5	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗
2.5.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.5.2	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
2.5.3	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
2.6.1	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
2.7.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.7.2	✗	✓	✗	✓	✓	✓	✗	✗	✗	✗
2.7.3	✓	✓	✓	✓	✗	✗	✗	✗	✓	✗
2.7.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
2.7.5	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗
2.8.1	✓	✓	✗	✓	✗	✓	✗	✗	✗	✓
2.9.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.12.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.12.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.12.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

(b)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

We analyzed the facilities provided by different web browsers for creating and using user style sheet and also to save copies of author style sheet.

Table 6(b) provides the result of accessibility evaluation of web browsers with respect to the Operable guidelines of UAAG 2.0. According to Operable principle of UAAG, web browsers should be able to make their components and websites components easily operable by users. During analysis of the Operable feature we tested whether web browsers support all functionality of keyboard or not. There should not be any keyboard traps, or loss of keyboard focus.

We analyzed the shortcuts available in web browsers for forward and backward sequential navigation. A web browser should alert the user during wrapping of navigation. We analyzed the commands present in web browser for direct navigation and the method to customize them. We also tested the forward and backward text search. Web browsers should show all match found and should alert on wrap. We also analyzed the navigation of web browsers through different structures of websites. The navigation related accessibility features are mostly confirmed by Mozilla-firefox. We tested different processes provided by web browsers to access and activate input methods. A web browser should be compatible with all input devices appropriate to its platform. We analyzed the configuration setting of all web browsers and also the persistence and reversibility of web browsers' configuration. We verified whether a web browser al-

Table 7. Result of accessibility evaluation of web browsers with respect to Guideline 3 (Understandable) and Guideline 5 (Specification and conventions)

	mozilla Firefox 35.0	Google Chrome 40.22	Opera 27.0	Comodo Dragon 36.1	Internet Explorer 8	Avant 12.5	Flock 2.6.1	Safari 5.34.57	SeaMonkey 2.32	Maxthon 4.4
3.1.1	✗	✓	✓	✓	✗	✗	✗	✓	✗	✓
3.1.2	✓	✓	✗	✓	✓	✓	✓	✗	✓	✗
3.1.3	✗	✗	✗	✗	✓	✓	✓	✓	✓	✗
3.1.4	✓	✗	✗	✓	✗	✗	✓	✓	✓	✓
3.1.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.1.6	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
3.1.7	✓	✗	✓	✓	✗	✗	✗	✓	✗	✗
3.1.8	✓	✗	✗	✗	✗	✗	✗	✗	✓	✗
3.2.1	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓
3.2.2	✓	✓	✓	✓	✓	✗	✗	✓	✓	✗
3.2.3	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓
3.2.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
3.2.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
3.3.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5.1.1	✓	✓	✗	✓	✗	✗	✓	✗	✓	✗
5.1.2	✓	✗	✗	✗	✗	✗	✓	✗	✓	✗
5.1.6	✓	✓	✗	✓	✗	✗	✓	✓	✗	✓

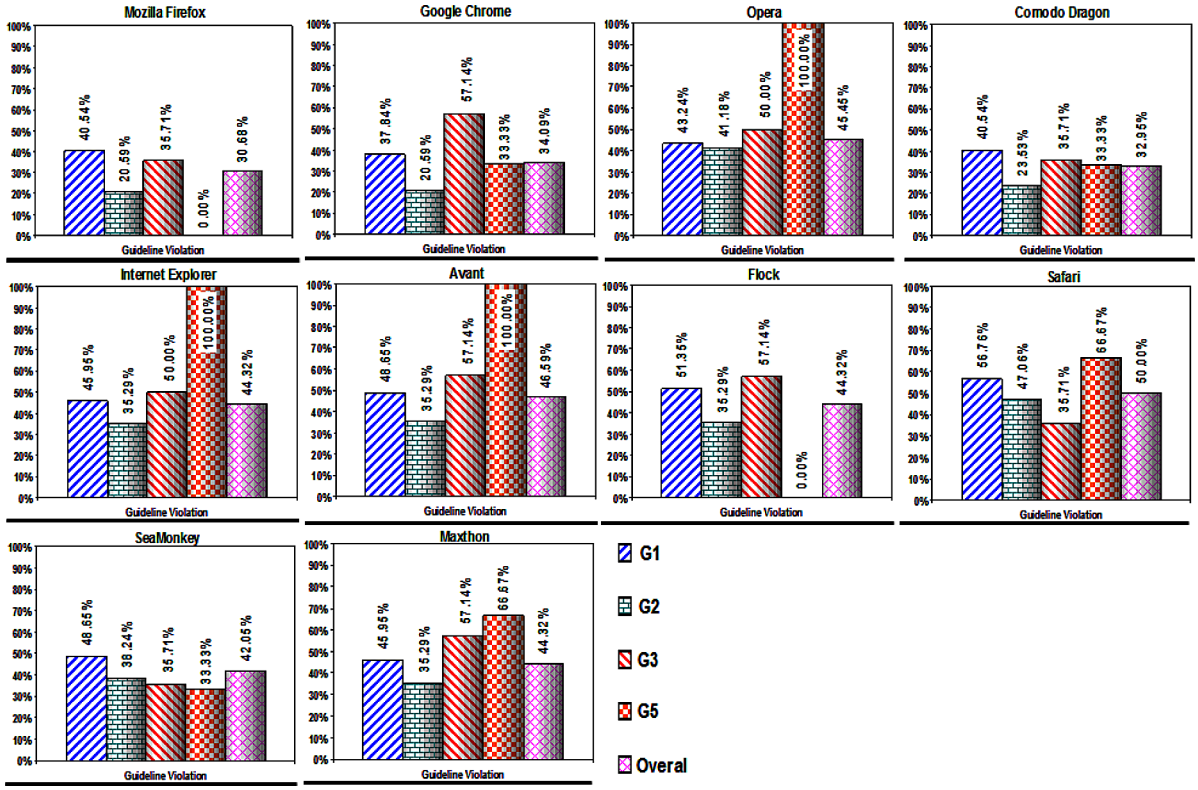
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

lows creating multiple preference settings. The preference settings should be transferable from one device to another. We also analyzed the customize display of controls over the user interface of web browsers.

Table 7 provides the result of accessibility evaluation of web browsers with respect to the Guideline 3 (Understandable) and Guideline 5 (specifications and conventions) of UAAG 2.0. According to Understandable principle of UAAG, web browser should be able to make its contents, interface, documentation, and websites component easily understood by users. We analyzed the effect of web browsers on the form of websites to make it understandable as web browsers can't totally control the forms of websites, but can control and customize specific features. Web browser should provide auto-fill mechanism for specific common fields. Web browsers should be capable to save local versions of web contents. It was found that form related accessibility features are mostly confirmed by Mozilla-Firefox, Comodo-Dragon, and Safari web browsers.

We scrutinized the accessibility of the documentations of web browsers. The document should provide the features of the websites, accessibility features, and the changes between versions. We also tested the web browsers capability to avoid unpredictable focus changes. We also analyzed the feedback features of the web browsers.

Figure 20. Accessibility evaluation of individual web browsers with respect to the "Perceivable", "Operable", "Understandable", and "Specifications and conventions" principles of UAAG2.0 guideline



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

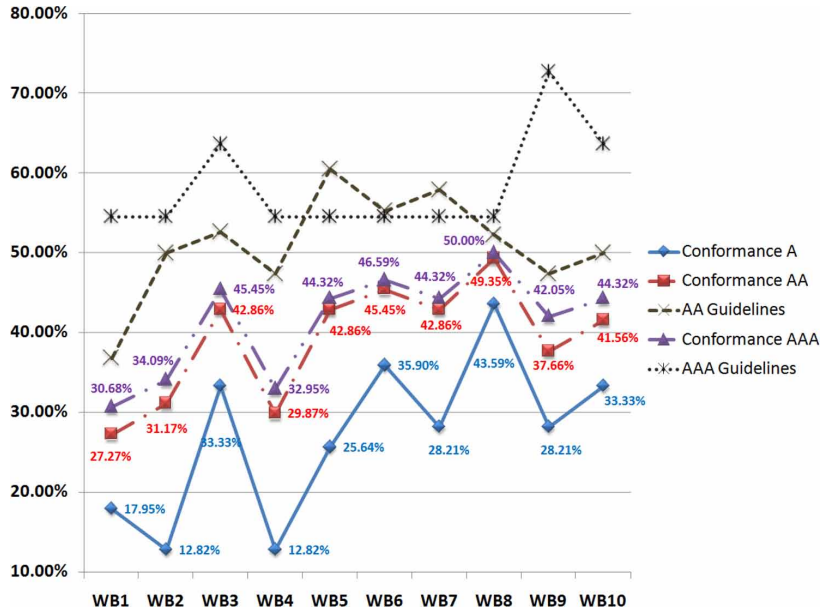
Result Analysis

Figure 20 provides the result of accessibility evaluation of individual web browsers with respect to the "perceivable", "operable", "understandable", and "specifications & conventions" principles.

It was observed that the most two accessible web browsers of all are "Mozilla Firefox" and "Comodo Dragon" with an overall violation of 30.68% and 32.95% respectively. Two web browsers that are less accessible among all are "Safari" and "Avant" with an overall violation of 50.00% and 46.59% respectively. The overall accessibility violation of "Google Chrome", "Opera", "Internet Explorer", "Flock", "SeaMonkey", and "Maxthon" are 34.09%, 45.45%, 44.32%, 44.32%, 42.05%, and 44.32% respectively.

Figure 21 represents the Accessibility Evaluation of individual web browsers with respect to different conformance like Conformance A, AA, and AAA. As per the conformance level A, least accessible web browsers is "Safari" with 43.59% violation, similarly most accessible web browsers are "Google Chrome" and "Chomodo Dragon" both with 12.82% violation. According to the conformance level AA

Figure 21. Accessibility evaluation of individual web browsers with respect to three conformance level

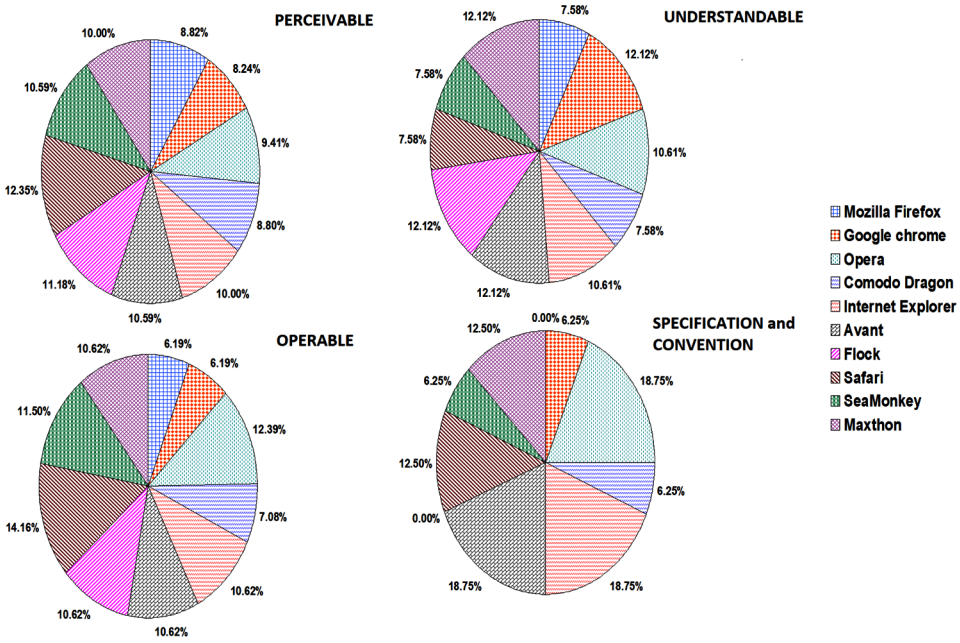


least accessible web browsers is "Safari" with 49.35% violation, similarly most accessible web browser is "Mozilla Firefox" with 27.27% violation. As per the conformance level AAA least accessible web browsers is "Safari" with 50.00% violation, similarly most accessible web browser is "Mozilla Firefox" with 30.68% violation.

Figure 22 provides a comparative view of guideline violations in case of perceivable, operable, understandable, and robust with respect to different web browsers. During our analysis we observed that most of the web browsers violated the fifth principle of UAAG 2.0 (specifications & conventions) with an average of 53.33% violation. The principle which is less violated by all web browsers is "Operable" with an average of 33.24% violation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 22. Accessibility violation of principles of UAAG 2.0 with respect to the web browsers



Evaluation of Web Browsers of Android Mobile

Methodology

The objective of this research is to study the accessibility of web browsers available for android mobile phones. The operating environment of mobile phones and personal computers (PC) are different, such as use of keyboard, mouse, touch screens and navigation features. Thus, the applicability of accessibility guidelines on web browsers for PCs differs from that of web browsers meant for mobile phones. First, we classify the UAAG 2.0 guidelines and choose the accessibility guidelines that are applicable to web browsers. Then, we select guidelines that are applicable to web browsers of mobile phones. Figure 23 represents the methodology adopted for evaluating web browsers of android mobiles. Table 8 shows the guidelines, which are extracted from UAAG2.0, for accessibility analysis of web-browsers.

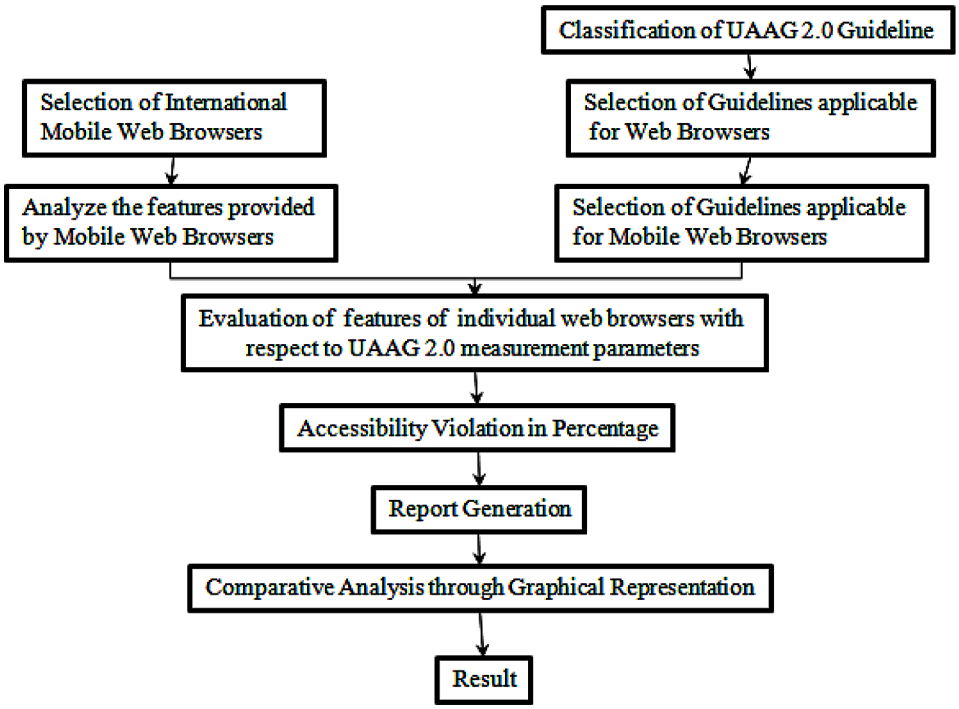
Evaluation

This research is intended to provide an accessibility evaluation of 15 Web browsers, commonly used in android mobiles, based on UAAG 2.0. For our analysis, we have considered the latest version of top 15 web browsers available for android mobiles. The data taken for our analysis is gathered during the period 1st February 2016 to 21st August 2016. Figure 24 represents the list of selected web browsers.

Figure 25(a) depicts the result of accessibility evaluation of web browsers with respect to the Perceivable guidelines of UAAG 2.0. During analysis of the perceivable feature, we tested the web browser's ability to control text formatting. Web browsers can regulate the text-formatting by operating on text colour, text size, and font of the text. We observe that all web browsers are unable to control text format-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 23. Methodology adopted to analyze the accessibility of web browsers of android mobiles



ting of either rendered text, links or block of text. We also analyzed the methods provided by the web browsers to customize the highlighting feature. This accessibility feature is well organized in case of "Puffin" and "Mercury" web browsers. Web browsers should be able to provide the outline view, source view, and off-line view of a website. This accessibility feature is well-managed by "Mozilla Firefox", "Google Chrome", "Blue Safari", "Pale Moon", "Flash Fox", "Fire Phoenix", and "Puffin" web browsers.

We analyzed all features of viewport and top-level viewport of a web browser. The viewports of a web browser should contain the zooming and scrolling features. Web browser should be able to control the bookmark features. We also evaluated the web browsers' ability for text reflow. All these viewport and top-level viewport related accessibility features are mostly confirmed by "Maxthon", "Dolphin", and "Puffin and Mercury" web browsers. We tested the ability of web browsers to control the text alternative for all non-text web components. Web browsers should also be able to indicate the absence of text alternatives.

Figure 25(b) provides the result of accessibility evaluation of web browsers of mobile phones with respect to the Operable guidelines of UAAG 2.0. A web browser should alert the user during wrapping of navigation. We analyzed the commands present in web browsers for direct navigation and the method to customize them. We also tested the forward and backward text search. Web browsers should show all match found and should alert on wrap. We also analyzed the navigation of web browsers through different structures of websites. The search and navigation related accessibility features are mostly confirmed by "Puffin" web browser. We analyzed the configuration setting of all web browsers and also the persistence and reversibility of web browsers configuration. We verified whether a web browser allows creating multiple preference settings. The preference settings should be transferable from one device to another. We also analyzed the customize display of controls over the user interface of web browsers.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 8. Result of accessibility evaluation of web browsers with respect to guideline 3 (understandable) and guideline 5 (specification and conventions)

Guidelines Applicable to Web-Browsers of Mobile			
1.1.1	Render Alternative Content	1.10.2	Show Element Hierarchy
1.1.2	Indicate un-rendered Alternative Content	2.3.1	Allow Direct Navigation to Enabled Elements
1.1.3	Replace Non-Text Content	2.3.2	Allow Direct Activation of Enabled Elements
1.1.5	Provide Configurable Alternative Content Defaults	2.4.1	Text Search
1.3.1	Distinguishable Highlighting	2.4.2	Search Direction
1.3.2	Highlighting Options	2.4.3	Match Found
1.3.4	Distinguishing Enabled Elements from disabled elements	2.4.4	Alert on Wrap or No Match
1.3.5	Distinguishing Visited links from Unvisited links	2.4.5	Alternative Content Search
1.4.1	Basic text formatting (Globally)	2.5.1	Provide Structural navigation by heading and Within Tables
1.4.2	Basic text formatting (By Element)	2.6.1	Allow Persistent Accessibility Settings
1.4.3	Blocks of text (Globally)	2.6.2	Allow Restore All to Default
1.4.4	Configured and Reflowed Text Printing	2.6.3	Allow Multiple Sets of Preference Settings
1.4.5	Default to Platform text strings	2.6.4	Allow Preference Changes from outside the user Interface
1.4.6	Advanced text formatting	2.6.5	Make Preference Settings Transferable
1.8.1	Highlight Viewport	2.7.1	Customize Display of controls for User Interface Commands, Functions, and Add-ons
1.8.2	Move Viewport to Selection and Focus	2.8.1	Adjustable Time Limits
1.8.3	Provide Viewport Scrollbars	3.1.1	Text Entry Undo
1.8.4	Indicate Viewport position	3.1.2	Settings Changes can be Reversed or confirmed
1.8.5	Allow Zoom	3.1.3	Retrieval Progress
1.8.6	Maintain Point of Regard	3.1.4	Spell Check
1.8.7	Customize Viewport Highlighting	3.1.5	Back Button
1.8.9	Provide Viewport History	3.1.6	Form Submission Confirm
1.8.10	Allow Top-Level Viewport Open on Request	3.1.7	Form Auto-Fill
1.8.11	Allow Top-Level Viewport Focus Control	3.1.8	Save Form Entries
1.8.12	Allow Same User Interface	3.2.1	Accessible Documentation
1.8.13	Multi-Column Text Reflow	3.2.2	Describe Accessibility Features
1.8.14	Ignore Fixed Unit Dimensions	3.2.3	Document All Features
1.8.15	Linearize Content	3.2.4	Changes Between Versions
1.8.16	Provide Web Page Bookmarks	3.2.5	Centralized View
1.9.1	Outline View	3.3.1	Avoid Unpredictable Focus
1.9.2	Source View	5.1.6	Enable Reporting of user Agent Accessibility Faults
1.10.1	Show Related Elements		

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 24. List of Android cell phone web Browsers selected for analysis



Figure 25. Result of accessibility evaluation of web browsers of mobile phones with respect to (a) Guideline 1 (Perceivable),(b) Guideline 2 (Operable), (c) Guideline 3 (Understandable), and Guideline 5 (specification and convention)

	mozilla Firefox	Google Chrome	Opera	Maxthon	Blue safari	Internet Web Exploer	Pale Moon	Flash fox	Fire Phonix	Web Browser & Web Explorer	Web Browser & Explorer	UC browser	Dolphin	Puffin Browser	Mercury browser
1.1.1	✓	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓	✗	✗	✓	✗
1.1.2	✗	✗	✗	✓	✗	✗	✗	✗	✗	✓	✓	✗	✓	✗	✓
1.1.3	✓	✗	✗	✓	✗	✗	✗	✗	✗	✓	✓	✓	✓	✗	✓
1.1.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.3.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.3.2	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓
1.3.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.3.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.4.1	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.4.2	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.4.3	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.4.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.4.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.4.6	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.8.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.8.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.7	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.8.9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.10	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.11	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓
1.8.12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.8.15	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.8.16	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.9.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.9.2	✓	✓	✗	✗	✓	✗	✓	✓	✓	✗	✗	✗	✗	✓	✗
1.10.1	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
1.10.2	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

(a)

	mozilla Firefox	Google Chrome	Opera	Maxthon	Blue safari	Internet Web Exploer	Pale Moon	Flash fox	Fire Phonix	Web Browser & Web Explorer	Web Browser & Explorer	UC browser	Dolphin	Puffin Browser	Mercury browser
2.3.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.3.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.4.1	✓	✓	✓	✓	✗	✗	✓	✓	✓	✗	✗	✓	✓	✓	✗
2.4.2	✓	✓	✓	✓	✗	✗	✓	✗	✓	✗	✗	✓	✓	✓	✗
2.4.3	✗	✓	✓	✓	✗	✗	✗	✓	✗	✗	✗	✓	✓	✓	✗
2.4.4	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗
2.4.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗
2.5.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.6.1	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.6.2	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗
2.6.3	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
2.6.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
2.6.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗	✗	✓
2.7.1	✓	✗	✗	✗	✗	✗	✓	✓	✓	✗	✗	✓	✓	✓	✗
2.8.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

(b)

	mozilla Firefox	Google Chrome	Opera	Maxthon	Blue safari	Internet Web Exploer	Pale Moon	Flash fox	Fire Phonix	Web Browser & Web Explorer	Web Browser & Explorer	UC browser	Dolphin	Puffin Browser	Mercury browser
3.1.1	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
3.1.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.1.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.1.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
3.1.5	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓
3.1.6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.1.7	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓
3.1.8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.2.1	✓	✗	✓	✗	✗	✗	✓	✓	✓	✗	✗	✓	✓	✓	✓
3.2.2	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
3.2.3	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
3.2.4	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
3.2.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
3.3.1	✓	✓	✓	✓	✗	✗	✓	✓	✓	✗	✗	✓	✓	✓	✓
5.1.5	✓	✓	✓	✓	✗	✗	✗	✗	✓	✗	✗	✓	✓	✓	✓

(c)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 25(c) depicts the result of accessibility evaluation of web browsers of mobile phones with respect to Guideline 3 (Understandable) and Guideline 5 (specifications and conventions) of UAAG 2.0. We analyzed the effect of web browsers on the form of websites to make it understandable as web browsers can't totally control the forms of websites, but can control and customize specific features. Web browsers should provide auto-fill mechanism for specific common fields. Web browsers should be capable to save local versions of web contents. It was found that form related accessibility features are mostly confirmed by all web browsers except "Maxthon" and "Internet Explorer". We verified the accessibility of the documentations of web browsers. A document should provide all the features of a web browser, accessibility features, and the changes between versions. We tested the web browsers' capability to avoid unpredictable focus changes. We also analyzed the feedback features of the web browsers.

Result Analysis

Figure 26 provides the result of accessibility evaluation of individual web browsers of mobile phones with respect to the "perceivable", "operable", "understandable", and "specifications and conventions" principles.

It was observed that the most accessible web browser is "Puffin Web browser" with an overall violation of 41.27%. Similarly, least accessible web browser is "Internet Web Explorer" with an overall violation of 63.49%. The overall accessibility violation of "Mozilla Firefox", "Google Chrome", "Opera", "Maxthon", "Blue Safari", "Pale Moon", "Flash Fox", "Fire Phoenix", "Web Browser & Web Explorer", "Web Browser & Explorer", "UC Browser", "Dolphin", and "Mercury" are 42.86%, 46.03%, 50.79%, 46.03%, 61.90%, 52.38%, 49.21%, 47.62%, 53.97%, 53.97%, 49.21%, 42.86% and 47.62% respectively.

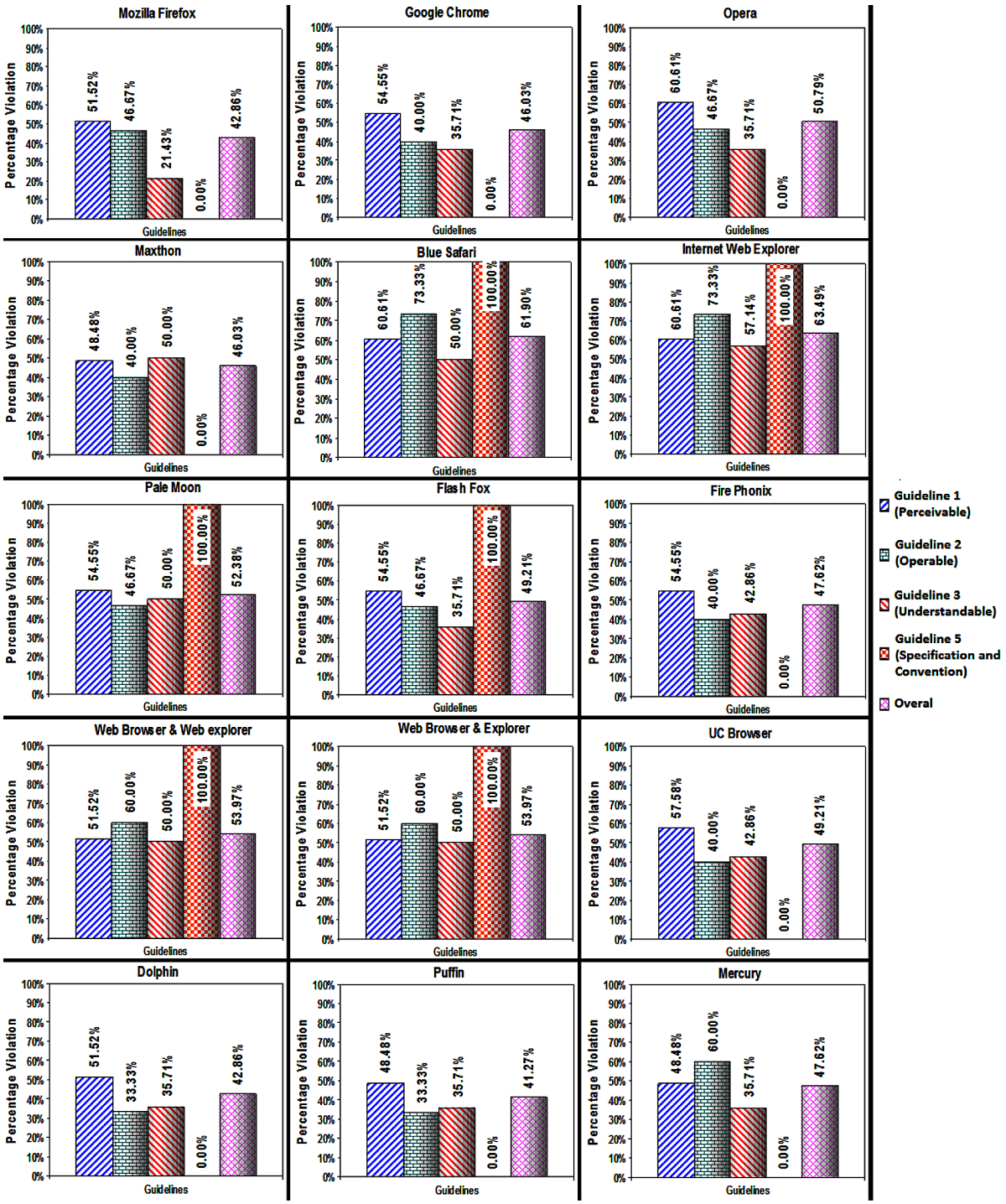
Figure 27 represents the Accessibility Evaluation of individual web browsers with respect to different conformance like Conformance A, AA, and AAA. As per the conformance level A, least accessible web browsers is "Internet Web Explorer" with 62.50% violation, similarly most accessible web browsers are "Maxthon" and "Dolphin" both with 25.00% violation. According to the conformance level AA, least accessible web browsers is "Internet Web Explorer" with 60.00% violation, similarly most accessible web browser are "Dolphin" and "Puffin" both with 38.18% violation. As per the conformance level AAA least accessible web browsers is "Internet Web Explorer" with 63.49% violation, similarly most accessible web browser is "Puffin" with 41.27% violation.

Figure 28 provides a comparative view of guideline violations in case of perceivable, operable, understandable, and robustness with respect to different web browsers of mobile phones. During our analysis we observed that most of the web browsers violated the "Perceivable" principle of UAAG 2.0 with an average of 53.94% violation. The principle which is less violated by all web browsers is "specifications & conventions" with an average of 40.00% violation.

In case of Perceivable guideline, the web browsers which cause most accessibility violation are "Opera", "Blue Safari", and "Internet Web Explorer" each with 7.49% violation. For Operable guideline, the web browsers which cause most accessibility violation are "Blue Safari" and "Internet Web Explorer" each with 9.91% violation. With respect to Understandable guideline, the web browser which causes most accessibility violation is "Internet Web Explorer" with 9.09% violation. As per the "specifications and conventions" guideline, the web browsers which cause most accessibility violation are "Blue Safari", "Internet Web Explorer", "Pale Moon", "Flash Fox", "Web Browser and Web Explorer", and "Web Browser & Explorer" all with 16.67% violation. While evaluating the 15 chosen web browsers it was observed that there is an urgent need to improve the web browsers of mobile phones in order to make them effective for accessing web sites.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 26. Accessibility evaluation of web browsers of mobile phones with respect to the "Perceivable", "Operable", "Understandable", and "Specifications and conventions" principles of UAAG2.0 Guideline



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 27. Accessibility evaluation of individual android cell phone web browsers with respect to three conformance level

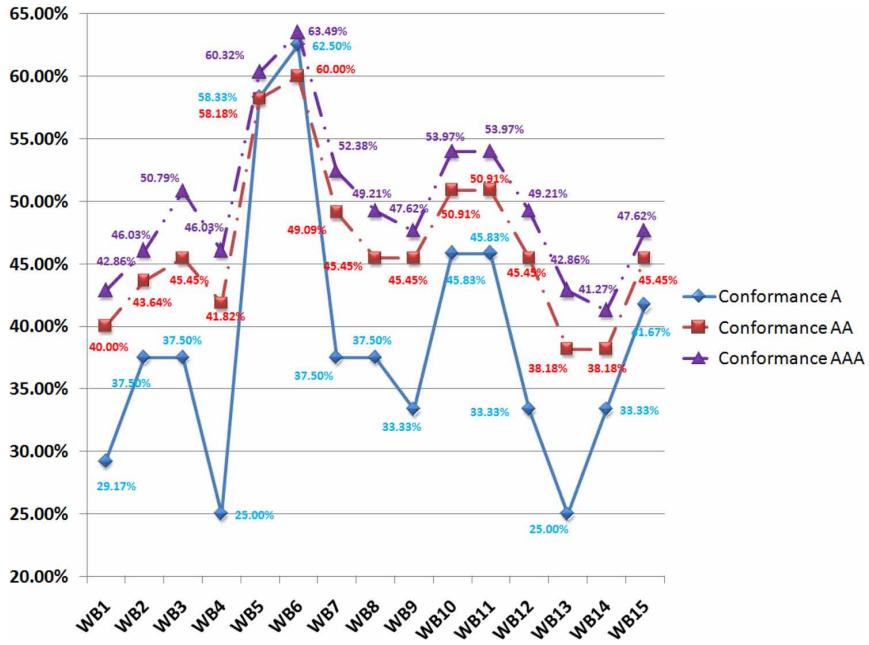
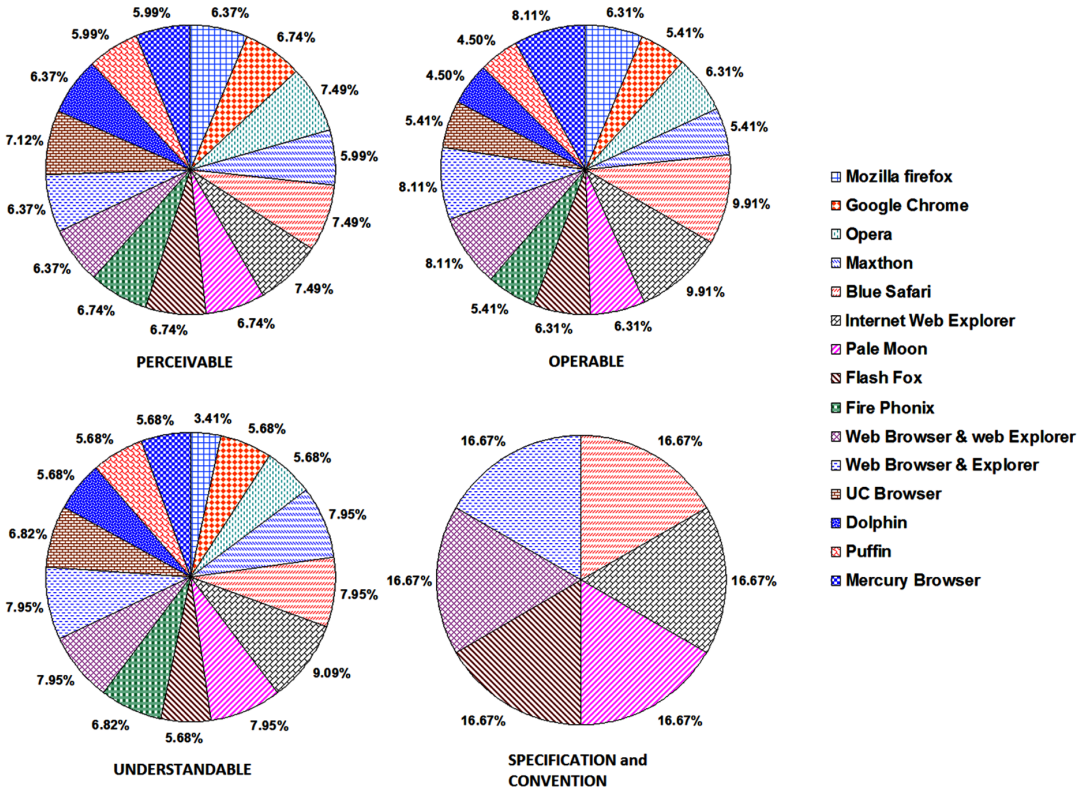
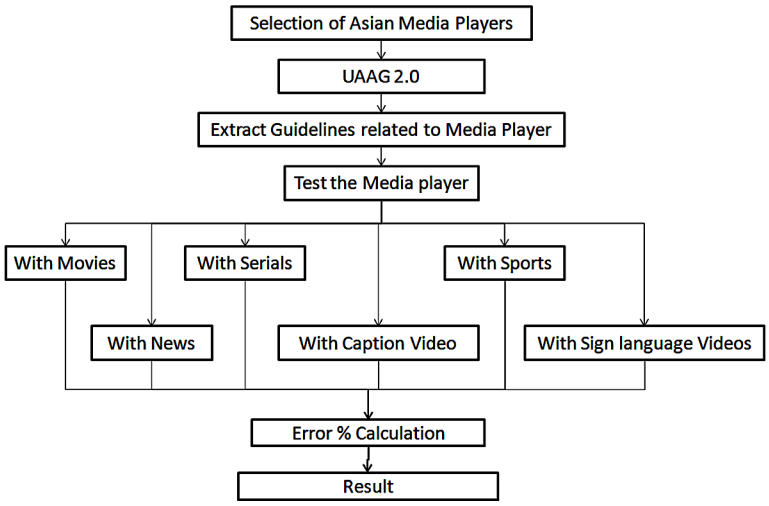


Figure 28. Accessibility violation of principles of UAAG 2.0 with respect to web browsers



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 29. Workflow for accessibility analysis of embedded media players



Evaluation of Embedded Media Players

Methodology

Here we have considered four media players. Features of each media players are minutely verified. First we extract the set of guideline, which are dealing with the accessibility of media players, form UAAG 2.0 then check each media players. All the features are checked minutely, but the important points are

- Configurable alternative contents (audio description, caption, sign language),
- Resizable View Ports,
- Play, Stop, Resume features,
- Zoom in and Zoom out features,
- Local and Global volume control,
- Point of regard of icons,
- History and bookmark features,
- Controllability of top level view port,
- Keyboard functionality,
- Focus order and Focus visible,
- Sequential navigation,
- Time based navigation.

To measure all the dictum of UAAG 2.0 in each media players first we check all the elements and feature provided by them. Then we evaluate by playing large variety of video with different peculiarity (Assistive facilities). We documented the result in a table with '✓' (for pass) and '✗' symbol (for fail). Then we calculated the error percentage by calculating no. of failed features with total no. of features.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 30. Result of analysis of guidelines per embedded Media players

	Name	Media Players: Youtube	Vimeo	Youku	Dailymotion
	UAAG (User Agent Accessibility Guidelines) 2.0				
1.1.4	Provide Configurable Alternative Content Defaults	✓	✗	✓	✓
1.1.5	Facilitate Clear Display of Alternative Content for Time-based Media	✓	✗	✗	✓
1.1.6	Allow Resize and Reposition of Time-based Media Alternatives	✗	✗	✗	✗
1.3.1	Highlighted Items	✓	✗	✗	✗
1.3.2	Highlighting Options	✗	✗	✗	✗
1.5.1	Global Volume	✓	✗	✓	✓
1.6.1	Speech Rate, Volume, and Voice	✗	✗	✗	✗
1.6.3	Advanced Speech Characteristics	✗	✗	✗	✗
1.6.5	Synthesized Speech Language	✓	✗	✗	✗
1.8.1	Highlight Viewport	✓	✗	✓	✓
1.8.5	Allow Zoom	✓	✓	✗	✗
1.8.6	Maintain Point of Regard	✓	✗	✓	–
1.8.9	Allow Viewport Resize	✓	✓	✓	✓
1.8.10	Provide Viewport History	✓	✗	✓	✓
1.8.11	Allow Top-Level Viewport Open on Request	✓	✓	✗	✓
1.8.12	Allow Top-Level Viewport Focus Control	✓	✓	✓	✓
1.8.13	Allow Same User Interface	✓	✓	✓	✓
1.8.14	Provide Webpage Bookmarks	✓	✓	✓	✓
2.1.1	Provide Full Keyboard Functionality	✓	✓	✗	✗
2.1.2	Show Keyboard Focus	✓	✓	✗	✗
2.1.3	Avoid Keyboard Traps	✓	✓	✗	✗
2.1.4	Separate Selection from Activation	✓	✓	✗	✗
2.2.1	Sequential Navigation Between Elements	✓	✓	✗	✗
2.2.2	Sequential Navigation Between Viewports	✗	✗	✗	✗
2.2.3	Default Navigation Order	✓	✓	–	–
2.2.4	Options for Wrapping in Navigation	✗	✗	✗	–
2.9.1	Adjustable Time Limits	✓	✓	✓	✓
2.11.1	Time-Based Media Load-Only	✗	✓	✗	✗
2.11.2	Execution Placeholder	✓	✓	✓	✓
2.11.3	Execution Toggle	✓	✓	–	–
2.11.4	Adjustable Playback Rate for Prerecorded Content	✓	✗	✗	✗
2.11.5	Stop/Pause/Resume Time-Based Media	✓	✓	✓	✓
2.11.6	Navigation of Time-Based media by Time	✓	✗	✓	✓
2.11.7	Navigation of Time-Based Media by Semantics	✓	✗	✗	✗
2.11.8	Video Contrast and Brightness	✗	✗	✗	✗
	Error Percentage	22.86%	51.43%	57.14%	48.57%

Evaluation

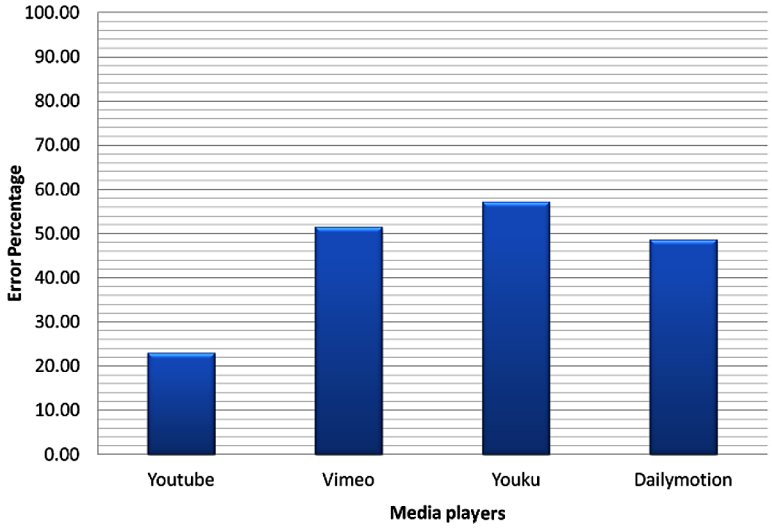
This research is intended to provide an accessibility evaluation of 4 Asian Media Players based on UAAG 2.0. The data taken for our analysis is gathered during the period 1st May 2014 to 21st June 2014.

While analyzing the media players we observe that, maximum guideline violation found in Youku with 57.14% violation, and the least violation found in Youtube with 22.86% violation. The violation with respect to Vimeo and Dailymotion were found to be 51.43%. Figure 30 represents the result of analysis.

During the evaluation we detect that the guidelines, which are not violated by all player are Guideline 1.8.9, Guideline 1.8.12, Guideline 1.8.13, Guideline 1.8.14, Guideline 2.9.1, Guideline 2.11.2, and Guideline 2.11.5. The guidelines, which are violated by all players are Guideline 1.1.6, Guideline 1.3.2, Guideline 1.6.1, Guideline 1.6.3, Guideline 2.2.2, and Guideline 2.11.8.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 31. Percentage of guideline violation in each embedded Media Player



We studied that in Youku media player when the zooming in reaches more than 300% the elements are not working properly. We studied that in daily motion media player the keyboard functionality are not working properly. Figure 31represents the percentage of guideline violated by each media player. According to the figure Youtube media player has less guideline violation. So Youtube is most accessible than others.

ACCESSIBILITY OF AUTHORING TOOLS

ATAG (Authoring Tool Accessibility Guideline) is an international standard for maintaining and evaluating the accessibility of different authoring tools. Authoring tools are the software used to develop different websites. The latest version of ATAG, ATAG 2.0 was recommended by W3C on 24th September 2015. Following features describe the guidelines of ATAG in short:

- The user interface of authoring tool should be accessible,
- The online user interface of the authoring tool should follow WCAG 2.0 Accessibility features,
- The offline user interface of the authoring tool should follow Platform specific Accessibility features,
- Alternative content should be available for each graphical element of the interface.
- The presentation of editing view should be programmatically determined,
- All keyboard related features should be available in user interface,
- The preview window should be as accessible as accessible as user agents.
- The user interface should help authors in avoiding and correcting mistakes
- A well accessible document, of user interface, should be available including all necessary features of user interface,
- The authoring tool should support programmers in development of accessible web content,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- The authoring tools should support the authors in producing and improving the accessibility of web contents.

RECOMMENDATIONS

Based on our study the following recommendations are made with respect to the design of web portals: text alternatives should be provided for all non-text web content, headers are to be included for each page, section, and table. There should be provision for controlling color contrasts. All keyboard functionalities need to be supported, and all the forms must be well structured and interactive.

On the basis of our analysis the following recommendations are made with respect to the design of web browsers: Web browsers should provide mechanisms to customize different highlighted options, users should be allowed to control the focus during creation of new viewports or top level viewports, the position of view should be indicated in the viewport, text formatting should be provided for blocks of text, wrapping of navigation should be allowed but with a message after completion of one round, customization of keyboard commands should be allowed, alternative content search should be allowed, mechanism should be provided to support and apply user style sheets, there should be mechanisms to activate new input methods, web browsers should provide mechanisms to choose and customize alternative contents, and there should be provision to create and transfer multiple preference settings. These features must be incorporated in web browsers so that web portals can be accessed effectively.

Similarly, the media players should allow resizing and repositioning of media alternatives provided in videos, highlight the options (like foreground and background colors, and resize the indicator when it is an image), allow a user to adjust all speech characteristics provided by the speech synthesizer, allow sequential navigation between viewports, and allow the users to adjust the contrast and brightness of visual time-based media.

CONCLUSION

With the growing number of web portals worldwide, accessibility issues have emerged as a serious concern for web designers. In this chapter we have analyzed the accessibility of web components based on WCAG 2.0 and accessibility of user agents, such as web browsers and media players based on UAAG 2.0. We also describe important features of ATAG. The issues dealt in this chapter can help web developers for effective design of web portals, web browsers, and media players by adhering to the recommendations.

REFERENCES

Abanumy, A., Al-Badi, A., & Mayhew, P. (2005). E-Government Website Accessibility: In-Depth Evaluation of Saudi Arabia and Oman. *The Electronic Journal of eGovernment, 3*(3), 99-106.

Al-Radaideh, M., Nuser, M., & Wahbeh, A. (2011, May). Evaluating Accessibility of Jordanian E-Government Websites for People with Disabilities. *Proceedings of International Conference on Information and Communication Systems*, 127-131.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Arrue, M., Vigo, M., & Abascal, J. (2007). Automatic evaluation of mobile web accessibility. In *Universal Access in Ambient Intelligence Environments*. Springer.

Authoring Tool Accessibility Guidelines (ATAG 2.0). (2017, May 11). Retrieved from http://www.w3.org/TR/ATAG20/

Authoring Tool Accessibility Guidelines Working Group (ATAG WG). (2017, May 11). Retrieved from http://www.w3.org/WAI/AU/

Baazeem, I. S., & Al-Khalifa, H. S. (2015, December). Advancements in Web Accessibility Evaluation Methods: How Far Are We? In *Proceedings of the 17th International Conference on Information Integration and Web-based Applications & Services (IIWAS 2015)*. ACM. doi: 10.1145/2837185.2843850

Babu, J. R., & Sekharaiahm, K. C. (2014). A Panorama of Web Accessibility. *International Journal of Computer Science and Mobile Computing*, *3*(8), 311–317.

Bandeira, R., Lopes, R., & Carriço, L. (2010). Towards mobile Web accessibility evaluation. Free and Open Source Software for Accessible Mainstream Applications (FOSS-AMA), colocated with ETAPS (2010), 27-28.

Borodin, Y., Mahmud, J., Ramakrishnan, I. V., & Stent, A. (2007). The HearSay Non-Visual Web Browser. In *Proceedings of the 2007 international cross-disciplinary conference on Web accessibility (W4A 2007)*. ACM. 10.1145/1243441.1243444

Carter, J., & Markel, M. (2001). Web Accessibility for People With Disabilities: An Introduction for Web Developers. *IEEE Transactions on Professional Communication*, *44*(4), 225–233. doi:10.1109/47.968105

Ceaparu, I., & Shneiderman, B. (2002). Improving Web-based Civic Information Access: A Case Study of the 50 US States. *International Symposium on Technology and Society (ISTAS 2002), Copyright 2002 IEEE*, 275-282. doi: 10.1109/ISTAS.2002.1013826

Chisholm, W. A., & Henry, S. L. (2005). Interdependent Components of Web Accessibility. In *Proceedings of the 2005 International Cross-Disciplinary Workshop on Web Accessibility (W4A)*. ACM. 10.1145/1061811.1061818

Gandhi, S. K. (2016). India's Jumbo Jump from E-Commerce to Mobile Enabled Services (MES): A Review. *Productivity*, *56*(4), 326.

González, M., Moreno, L., Martínez, P., & Iglesias, A. (2011). Web accessibility requirements for media players. In *Human-Computer Interaction–INTERACT 2011*. Springer. doi: . doi:10.1007/978-3-642-23768-3_109

Ismail, A., & Kuppusamy, K. S. (2015). Accessibility of Indian universities' homepages: An exploratory study. Journal of King Saud University – Computer and Information Sciences, 1–11.

Ismailova, R., & Inal, Y. (2016). Web site accessibility and quality in use: a comparative study of government Web sites in Kyrgyzstan, Azerbaijan, Kazakhstan and Turkey. In *Universal Access in the Information Society*. Springer. Doi:10.100710209-016-0490-z

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kadu, M. V., Bagret, M. V. M., & Verma, M. A. (2015). Transforming from e-Governance to M-Governance. *International Journal of Advanced Research in Computer and Communication Engineering*, *4*(2), 457–462. doi:10.17148/IJARCCE.2015.42103

Kamal, K. K., Kumar, M., Shrivastava, S., & Chourasia, P. (2016). Mobile Seva-Enabling mGovernance in India. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. ACM. 10.1145/2851581.2851586

Kamal, K. K., Kumar, M., Varyani, B., Shrivastava, S., & Tripathi, P. (2015). Mobile Platform as a Service A Case Study of User Friendly Approach to Mobile Strategy. In *Proceedings of the 13th International Conference on Advances in Mobile Computing and Multimedia (MoMM 2015)*. ACM. 10.1145/2837126.2837163

Kamoun, F., Mourad, B. M. A., & Bataineh, E. (2013). WCAG 1.0 versus WCAG 2.0 Web Accessibility Compliance: A Case Study. In *Proceeding of the International Conference on Digital Information Processing, E-Business and Cloud Computing (DIPECC2013)* (pp. 94-101). The Society of Digital Information and Wireless Communication.

Kuzma, J. M., Yen, D., & Oestreicher, K. (2009). Global e-government Web Accessibility: An Empirical Examination of EU, Asian and African Sites. *Proceeding of 2nd International Conference on Information and Communication Technologies and Accessibility*, 1-6.

Latif, M. H. A., & Masrek, M. N. (2010). Accessibility Evaluation on Malaysian E-Government Websites. Journal of e-Government Studies and Best Practice, 1-11.

Lopes, R., Bandeira, R., Carriço, L., & Isacker, K. V. (2010). Towards Mobile Web Accessibility: Vision And Challenges. *Proceedings of the first International ÆGIS Conference*, 151-158.

Mahmud, J., Borodin, Y., & Ramakrishnan, I. V. (2007). CSurf: A Context-Driven Non-Visual Web-Browser. In *Proceedings of the 16th international conference on World Wide Web, WWW 2007*. ACM. 10.1145/1242572.1242578

Moreno, L., Gonzalez, M., Martínez, P., & Iglesias, A. (2011). A Study of Accessibility Requirements for Media Players on the Web. In *Proceeding of 6th International Conference, UAHCI 2011*. Springer. 10.1007/978-3-642-21672-5_28

Patra, M. R., & Dash, A. R. (2017). Analysis of Android Cell Phone Web-Browsers to Facilitate Accessible m-Governance. *Proceedings of the 10th International Conference on Theory and Practice of Electronic Governance, ICEGOV 2017*, 276-284. 10.1145/3047273.3047279

Patra, M. R., & Dash, A. R. (2017). Accessibility Analysis of Some Indian Educational Web Portals. *International Journal of Computer Science, Engineering and Applications (IJCSEA), 7*(4), 9–24. doi:10.5121/ijcsea.2017.7404

Patra, M. R., & Dash, A. R. (2017). Accessibility analysis of web browsers. *International Journal of Services Technology and Management*, *23*(4), 313–330.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Patra, M. R., Dash, A. R., & Mishra, P. K. (2014). A Quantitative Analysis of WCAG 2.0 Compliance for some Indian Web Portals. *International Journal of Computer Science, Engineering and Applications (IJCSEA)*, *4*(1), 9–24. doi:10.5121/ijcsea.2014.4102

Patra, M. R., Dash, A. R., & Mishra, P. K. (2014). Accessibility Analysis of Government Web Portals of Asian Countries. *Proceedings of the 8th International Conference on Theory and Practice of Electronic Governance, ICEGOV 2014*, 383-386. 10.1145/2691195.2691253

Souley, B., & Sambo, A. S. (2014). A Comparative Performance Analysis of Popular Internet Browsers in Current Web Applications. *West African Journal of Industrial and Academic Research*, *4*(1), 62–68.

Termens, M., Ribera, M., Porras, M., Boldú, M., Sulé, A., & Paris, P. (2009). Web Content Accessibility Guidelines: from 1.0 to 2.0. *Proceedings of the 18th international conference on World Wide Web*, 1171-1172. doi: 10.1145/1526709.1526912

Upatkoon, K., Wang, W., & Jamin, S. (2005). WebBee: An Architecture for Web Accessibility for Mobile Devices. *Proceeding of the 10th IFIP International Conference on Personal Wireless Communications*, 1-9. 10.1142/9781860947315_0046

User Agent Accessibility Guideline (UAAG 2.0). (2017, May). Retrieved from http://www.w3.org/TR/UAAG20/

User Agent Accessibility Guidelines Working Group (UAWG). (2017, May 11). Retrieved from http://www.w3.org/WAI/UA/

Vigo, M., Aizpurua, A., Arrue, M., & Abascal, J. (2008). Evaluating web accessibility for specific mobile devices. *Proceedings of the 2008 international cross-disciplinary conference on Web accessibility (W4A)*, 65-72. 10.1145/1368044.1368059

Web Content Accessibility Guidelines (WCAG 2.0). (2017, May 11). Retrieved from http://www.w3.org/TR/ WCAG20/

Web Content Accessibility Guidelines Working Group (WCAG WG). (2017, May 11). Retrieved from http://www.w3.org/ WAI/GL/

Yu, C. H., & Miller, R. C. (2011). Enhancing mobile browsing and reading, *Proceedings of the 2011 annual conference extended abstracts on Human factors in computing systems (CHI EA '11)*, 1783-1788. doi: 10.1145/1979742.1979845

KEY TERMS AND DEFINITIONS

Alternative Contents: Additional text alternative provided with all non-text contents for better understandability of disable persons.

ATAG: An international guideline created by W3C to control and verify the accessibility of authoring tools.

Authoring Tool: Software based on which website is created.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

UAAG: An international guideline created by W3C to control and verify the accessibility of user agents and assistive technologies.

User Agent: Software tools, agents, used from client side to access websites.

View Port: An interface through which website has been shown.

WAI: An initiative taken by W3C, some technical steps to make the accessible for all.

WCAG: An international guideline created by W3C to control and verify the accessibility of web components.

This research was previously published in Learner Experience and Usability in Online Education; pages 194-234, copyright year 2018 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 21
The Destructive Effect of Complex Analytics on Innovativeness

Burçin Güçlü
BES La Salle, Universitat Romon Llull, Barcelona, Spain

Miguel-Ángel Canela
IESE Business School, University of Navarra, Barcelona, Spain

ABSTRACT

Several studies have raised a common concern in the field of management, the lack of innovation. However, they either attribute this phenomenon to the inefficiency of marketing analytics, or to managerial despair in evaluating innovation projects. In this article, the authors propose and empirically test cognitive effort spent on marketing analytics which can lead to the lack of innovativeness, due to the negative impact of high cognitive effort on the managers' mood. In a longitudinal experiment, where manipulating the complexity of the decision context through marketing analytics, the authors demonstrate that managers employing simple marketing analytics expect their competitors to launch more products, compared to managers using complex marketing analytics. They also demonstrate that firms employing simple marketing analytics behave venturesome by embarking upon innovative activities. At the same time, firms using complex marketing analytics take more deliberative actions by innovating less and amplifying short-term gains with high priced products.

INTRODUCTION

In the last decade there has been a gradual data expansion that drives managers to seek for the development and employment of sophisticated tools that will help them make sense of the large datasets. Even though there have been significant improvements in terms of managerial tools, a lot of them fail to deliver useful information. In a recent interview, many executives stated that they did not trust the quality of the insight coming from many management tools. Particularly, nine out of ten executives admitted that their

DOI: 10.4018/978-1-7998-7297-9.ch021

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tools usually fail to meet their expectations, and only 23 percent of the executives interviewed stated that their tools were driven by some business strategy (Cruickshank, 2010). Recently, Ahuja and Novelli (2017) stressed out the importance of the behavioral factors that affect the evaluation of entrepreneurial efforts and the persistence of the evaluation methods providing little strategic value.

This paper focuses on the strategic choices of firms that vary with respect to the complexity of management tools, and the perceived risk of competition. In the model proposed, a firm's adoption of a strategy is dependent upon the perceived opportunities and threats in the decision context nesting risk of competition. Although firms acquire same information through market research tools, the complexity of market research tools alters their risk perception and consequently the strategies they pursue as they understand that opportunities and threats that are not identical. Consequently, firms who infer opportunities from market information follow bolder strategies, such as product launch and upgrades, while those who infer threats, pursue safer strategies such as pricing already existing products high and boosting earnings.

We conduct a longitudinal field experiment using StratSim (Deighan, James & Kinnear, 2006), a management simulation game, in which the availability of market research tools was manipulated for observation purposes such as the market information that are disclosed in different levels of complexity, and the degree to which restrictions alter strategic choices concerning innovation and pricing.

This paper is organized as follows. First, we provide a focused literature review and a behavioral theory of tool-aided decision making. Second, we present two studies conducted at individual- and group-level respectively. Finally, we discuss our findings and conclude with final remarks.

LITERATURE OVERVIEW AND THEORY

Many contemporary studies indicate mixed results for the effective applications of management tools and that highlights the ongoing dilemma regarding the usefulness of such tools (Little, 2004; Natter, Mild, Wagner & Taudes, 2008; Schilling & Schulze-Cleven, 2009). Christensen, Kaufman, and Shih (2008) raise an important concern of the last decade referring to the lack of innovativeness. They attribute this problem to management tools like financial metrics and methods employed in evaluating research and development (R&D) projects.

A study on the effect of decision making compares the attitude of two different profiles of people; the first person enrolls in fast and frugal decision making which requires less cognitive effort, whereas the second person conducts rigorous analyses when making a decision which requires more cognitive effort. As argued by Schwartz and colleagues (2002) the first person is found to be more optimistic with higher self-esteem compared to those who conduct rigorous analyses who outstand in depression, perfectionism, regret, and self-blame. These attitudes are attributed to a negative correlation of cognitive effort and mood, stating that the higher the cognitive effort required for a decision the lowest the mood and vise versa. Optimistic individuals show confidence in their self-capabilities and it is their optimistic attitude that encourages them to consistently approach challenges (Scheier, Carver & Bridges, 1994). This indicates that pessimistic managers are more likely to overestimate the risk of failure compared to optimistic managers who foresee more opportunities. In all cases, whether managers behave in an optimistic or a pessimist way, their attitude is what creates a shared understanding of the competitive environment not to mention what shapes their expectancies in terms of behavior.

Moreover, lack of optimism is linked to the tendency to lack entrepreneurial motivation as pessimistic views drive managers to downgrade their self-capabilities (Kruger, 1999) and to overweight risks and the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

probability of failure (Hmieleski & Baron, 2009). As argued by Benarjee and Newman (1991) those managers tend to avoid the bothersome situations by steering to "safer" strategies, defined as strategies with low-risk profile whose expected return is more foreseeable. Significantly, one such strategy is "Milking the cash cow" (Caves, Fortunato & Ghemawat, 1984; Zhang & Gimeno, 2007), in which firms strive to exploit their current assets to generate short-term gains that allow managers to please investors by meeting the forecasted financial numbers. This attitude minimizes the risk in operational activities and boosts short-term gains but it does so at the expense of getting crushed by dynamic firms with the technological advancement to respond to customer needs and the constantly changing business environment (Drucker, 1992).

We propose that the underlying behavioral pattern in this context is as follows: In line with Schwartz and colleagues (2002), managers who employ simple market research tools are more likely to need less cognitive effort to understand their decision environment and in this way they become optimistic perceiving less risk and more opportunities in their decision context. On the other hand, managers who employ complex market research tools are more likely to need more cognitive effort to understand their decision environment and hence become pessimistic, perceiving their decisions as risky and see more threats than the optimistic managers. Consequently, the use of simple market research tools fosters "entrepreneurial optimism" (Lovallo & Kahneman, 2003), in which managers overestimate their understanding of their decision environment and downgrade the risk of their strategic choices. On the contrary, the use of complex market research tools fosters the opposite scenario, in which managers assume that failure is more likely to occur, due to the lack of motivation in assessing the risk in their environment.

METHOD AND MATERIALS

Method

We examined how the use of market research tools impacts the firm strategy within StratSim (Deighan, James & Kinnear, 2006) in order to replicate the natural process of managerial decision making in marketing[1]. Bearing in mind that studying managerial decision making in marketing as it occurs in the field would hardly be feasible, StratSim provides a realistic setting, where participants (i.e. managers) enroll in management team debates and make strategic decisions in the face of risk.

In particular, StratSim by Interpretive Software, Inc. is a simulation game, specifically based on marketing decisions in the automotive industry. The participants are assigned to teams representing different companies and the team performance is evaluated with respect to three dimensions — team, their competitors, and the industry evolution — at each round corresponding to a yearly decision. Through the game, teams make decisions concerning product development, marketing, manufacturing, distribution, and financing using tools provided by the simulation. The input into the game was industry reports and market analyses to provide information for decision makers.

As with the automobile industry, product development in StratSim is expensive, time consuming, and risky. However, the reward of having the leading vehicle within a product class is often well worth the investment. Each firm has a limited number of product development centers that affects its ability to work on multiple development projects concurrently. Building and funding new centers can increase a firm's ability to develop more products at the same time. This investment corresponds to hiring more product development engineers and expanding the R&D facilities as it will allow firms to work on new vehicles or upgrades.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sample

Empirical studies took place in the Erasmus School of Economics, Erasmus University Rotterdam, in the Netherlands, where StratSim is used as a significant part of FEM11028 Seminar in Marketing Strategy, accounting for 12 ECTS out of the Master's total 60 ECTS. 114 full-time master students, who had already completed a credible amount of courses in marketing, were candidates to participate in our research. Among 114 full-time master students, 77 participants were randomly assigned to 10 teams of about six to seven people, with every five teams comprising a StratSim (automotive) industry that developed uniquely based on the competitors' interactions with the introduction of new products and the way they were supported.

Experimental Conditions

We modified the normal game procedure by altering the availability of the market research tools (see Table 1).

Table 1. Experimental manipulations

Round	Industry 1	Industry 2
R1	Simple Tools Only	Complex Tools Only
R2	Simple Tools Only	Complex Tools Only
R3	Simple Tools Only	Complex Tools Only
R4	Simple Tools Only	Complex Tools Only
R5	All Tools	All Tools
R6	All Tools	All Tools
R7	All Tools	All Tools
R8	All Tools	All Tools

As presented in Table 1, firms could either access a) only simple market research tools (concept test and focus group), or b) only complex market research tools (perceptual maps and conjoint analysis) and c), or a combination of simple and complex market research tools.

STUDY 1

In Study 1 which was conducted at the beginning of the experiment, we observed the participants' expectancies regarding competitors' actions in the next round in comparing the round that preceded with the one that followed in terms of innovative activities (product launch, minor upgrades, and major upgrades) and pricing. The purpose of this study was to demonstrate that the aforementioned behavioral processes that lead to the lack of innovation are grounded at the individual-level.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hypotheses

Drawing on the argumentation on theory, in the context of innovation, we provide our hypotheses as follows. First, we expect that the managers who employ simple market research tools will expect their competitors to undertake more innovative activities, compared to those who use the available complex market research tools. We expect managers employing only simple market research tools to be more optimistic regarding their entrepreneurial skills and to believe that their competitors will also follow this entrepreneurial stream. On the contrary, managers employing all the market research tools that are available are expected to be pessimistic regarding their entrepreneurial skills, to discard innovative opportunities and to expect their competitors to behave in line with their own behavior.

Second, we expect that managers employing only simple market research tools will downgrade their competitors' increase in prices, compared to managers employing all market research tools available. This is expected to happen as the managers employing simple market research tools will feel lower short-term earnings pressure, compared to the managers employing complex market research tools. The hypotheses are presented in Table 2.

Table 2. Study 1 hypotheses

Hypothesis	Description
H1a	Managers with simple tools availability will expect their competitors to launch more products, compared to firms with complex tools availability.
H1b	Managers with simple tools availability will expect their competitors to make more minor upgrades, compared to firms with complex tools availability.
H1c	Managers with simple tools availability will expect their competitors to make more minor upgrades, compared to firms with complex tools availability.
H2	Firms with simple tools availability are expected to have less expectation that their competitors will price their products higher, compared to firms with complex tools availability.

Procedure

We conducted surveys among the participants at the end of the first round of the game. In the first round of the game, the participants were called to make managerial decisions using market research tools for the first time. Thus, this initial round intended to reveal the complexity of the impact the required managerial decisions had on their mood and the difference between their beliefs about their competitors' actions and their degree of optimism. In addition to that, the survey conducted in this round was the first encounter the participants had with the survey questions which ensured the highest accuracy of the results.

The purpose of these surveys was to measure the participants' beliefs about their competitors' actions. Each survey was delivered once the participants submitted their decisions to the simulation, and was collected after the completion of every round. There was no time restriction for the surveys and most of them were completed in a reasonable time interval of around ten minutes.

We followed a conventional pretesting procedure; an initial draft of the survey was prepared one week prior to the experimental sessions, and the teaching team (i.e. the course instructor and three teaching

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

assistants) revised the draft over the week. We eliminated unnecessary questions, added clarification sentences, and changed the wording of some questions to avoid confusion.

We did not allow the participants to communicate with each other while completing the survey as we wanted to ensure the credibility of the answers and to ensure that each participant was expressing his/her personal opinion. Only the aforementioned teaching team was allowed to resolve any doubts from the participants' end. The surveys were circulated in print and the answers were recorded to an Excel sheet after the first round.

Three participants were missing in this round, which yielded 74 participants for the survey. We achieved a high response rate from the participants. Particularly, 74 participants out of 74 answered the question regarding competitors' innovative behavior, while 73 participants out of 74 answered the question regarding competitors' pricing behavior. The subjects were fairly incentivized to complete the surveys because the surveys constituted 10% of their overall grade.

For the sake of our theory, we were mainly interested in the participants' expectancy regarding the competitors' behavior, in terms of innovativeness (product launch, minor upgrades and major upgrades) and pricing. Specifically, participants were expected to have different expectations on these aforementioned matters with respect to the experimental conditions. Thus, in the first round of the survey, the participants were asked about their beliefs on competitors on a scale of -2 to 2 with -2 standing for the expectation that the competitors will spend less and 2 for the expectation that the competitors will spend more. Also, they were called to predict the competitors' behavior in the next round compared to the current round and "launching new vehicles," "minor upgrades" and "major upgrades" were listed.

Modeling

In each condition, we mainly looked at the differences in group means regarding the expected increase in the competitors' innovation (launch, major upgrade, minor upgrade) and pricing activities. The group means are presented in Table 3.

Table 3. Group means

Group Mean	Description
MEAN_SIMPLE_H1a	Mean value of the expected change in the competitors' product launch in the simple tools availability condition
MEAN_COMPLEX_H1a	Mean value of the expected change in the competitors' product launch in the complex tools availability condition
MEAN_SIMPLE_H1b	Mean value of the expected change in the competitors' product upgrade (minor) in the simple tools availability condition
MEAN_COMPLEX_H1b	Mean value of the expected increase in the competitors' product upgrade (minor) in the complex tools availability condition
MEAN_SIMPLE_H1c	Mean value of the expected increase in the competitors' product upgrade (major) in the simple tools availability condition
MEAN_COMPLEX_H1c	Mean value of the expected increase in the competitors' product upgrade (major) in the complex tools availability condition
MEAN_SIMPLE_H2	Mean value of the expected increase in the competitors' pricing in the simple tools availability condition
MEAN_COMPLEX_H2	Mean value of the expected increase in the competitors' pricing in the complex tools availability condition

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

We tested the significance of the differences in group means using two-sample, one-sided *t* tests with unequal variances. The null hypotheses were:

MEAN_SIMPLE_H1a < MEAN_COMPLEX_H1a

MEAN_SIMPLE_H1b < MEAN_COMPLEX_H1b

MEAN_SIMPLE_H1c < MEAN_COMPLEX_H1c

MEAN_SIMPLE_H2 < MEAN_COMPLEX_H2

Results

The results of the survey study are summarized in Table 4. In the first round of the game, we measured the expected change in the competitors' innovation activities with respect to the aforementioned scale. The mean response from 74 participants was 0.419 for launching new vehicles, 0.932 for minor upgrades and 0.865 for major upgrades, indicating an expected increase in competitors' innovative activities overall. As for launching new vehicles, the mean response in the simple tools only condition was 0.800 from a sample of 35 participants, while the mean response in the complex tools availability condition was 0.077 from a sample of 39 participants, indicating gradual differences in the expected increases in the competitors' product launching. The corresponding *t* test indicated that the difference in group means was significant (one-sided p=0.002). Concerning the minor upgrades, the mean response in the simple tools only condition was 0.971 from a sample of 35 participants, while the mean response in the complex tools availability condition was 0.897 from a sample of 39 participants, indicating differences in expected increases in the competitors' minor upgrades. However, the corresponding *t* test indicated that the difference in group means was insignificant (one-sided p=0.352). Concerning major upgrades, the mean response from 35 participants in the simple tools only condition was 0.914, while the mean response from 39 participants in the complex tools availability condition was 0.821, indicating differences in expected increases in competitors' product launching. However, the corresponding *t* test indicated that the difference in group means was insignificant (one-sided p=0.330).

In addition to that, we also measured the participants' beliefs regarding the competitors' expectations of product pricing in the next round. Participants selected the answer that best fitted their expectation and then assessed a value for this answer on the aforementioned scale. The mean response from a sample of 73 participants was 0.041, indicating an expected increase in the competitors' prices. The mean response from a sample of 34 participants in the simple tools only condition was 0.000, while the mean response from a sample of 39 participants in the complex tools availability condition was 0.077, indicating differences in the expected increases in the competitors' prices. However, the corresponding *t* test indicated that the difference in the group means was not significant (one-sided p=0.351).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Survey results

Sample	**H1a**	**H1b**	**H1c**	**H2**
Mean	0.419	0.932	0.865	0.041
Standard Deviation	1.073	0.816	0.911	0.857
Observations	74	74	74	73
Condition	**H1a**	**H1b**	**H1c**	**H2**
Simple Tools Only				
Mean	0.800	0.971	0.914	0.000
Standard Deviation	0.901	0.923	0.853	0.778
Observations	35	35	35	34
Complex Tools Only				
Mean	0.077	0.897	0.821	0.077
Standard Deviation	1.109	0.718	0.970	0.929
Observations	39	39	39	39
Difference in means	**0.723**	0.074	0.094	-0.077
T	**3.090**	0.382	0.443	-0.385
P (one-sided)	**0.002**	0.352	0.330	0.351

STUDY 2

In Study 2 which was conducted over the simulation game, we looked at the decision outcome concerning innovative activities (product launch, minor upgrades, and major upgrades) and pricing. As demonstrated in the previous study, the behavioral processes that lead to the lack of innovativeness and to short-term earnings orientation were grounded in an individual-level. The purpose of the current study was to demonstrate that these behavioral tendencies had group-level (i.e. firm-level) consequences in the long-run.

Hypotheses

In this study, we hypothesized that firms employing complex market research tools are likely to dispose the lack of entrepreneurial courage and adopt the milking the cash cow strategy by undertaking less innovative activities and setting their unit margins higher. To be more specific, they are expected to innovate less due to a high risk-aversion, perceived lack of entrepreneurial skills and high expectancy of a negative outcome which result from the employment of complex market research tools that require higher cognitive effort. Thus, firms that use only complex market research tools will undertake fewer future-value generating activities, such as product launches and upgrades.

In addition to that, these firms will also price their unit margins higher to generate higher short-term earnings. This behavioral tendency would be the outcome of the investors' expectations to meet the financial forecasts, resulting in myopic, short-term gain orientation and finally leading to a vicious cycle in which firms plagued with short-term gain orientation in the previous rounds reemphasize this behavior by taking prior financial performances as a benchmark. Table 5 summarizes the hypotheses of Study 2.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Study 2 hypotheses

Hypothesis	Description
H3a	Firms using only complex market research tools will tend to launch fewer products compared to those with only simple tools availability.
H3b	Firms using only complex market research tools will tend to upgrade products less often compared to those with only simple tools availability.
H4	Firms using only complex market research tools will tend to set their unit margins higher compared to those with only simple tools availability.

When all the market research tools are presented in one shot, we presume to find mixed results due to different findings in the field of cognitive science. Epfstein (1994) suggests that there are two modes of thought; the experiential and the analytical. The former refers to "heuristic decision making," in which individuals simplify their decision context by relying on fewer, recallable cues to reduce the cognitive effort in the decision making process (Shah & Oppenheimer, 2008), while the latter refers to elaborative, rational thinking by integrating all cues available in the decision context. Taking into account that our theory was in accordance with an experiential mode of thinking, we did not anticipate the effect of all the tools available for strategic choices (i.e. more/less innovative activities, lower/higher pricing) compared to the restricted availability of market research tools and waited for the results of the experiment.

Procedures

The two StratSim industries shared the same parameter setting; they were identical at the beginning of the simulation and then they were run independently in the different sessions. The game was played over nine rounds (i.e. one practice round and eight real rounds), and the team decisions were made after analyzing the previous period's results, as well as using market research tools in the current period. Firms were managed by participants in a marketing strategy course whose grades depended on their firms' profit at the end of all nine rounds. To maximize their profits, each firm needed to collect market information using the available market research tools and making key marketing (e.g. pricing and advertising spending) and innovation (new product launching, upgrading, entering into new markets) decisions based on market information.

To guarantee that the participants had the sufficient knowledge about the game, we applied the procedures presented in Table 6.

Table 6. Additional procedures

Additional Procedure	Purpose
Two compulsory three-hour sessions	Participants were debriefed about the purpose of the game, which was to expose them to the vital importance of marketing intelligence in strategic marketing decisions.
One practice round	Participants got used to the simulation procedure and software. They were told that the practice round was designed to be identical to the first real round, meaning that all firms would have access to the exact same market research tools they would have in the first real round and that they were free to use the same information in the first real round.
Essay writing	Participants were required to deliver one short essay for each tool, once every two weeks, where they specified how they defined the focal market research tool, what advantages/disadvantages they had. These essays were regularly examined and graded.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Modeling

In this section, we explain how we measure independent and dependent variables and control variables. Regarding dependent variables, we observed firms' decisions concerning innovative activities (product launch and upgrade) and pricing. At every round, the participants made a product launch and took upgrade and pricing decisions simultaneously based on the market information they gathered through the market research tools. We modeled these decisions using the following variables:

$LAUNCH_{i,t}$: Number of launches by firm *i* at time *t*.
$UPGRADE_{i,t}$: Number of upgrades by firm *i* at time *t*.
$MARGIN_{i,t}$: Profit divided by selling price of each vehicle sold by firm *i* at time *t*, in percentage.

Regarding independent variables, we explained the dependent variables using tool manipulations:

$COMPLEX_{i,t}$: Dummy variable equal to 1 if firm *i* employed complex market research tools at time *t* and 0 otherwise.
$SIMPLE_{i,t}$: Dummy variable equal to 1 if firm *i* employed simple market research tools at time *t* and 0 otherwise.

Table 7 provides the control variables with corresponding literature.

Table 8 provides the descriptive statistics overall.

The descriptive statistics concerning the dependent variables within each experimental condition are presented in Table 9.

Table 7. Control variables

Control Variables	Description	Reason
ROUND	Variable to capture the linear time trend;	Kalwani, Yim, Rinne & Sugita, 1990; Messinger & Narasimhan, 1997; Miller & Friesen, 1984
ROUNDSQ	Variable to capture the quadratic time trend;	Manchanda, Xie & Youn, 2008
$FGROWTH_{i,t}$	Percent growth in unit sales of firm *i* from t-1 to t at time *t*;	Hauser, Tellis & Griffin, 2006
$STOCKPRICE_{i,t-1}$	Firm *i*'s stock price in dollars at *t-1*	Hauser, Tellis & Griffin, 2006
$COMPETITION_{i,t-1}$	Herfindahl index in firm *i*'s industry at time *t-1*;	Anderson & Sullivan, 1993; Lee & Grewal, 2004
$MARGIN_{i,t-1}$	Profit (selling price minus cost of goods sold) divided by the selling price of each vehicle sold by firm *i* at time *t-1*, in percentage;	Yang, Chen & Allenby, 2003
$BLAUNCH_{i,t}$	Dummy variable equal to 1 if there is launch by firm *i* at time *t* and 0 if not;	To represent innovative activities that precede each other
$BUPGRADE_{i,t}$	Dummy variable equal to 1 if there is more than one upgrade by firm *i* at time *t* and 0 if not.	To represent innovative activities that precede each other

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 8. Descriptive statistics: Overall

Dependent Variables	Variable Type	Mean	Std. Dev.
LAUNCHi,t	Count	0.30	0.56
UPGRADEi,t	Count	1.65	1.15
MARGINi,t	Metric	29.21	4.40
Independent Variables	**Unit**	**Mean**	**Std. Dev.**
SIMPLEi,t	Dummy	0.25	0.43
COMPLEXi,t	Dummy	0.25	0.43
Control Variables	**Unit**	**Mean**	**Std. Dev.**
ROUND	Metric	4.50	2.31
ROUNDSQ	Metric	25.50	21.26
FGROWTHi,t	Metric	6.31	13.59
STOCKPRICEi,t-1	Metric	51.36	15.85
COMPETITIONi,t-1	Metric	0.21	0.00
MARGINi,t-1	Metric	10.20	0.28
BLAUNCHi,t	Dummy	0.25	0.44
BUPGRADEi,t	Dummy	0.54	0.50

Table 9. Descriptive statistics within experimental conditions

Simple Tools Only			
Dependent Variables	**Variable Type**	**Mean**	**Std. Dev.**
LAUNCHi,t	Count	0.25	0.44
UPGRADEi,t	Count	1.25	0.85
MARGINi,t	Metric	31.45	3.01
Complex Tools Only			
Dependent Variables	**Variable Type**	**Mean**	**Std. Dev.**
LAUNCHi,t	Count	0.35	0.67
UPGRADEi,t	Count	1.05	0.89
MARGINi,t	Metric	31.45	4.80
All Tools Availability			
Dependent Variables	**Variable Type**	**Mean**	**Std. Dev.**
LAUNCHi,t	Count	0.30	0.56
UPGRADEi,t	Count	2.15	1.19
MARGINi,t	Metric	26.97	3.65

We fitted the following models to measure the impact of market research tools on innovative activities and pricing. We set all-tools availability as our baseline condition. Models (1), (2) and (3) were fixed-effects Poisson regression models because the dependent variables are count variables. Model (4) was a fixed-effects model because the dependent variable is metric. Within subjects effects represent the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

variability of the dependent variables of interest for each firm. To be more specific, they are a measure of how firms tend to change over time, controlling for unobserved effects driven from the heterogeneity of the firms:

$$\ln[E(LAUNCH_{i,t})] = \delta_1 * COMPLEX_{i,t} + \delta_2 * SIMPLE_{i,t} + \delta_3 * ROUND + \delta_4 * ROUNDSQ + \delta_5 * FGROWTH_{i,t} + \delta_6 * STOCKPRICE_{i,t-1} + \delta_7 * COMPETITION_{i,t-1} + \delta_8 * BUPGRADE_{i,t} + \nu_i$$

$$\ln[E(UPGRADE_{i,t})] = \beta_1 * COMPLEX_{i,t} + \beta_2 * SIMPLE_{i,t} + \beta_3 * ROUND + \beta_4 * ROUNDSQ + \beta_5 * FGROWTH_{i,t} + \beta_6 * STOCKPRICE_{i,t-1} + \beta_7 * COMPETITION_{i,t-1} + \beta_8 * BLAUNCH_{i,t} + \nu_i$$

$$\ln[E(UPGRADE_{i,t})] = \varphi_1 * COMPLEX_{i,t} + \varphi_2 * ROUND + \varphi_3 * FGROWTH_{i,t} + \varphi_4 * STOCKPRICE_{i,t-1} + \varphi_5 * COMPETITION_{i,t-1} + \varphi_6 * BLAUNCH_{i,t} + \nu_i$$

$$MARGIN_{i,t} = \gamma_0 + \gamma_1 * COMPLEX_{i,t} + \gamma_2 * SIMPLE_{i,t} + \gamma_3 * MARGIN_{i,t-1} + \gamma_4 * ROUND + \gamma_5 * ROUNDSQ + \gamma_6 * FGROWTH_{i,t} + \gamma_7 * STOCKPRICE_{i,t-1} + \gamma_8 * COMPETITION_{i,t-1} + \nu_i + \varepsilon_{i,t}$$

Results

The results of this study are summarized in Table 10. In Model (1), we found evidence that firms employing only complex market research tools launch new products less often (p=0.038) than those firms employing only simple market research tools, compared to when firms have all the tools available. That is, controlling for other factors, the mean number of launches in the complex tools availability condition is 0.07 units less than the mean number of launches in the all tools availability condition, while the mean number of launches in the simple tools availability condition is not significantly different from the mean number of launches in the all tools availability condition.

In Model (2), we failed to find evidence that firms employing only complex market research tools upgrade their products less often (p=0.308) than those firms employing only simple market research tools, compared to when firms have all the tools available. Nevertheless, when we replicated the same analysis in Model (3) by excluding insignificant variables $SIMPLE_{i,t}$ and ROUNDSQ from the estimation, we found evidence that firms employing only complex market research tools, upgrade their products less often (p=0.090) compared to when firms have all the tools available. That is, controlling for other factors, the mean number of upgrades in the complex tools availability condition is 0.49 units less than the mean number of upgrades in the all tools availability condition.

In Model (4), we found evidence that firms tend to set their product margins higher (p=0.002) when they only employ simple market research tools, as well as when they employ only complex market research tools (p=0.000), compared to when they have all the tools available. However, the coefficient of $COMPLEX_{i,t}$ is larger than the coefficient of $SIMPLE_{i,t}$, meaning that the difference between the complex- and the all-tools availability is larger than the difference between the simple- and the all-tools availability. This suggests that firms set their margins higher when they only have complex market research tools than when they only have simple market research tools. That is, controlling for other factors, firms using only simple market research tools set their margins 2.92 units in a percentage higher than when they have the all tools availability condition, while firms using only complex market research tools set their margins 3.96 units in a percentage higher than when they have the all tools availability condition.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 10. Results

Independent Variables	$LAUNCH_{i,t}$ (1) Coefficient	$UPGRADE_{i,t}$ (2) Coefficient	$UPGRADE_{i,t}$ (3) Coefficient	$MARGIN_{i,t}$ (4) Coefficient
Constant				50.850***
				(11.228)
COMPLEXi,t	**-2.616****	-0.503	**-0.709***	**3.957*****
	(1.255)	(0.494)	(0.418)	(0.956)
SIMPLEi,t	-1.040	0.273		**2.917*****
	(1.057)	(0.443)		(0.881)
ROUND	1.887**	0.297	0.120**	-0.597
	(0.907)	(0.249)	(0.052)	(0.452)
ROUNDSQ	-0.227**	-0.014		0.045
	(0.097)	(0.023)		(0.047)
FGROWTHi,t	0.053***	0.025***	0.026***	-0.052**
	(0.022)	(0.009)	(0.009)	(0.016)
COMPETITIONi,t-1	171.871**	39.262	42.121	-143.255**
	(77.424)	(28.716)	(26.889)	(53.614)
STOCKPRICEi,t-1	-0.006	0.016**	0.016**	0.011
	(0.028)	(0.008)	(0.008)	(0.017)
BLAUNCHi,t		-0.383	-0.375	
		(0.247)	(0.243)	
BUPGRADEi,t	-0.951*			
	(0.507)			
MARGINi,t-1				0.261**
				(0.101)
Number of observations	80	80	80	80
Number of groups	10	10	10	10
Observations per group	8	8	8	8
$X_2(8)$	16.27	25.53		
$X_2(6)$			25.99	
F(8,62)				23.73

***p<0.01; ***p<0.05; ***p<0.10
Standard errors are in parentheses.

DISCUSSION AND CONCLUSION

This study aimed at proposing a behavioral model of the variations in strategic choices with respect to the way information is presented while validating the underlying theory that predicts the several variances in strategic choices. This model advances a central hypothesis that the cognitive effort required in a decision environment is negatively related to optimism and self-esteem (Schwartz et al., 2002). Specifically, we tested whether changes in the mood due to the cognitive effort required in the deci-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

sion context lead to changes in strategic choices. Consequently, the use of simple market research tools fosters "entrepreneurial optimism" (Lovallo & Kahneman, 2003) in which managers overestimate their understanding of decision environment and downgrade the risk of their strategic choices. However, the use of complex market research tools fosters the opposite scenario in which managers assume that failure is more likely to occur, due to lack of motivation and confidence in their managerial skills in assessing the risk in their environment. The results of this longitudinal experiment confirmed that firms steer to bolder strategies when their (hypothetical) managers employ simple market research tools alone since the low degree of cognitive effort in the decision making process enhances an entrepreneurial spirit accompanied with innovativeness. The findings also confirmed the opposite scenario in which firms steer to the "milking the cash cow" strategy when their (hypothetical) managers only employ complex market research tools due to the high degree of cognitive effort required in the decision making process which wipes away their enthusiasm and leaves them with myopic, risk-averse tendencies to boost earnings by pricing their products higher.

A key aspect of the experiment was that the decision making process was observed within the firm through the survey study that followed the managers' expectancies. From that perspective, Study 1 has an impactful contribution to the studies on managerial decision making as it provides essential information regarding the participants' early beliefs about their competitors and those beliefs are examined in various phases over the simulation game. Particularly, in Study 1, the participants' beliefs about their competitors are shaped from the very beginning of the simulation game, as the participants' beliefs about their competitors' product launching reflects what happens over the simulation: The participants in the simple tools availability condition have an optimistic view about their competitors, believing that their competitors are in a good mood to undertake more product launches, while those in the complex tools availability condition have the opposite view, believing that their competitors do not possess adequate entrepreneurial skills to undertake more product launches. The entrepreneurial optimism is more evident in the product launching decisions than in the product upgrade decisions because product launching is a more long-term investment decision, whose financial outcome is evident in two or three periods after launching, depending on whether the new vehicle is launched in an already-existing class or in a new class, while the financial impact of product upgrading can be observed in one or two periods after implementation, depending on whether the upgrade is minor or major.

The results from Study 2 further substantiated our theoretical predictions. Significantly, the results provided evidence that firms employing only complex market research tools embark upon innovative activities less often than those firms employing simple market research tools, compared when firms have all the tools available. In addition to that, firms employing only complex market research tools are more prone to price their products higher than those firms employing only simple market research tools, compared when firms have all the tools available. As suggested, the product upgrades can be perceived as less innovative due to their shorter time horizon compared to product launches, and we are not surprised to find weaker support for the impact of complexity on product upgrade decisions in Study 2.

This study concludes that managers use management tools that provide little strategic value because they employ management tools that do not account for human cognition. As emphasized in this study, human cognition benefits from simplicity. Reducing the cognitive effort required in the decision making process ensures a positive mood, enhances entrepreneurial optimism, and contributes to the firm value in the long run. For this reason, we believe that businesses need to consider their managers' cognitive limitations when it comes to combining managerial decision making and the benefits of decision support systems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

This study provides necessary information to several disciplines as it delves into the issue of the lack of innovation and proposes a solution by examining the root of the problem that lies in the way market information is presented. As suggested, academics in the field of management should further integrate behavioral consequences of employing decision support systems in solving complex, ill-structured problems in their decision environment.

Also, this study addresses a common issue in the practitioners' world referring to the consequence of using management tools that destroy firm value. However, as concluded in this study, management tools per se do not destroy firm value. It is the tool characteristics that foster different moods in managers and thus create problems for the firm value. As proposed in this study, practitioners are advised to revise their decision-making protocols, especially those that require the employment of management tools.

Last, this study encourages further work on simplicity outperforming complexity in the context of decision support systems. It acknowledges that the last decade has been very promising on this matter, but stresses that the impact of complexity on managers' mood in the context of business analytics requires further examination.

REFERENCES

Ahuja, G., & Novelli, E. (2017). Activity overinvestment: The case of R&D. *Journal of Management*, *43*(8), 2456–2468. doi:10.1177/0149206317695770

Anderson, E. W., & Sullivan, M. W. (1993). The antecedents and consequences of customer satisfaction for firms. *Marketing Science*, *12*(2), 125–143. doi:10.1287/mksc.12.2.125

Benarjee, A. V., & Newman, A. F. (1991). Risk-bearing and the theory of income distribution. *The Review of Economic Studies*, *58*(2), 211–235. doi:10.2307/2297965

Caves, R. E., Fortunato, M., & Ghemawat, P. (1984). The decline of dominant firms, 1905-1929. *The Quarterly Journal of Economics*, *99*(3), 523–546. doi:10.2307/1885963

Christen, M., & Sarvary, M. (2007). Competitive pricing of information: A longitudinal experiment. *JMR, Journal of Marketing Research*, *44*(February), 42–56. doi:10.1509/jmkr.44.1.42

Christensen, C. M., Kaufman, S. P., & Shih, W. C. (2008). Innovation killers: How financial tools destroy your capacity to do new things. *Harvard Business Review*, *86*(1), 98–105. PMID:18271321

Cruickshank, B. (2010, October 6). Making business intelligence work. *Financial Times*. Retrieved from Financial Times. Retrieved from http://search.ft.com/advsearch

Curren, M. T., Folkes, V. S., & Steckel, J. H. (1992). Explanations for successful and unsuccessful marketing decisions: The decision maker's perspective. *Journal of Marketing*, *56*(2), 18–31. doi:10.2307/1252039

Deighan, M., James, S. W., & Kinnear, T. C. (2006). *StratSim Marketing: The Marketing Strategy Simulation*. Charlotsville, VA: Interpretive Software, Inc.

Drucker, P. F. (1992). The new society of organizations. *Harvard Business Review*, *70*(5), 95–104. PMID:10121319

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Epfstein, S. (1994). Integration of the cognitive and psychodynamic unconscious. *The American Psychologist*, *49*(8), 709–724. doi:10.1037/0003-066X.49.8.709 PMID:8092614

Glazer, R., Steckel, J. H., & Winer, R. S. (1992). Locally rational decision making: The Distracting effect of information on managerial performance. *Management Science*, *38*(2), 212–226. doi:10.1287/mnsc.38.2.212

Hauser, J. R., Tellis, G. J., & Griffin, A. (2006). Research on innovation: A review and agenda for Marketing Science. *Marketing Science*, *25*(6), 687–717. doi:10.1287/mksc.1050.0144

Hmieleski, K. M., & Baron, R. A. (2009). Entrepreneurs' optimism and new venture performance: A social cognitive perspective. *Academy of Management Journal*, *52*(3), 473–488. doi:10.5465/AMJ.2009.41330755

Kalwani, M. U., Yim, C. K., Rinne, H. J., & Sugita, Y. (1990). A price expectations model of customer brand choice. *JMR, Journal of Marketing Research*, *27*(3), 251–262. doi:10.2307/3172584

Kruger, J. (1999). Lake Wobegon be gone! The 'below-average effect' and the egocentric nature of comparative ability judgments. *Journal of Personality and Social Psychology*, *77*(2), 221–232. doi:10.1037/0022-3514.77.2.221 PMID:10474208

Lee, R. P., & Grewal, R. (2004). Strategic responses to new technologies and their impact on firm performance. *Journal of Marketing*, *68*(4), 157–171. doi:10.1509/jmkg.68.4.157.42730

Little, J. D. C. (2004). Comments on models and managers: The concept of a decision calculus. *Management Science*, *50*(12), 1841–1861. doi:10.1287/mnsc.1040.0267

Lovallo, D., & Kahneman, D. (2003). Delusions of success: How optimism undermines executives' decisions. *Harvard Business Review*, *81*(7), 1–10. PMID:12858711

Manchanda, P., Xie, Y., & Youn, N. (2008). The role of targeted communication and contagion in product adoption. *Marketing Science*, *27*(6), 961–976. doi:10.1287/mksc.1070.0354

Messinger, P. R., & Narasimhan, C. (1997). A model of retail formats based on consumers' economizing on shopping time. *Marketing Science*, *16*(1), 1–23. doi:10.1287/mksc.16.1.1

Miller, D., & Friesen, P. H. (1984). A longitudinal study of the corporate life cycle. *Management Science*, *30*(10), 1161–1183. doi:10.1287/mnsc.30.10.1161

Natter, M., Mild, A., Wagner, U., & Taudes, A. (2008). Planning new tariffs at tele.ring: The application and impact of an integrated segmentation targeting, and positioning tool. *Marketing Science*, *27*(4), 600–611. doi:10.1287/mksc.1070.0307

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the life orientation test. *Journal of Personality and Social Psychology*, *67*(6), 1063–1078. doi:10.1037/0022-3514.67.6.1063 PMID:7815302

Schilling, M. S., & Schulze-Cleven, P. (2009). Beyond matrices and black-box algorithms: Setting marketing priorities with Marketing Strategy Conferences. *Journal of Marketing Management*, *25*(5-6), 571–590. doi:10.1362/026725709X461867

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Schwartz, B., Ward, A., Monterosso, J., Lyubomirsky, S., White, K., & Lehman, D. R. (2002). Maximizing versus satisficing: Happiness is a matter of choice. *Journal of Personality and Social Psychology*, *83*(5), 1178–1197. doi:10.1037/0022-3514.83.5.1178 PMID:12416921

Shah, A. K., & Oppenheimer, D. M. (2008). Heuristics made easy: An effort-reduction framework. *Psychological Bulletin*, *134*(2), 207–222. doi:10.1037/0033-2909.134.2.207 PMID:18298269

van Bruggen, G. H., Smidts, A., & Wierenga, B. (2001). The impact of the quality of a marketing decision support system: An experimental study. *International Journal of Research in Marketing*, *13*(4), 331–343. doi:10.1016/S0167-8116(96)00017-1

Yang, S., Chen, Y., & Allenby, G. M. (2003). Bayesian analysis of simultaneous demand and supply. *Quantitative Marketing and Economics*, *1*(September), 251–275. doi:10.1023/B:QMEC.0000003327.55605.26

Zhang, Y., & Gimeno, J. (2007). Milking the cash cow: Earnings pressure and competitive behavior in U.S. electricity industry. *Academy of Management Proceedings, August*, 1-6.

ENDNOTES

[1] StratSim is basically, in all aspects, the same as MARKSTRAT, a simulation game commonly used in academic research and longitudinal field experiments (Christen & Sarvary, 2007; Curren, Folkes, & Steckel, 1992; Glazer, Steckel & Winer, 1992; van Bruggen, Smidts, & Wierenga, 1996).

This research was previously published in the International Journal of Applied Behavioral Economics (IJABE), 6(4); pages 38-56, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 22
Effective Tools for Improving Employee Feedback during Organizational Change

Tanja Sedej
Graduate School of Government and European Studies, Slovenia

Gorazd Justinek
Graduate School of Government and European Studies, Slovenia

ABSTRACT

Feedback is the fastest and most effective way for organizations to make improvements or get things back on track. Prompt and constructive feedback is strongly linked to employee satisfaction and productivity, and can increase both. During times of change when employees want to be heard and feel involved, it is even more important that the optimal internal communication tools for managing employee feedback are selected. This article tackles these questions and provides fresh empirical data on the selection of internal communication tools in general, with focus then devoted to managing feedback during change from the perspective of a professional communicator. The data evaluated and analyzed was gathered on the basis of research carried out in 2014 among 105 professional communicators of large and medium-sized companies, and was then compared with the results of similar research conducted in 2012.

INTRODUCTION

The general consensus is that organizational changes are becoming increasingly frequent, and so must be planned and managed with great care (Barrett, 2002; D'Aprix, 2008; Kitchen, 2002; Kotter, 1996; Luecke, 2003; Sedej & Mumel, 2013). Sedej and Mumel (2013, p. 25) argue that implementing change often takes longer than planned, whereas Balogun and Hope Hailey (2004) report that approximately 70 percent of changes implemented within organizations fail to achieve their set objectives.

DOI: 10.4018/978-1-7998-7297-9.ch022

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Therefore, a critical factor to be taken into account during an organizational change is internal communications. It is widely accepted that internal communications play a key role in the successful implementation of change (Goodman & Truss, 2004; Kalla, 2005; Kotter, 1996; Proctor & Doukakis, 2003; Young & Post, 1993). Communicating effectively within organization is not something that is nice to have. Indeed, internal communication is essential for the smooth running of every organization. Justinek and Sedej (2011) argue that internal communications represent a key performance and productivity issue, especially for international companies. It is therefore vital to ensure that employees have an optimal range of internal communication tools in general and for giving and receiving feedback. Rapidly changing circumstances require internal communication tools to be continuously improved and revised.

Particularly, when change has a significant impact on employees, organizations need to provide a broad range of options for employees to communicate, ask questions, vent anxieties and express opinions. Working without feedback during a change process is akin to setting off on an important journey without a map. Relying only on sense of direction is not sufficient and of itself to make improvements or keep things on the right track.

The number of ways to communicate in organizations has rapidly increased over the last two decades (Lengel & Daft, 1998; Lydon, 2005; Richardson & Denton, 1996; Wojtecki & Peters, 2000). It is therefore crucial that this area is comprehensively understood in order to achieve best results for setting a feedback system using internal communication tools.

There is a lack of understanding about the link between the effectiveness of internal communications, internal communication tools and feedback during change. Each internal communication tool has features that make it suitable and appropriate in certain situations, but entirely inadequate in others. This chapter therefore explores which internal communication tools are the most appropriate during change generally, as well as in terms of achieving overall business success and facilitating feedback.

The purpose of this chapter is therefore to present not only a critical review of the theories and approaches currently presented regarding internal communications and the facilitation of feedback through internal communication tools, but also the results of an empirical study that will encourage further research into the nature of organizational change, change communications, and internal communication tools and setting feedback system in order to create a more pragmatic framework in which to operate.

This chapter begins with a conceptual analysis of the meaning of organizational change and change management, internal communications and the internal communication tools which are used in this regard. It then concludes with an investigation of the understanding of feedback and its power to enhance the change process.

The results of research conducted on the selection of tools for improving employee feedback in internal communication during change are also presented. The topic was first researched in 2012, but was repeated in 2014. The analysis however reveals that there has been a gradual shift in the use of internal communication tools generally and, more specifically, for exchanging feedback.

THEORETICAL BACKGROUND

Change Management and Internal Communications

Technological development, fierce competition and globalization are just some of the critical elements that force organizations to transform or adjust to new business conditions. Organizational changes are

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a fact of everyday life and vital for survival. They must therefore be successfully planned and managed (Balogun & Hope Hailey, 2004; Beshtawi & Jaaron, 2014; Ćirić & Raković, 2010; D'Aprix, 2008; Koonce, 1991; Kitchen & Daly, 2002; Kotter, 1996; Luecke, 2003). Kitchen and Daly (2002, p. 46) argue that twenty-first century organizations are preoccupied with the concept of change. Ćirić and Raković (2010, p. 24) explain that changes are difficult to predict, and tend to occur with growing frequency. Therefore, change management is becoming an increasingly significant issue in the business world.

As change management garners increasing attention, many definitions of the concept have emerged. For example, Moran and Brightman (2000, p. 66) define change management as the process of continually renewing an organization's direction, structure, and ability to serve the ever-changing needs of its external and internal customers. Kitchen (2002, p. 48) explains that change management implies an attempt to understand the dynamics in the business environment, as well as the organization's own internal dynamics. Beshtawi and Jaaron (2014, p. 128) argue that the main intention behind a change management framework is to help all employees, even managers, to move successfully from the current state to a future state while achieving the business results desired.

The keystone of organizational change lies in internal communications, and employee communication is a pivotal element in achieving business success (Elving, 2005; Frahm & Brown, 2007; Goodman & Truss, 2004; Kitchen & Daly, 2002; Koivula, 2009; Lydon, 2006; Richardson & Denton, 1996). Goodman and Truss (2004, p. 217) believe that appropriate communication helps employees understand the need for change and its direct impact. Sande (2008, p. 29) considers communication to be real only when it is two-way. Elving (2005, p. 131) states that one of the main purposes of change communication can be to prevent, or at least reduce, resistance to change. Goodman and Truss (2004, p. 226) listed some examples of potential purposes for internal communication: getting buy-in, securing commitment to change, minimizing resistance, reducing personal anxiety, ensuring clarity of objectives, sharing information, setting out the vision, challenging the status quo, increasing clarity and mitigating uncertainty.

Organizational change can be both invigorating and intimidating (Sedej & Mumel, 2013, p. 23). Once employees are encouraged to carry out their jobs differently, the whole organization begins to change. Effective internal communication is therefore essential for addressing organizational concerns. Goodman and Truss (2004, p. 226) listed some examples of potential purposes for internal communication: getting buy-in, securing commitment to change, minimizing resistance, reducing personal anxiety, ensuring clarity of objectives, sharing information, setting out the vision, challenging the status quo, increasing clarity and mitigating uncertainty.

Despite the growing attention of the presented field, numerous errors in change management are directly linked to the collapse of internal communications (Elving, 2005; Gilsdorf, 1998; Kotter, 1996). Newton (2007, p. 186) also believes that it is necessary to take into account how much damage is sustained through too little or too much communication when considering the level of communication intensity in the context of change management. Sedej and Mumel (2015, p. 9) explain that employees always want to be kept abreast of what is happening in an organization and how the changes implemented will affect their work life.

The above observations highlight the huge importance of internal communications during the change process. It draws attention in particular to the importance of careful planning and change management. Justinek and Sedej (2011, p. 230) emphasize that internal communications must be sufficiently flexible to adapt smoothly to business needs.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Internal Communication Tools during Change

The immense significance of internal communications during change is therefore noted, but there remain some specific areas which have not been adequately investigated in this regard. Few studies have investigated internal communication tools in detail. The results of those studies usually highlight the importance of giving sufficient thought to tool selection (Goodman & Truss, 2004; Merrell, 2012; Richardson & Denton, 1996; Young & Post, 1993).

Indeed, internal communication tools need to be chosen carefully, especially during times of change. Appropriate tool selection helps employees adapt more smoothly to organizational changes and new business needs. Austin and Currie (2003, p. 236) believe that managers should use a variety of the tools available to them, find innovative ways to strengthen employee relations, and disseminate information as soon as it is known. Lydon (2006) agrees that organizations need to use communication tools that have been proven to work.

Buckingham (2008) argues that if the internal communication tools used do not fit the true culture of the organization, then only few individuals will truly take heed of the internal information flows. Sedej and Mumel (2013, p. 23) believe that unsuitable internal communication approaches are frequently employed during change; mistakes occur as unclear goals are set, inappropriate messages are relayed and inappropriate communication tools and channels are selected, which all too often result in poor communication results. It is therefore clear that the selection of appropriate internal communication tools represents a challenge.

It is crucial that internal communication tools, which should include both personal and impersonal modes of internal communications, are selected with due thought and consideration (Mumel, 2008; Ranken, 2007; Richardson & Denton, 1996). Barrett (2002, p. 221) states that effective employee communication uses all the tools available in order to reach its audience, but relies more on direct communication (verbal or face-to-face) than indirect communication (written and electronic tools).

Face-to-face communication is generally considered more efficient than other forms (Holtz, 2004; Mumel, 2008; Richardson & Denton, 1996), but is time-consuming and costly for widely dispersed organizations. Richardson and Denton (1996, p. 215) add that if personal (verbal) communication is limited, it is necessary to consider interactive tools, particularly video and telephone conferencing. Holtz (2005, p. 22) underlines that innovations in web-based technology have generated a wide range of exciting new tools in internal communications.

Handling change electronically is sometimes more convenient and efficient, but can be counterproductive when dealing with complex issues. Wojtecki and Peters (2000, p. 1) believe that many managers use e-mail, intranets, and other innovative technological tools to communicate and see them as effective internal communication solutions that meet the high demand for communicating during times of change.

Many authors divide internal communication tools according to the mode of transmission (Bratton & Gold, 1994; Klein, 1996; Mumel, 2008). In this context, organizations have a wide range of written (printed), verbal (oral), and electronic internal communication tools available.

Sedej and Mumel (2005, p. 12) explain and clarify verbal, written and electronic internal communication tools as mode of transmission. In general, verbal (personal face-to-face) communication ranges from informal conversations between two employees to formal large meetings with directors. The key feature of this mode of communications is that the information is sent from the sender directly; the information is also expressed through tone of voice and non-verbal communication such as hand gestures and facial expressions, which enrich the interpretation and contribute to a better understanding of the message.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Written communications vary from monthly reports to annual reports and corporate brochures. Electronic communications encompass the commonly used e-mails up to modern video content.

In Table 1, the internal communication tools are divided as mentioned above into three categories (verbal, written and electronic). Some of the tools in the table are classified into several subcategories. If the information is transmitted via electronic equipment, this equipment will hereinafter be regarded only as electronic internal communication tools.

Table 1. Internal communication tools according to mode of transmission

Internal Communication Tools		Verbal	Written	Electronic
Direct	Working breakfast			
	Internal events			
	Annual performance interview			
	Leader walkabouts			
	Meetings			
Indirect	Brochures			
	Internal magazines			
	Flyers, posters			
	Suggestion box			
	Bulletin board			
	Reports			
	Corporate guides			
	Questionnaires			
	CD/DVD/USB			
	Social media			
	Electronic bulletin board			
	E-mails			
	Electronic newsletter			
	Internal radio			
	Internal research			
	Intranet			
	Telefax			
	Telephone			
	Teleconference			
	Videoconference			
	Video clips			
	Virtual world (3D)			

Source: Sedej and Mumel (2005, p. 12)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Feedback Tools in Internal Communication during Change

Especially during process of change internal communications and the tools represent an underutilized way to get closer to employees' expectations and opinions by simply listening and responding to them. The systematic gathering of feedback within any organization is crucial for its smooth and normal functioning.

Many authors (Kreps, 1990; Theaker, 2004; Russ, 2007; Parker, 2009; Sande, 2009) underline the significance of feedback in internal communications. Hattie and Timperley (2007, p. 81) define feedback as information that is provided by an agent regarding aspects of one's performance or understanding. Kotter and Cohen (2003, p. 101), on the other hand, define feedback as one of the most important forms of information required to achieve success in an organization.

It is vital to have a clear understanding of the concept throughout the organization. As feedback is a critical business component Hattie and Timperley (2007, p. 81) describe it as a consequence of performance.

Indeed, all good communications consist of not only effectively delivering information, but also actively listening. Even Sande (2009, p. 29) emphasizes that internal communications require an active sender, active receiver and a healthy feedback loop.

It is a mistake to expect that only increasing the frequency of messages through different internal communication tools and the introduction of new tools will be sufficient to encourage feedback information flows. The methods for obtaining feedback are becoming increasingly diverse and innovative (Holtz, 2005; Sedej & Mumel, 2005). In addition to the most commonly used questionnaires and suggestion boxes, the use of quizzes, games, forums and blog are establishing a foothold in internal communications. Russ (2007, p. 8) clarifies that feedback can be obtained using multiple internal communication tools, verbal (within large or small groups and interpersonal communication) and nonverbal (written) feedback.

Especially in a process of change it is important to regularly facilitate and acquire feedback. Organizations need to clarify ambiguities through internal communications and gain the support and cooperation of their employees. Parker (2009, p. 25) firmly believes that if employees have the opportunity to express their personal fears, only then can progress in the process of change be made.

In order for organizations to promote open communication with all their employees, i.e. from those who are more vocal to those less willing to speak up, it is vital that there are several ways to obtain feedback. As a result, organizations often offer employees the option to provide feedback anonymously through research projects or suggestion boxes, through which employees and executives exchange opinions. Harris (2007, p. 12) argues that it is important to provide an opportunity for personal feedback communication, but it is also important to provide some channels that allow adequate anonymity because employees are often wary of expressing their real opinion, but this is largely dependent on the culture of the organization.

RESEARCH

There is no longer any doubt that employees are the most important part of the success of any organization. The employee communication process, together with internal communication tools for an effective feedback system, has undergone fundamental change, as technology has become an important part of the business world. It is imperative to have a comprehensive overview of what resonates with employees in internal communications as well as a solid understanding of the most appropriate internal communication tools for giving and receiving feedback.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Therefore, a question that addresses this chapter is in place: What are the most appropriate internal communication tools to facilitate communication and consequently employee feedback?

Methods

To begin, theoretical and background information was gathered on the concepts of change management in internal communications generally and more detailed internal communication tools for facilitating employee feedback. The existing research and literature on change processes and internal communications were used to construct the research framework.

The theoretical framework was then verified empirically with a structured questionnaire on internal communications during organizational change, in which the main focus was on internal communication tools in general and in detail for facilitating feedback during process of change.

Similar research was first conducted in 2012, with a follow-up project conducted two years later in 2014, thereby allowing the two sets of data to be compared.

Design of Research

The questionnaires were designed solely for internal communication experts who have adequate knowledge and appropriate access to this kind of information. The focus was on experts who operate in large and medium-sized companies, where the high number of employees requires not only systematically planned and thoughtful internal communications but also a carefully managed system for feedback. The questionnaire was available to communication experts to complete for approximately three months in 2012 and again in 2014.

In 2012 a total of 71 internal communication experts participated in the research, of whom 48 (68%) represented large companies and 23 (32%) medium-sized companies.[1] The youngest company participating in the research was only 2 years old, with the oldest having been established for 137 years; the average duration of incorporation for all the participating companies was 21.5 years. The key share represents companies that have been established for 2 to 30 years (87%). In terms of NACE,[2] the structure of the participating companies reveals that most operate in the manufacturing sector (15%), with second and third place shared by information and communication (14%) and financial and insurance activities (14%). The following activities are also well represented: other services activities, wholesale and retail trade, repair of motor vehicles and motorcycles, administrative and support service activities, and education.

In 2014, a total of 105 internal communication experts participated in the research, of whom 63 (60%) represented large companies and 42 (40%) medium-sized companies. The youngest company participating in the research was only 3 years old, the oldest 139; the average of all participating companies in terms of number of years of existence was 20.5 years. The key share represents companies that have operated from 3 to 30 years (89%). The structure of the participating companies in terms of NACE shows that most operate in the manufacturing sector (17%); the second place belongs to information and communication sector (16%) and the third place to financial and insurance activities sector (13%). The following activities also have an essential share: wholesale and retail trade, other services activities, repair of motor vehicles and motorcycles, education, administrative and support service activities.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The Results

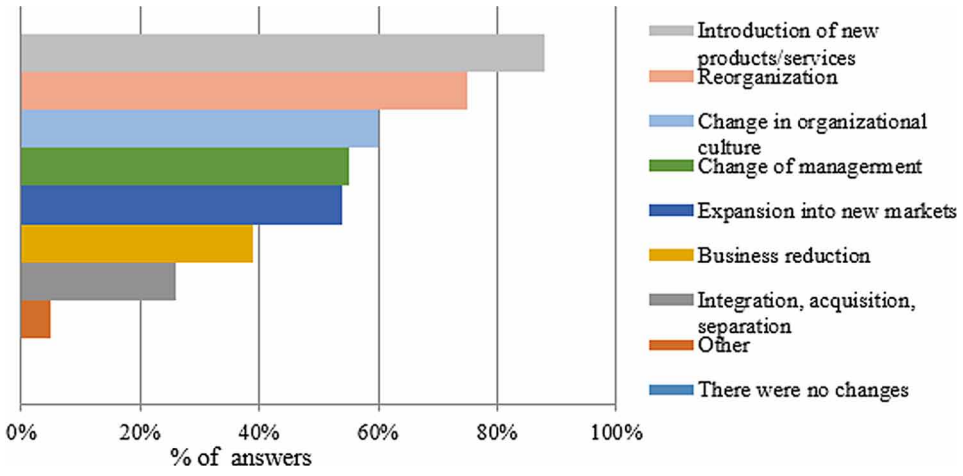
As presented earlier in the chapter, the organizations today have a wide range of internal communication tools at their disposal and thereby numerous of possibilities to receive and give feedback to their employees. Especially during the process of change it is important to communicate openly and frequently to prevent or at least reduce employee resistance. Their concerns should be discovered in the early phase and addressed as soon as possible. In this manner all internal communications have to be cautiously planned and managed. Bellow results of the research tackle comprehensively the mentioned issues.

Frequency and Types of Organizational Change

Organizations face changes relatively often; this was also verified by the research conducted in both 2012 and 2014.

In 2012 the experts estimated that an average of 4 major organizational changes had occurred in the previous three years. After more detailed analysis, the types of changes were also established (Figure 1). In the last three years, the organizations had to deal most frequently with the introduction of new products and services (79%) and reorganization (72%), followed by expansion into new markets and changes to the management and organizational culture. The last three listed changes were identified by approximately every second organization that participated in the research.

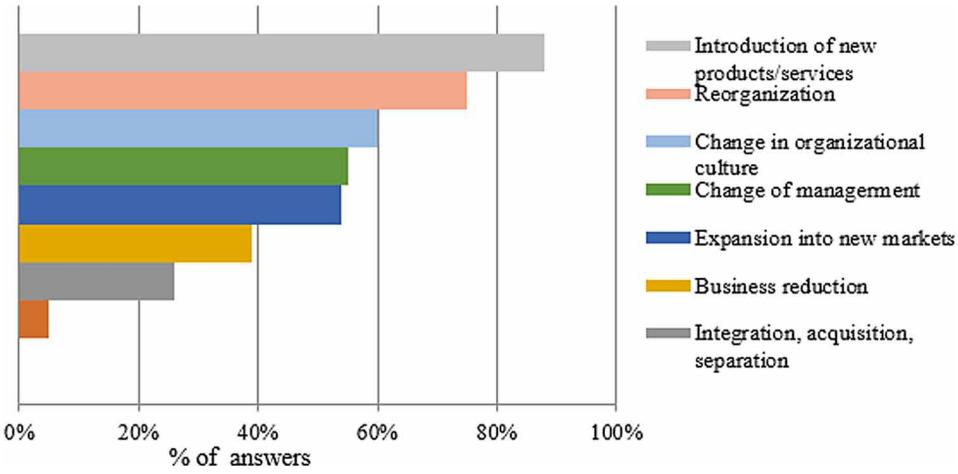
Figure 1. Type of organizational changes 2009-2011 (as a percentage)



Two years later, in 2014 the experts estimated that in the last three years on average 4.5 major organizational changes had occurred (Figure 2). Analysis also shows that in the last three years, the organizations had to deal most frequently with the introduction of new products and services (81%) and reorganization (75%), followed by change in organizational culture, expansion into new markets and change of management (approx. 50–60%).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Type of organizational changes 2011-2013 (as a percentage)



Internal Communication Tools Used during Change in General

The right frequency and combination of internal communication tools are also vital, especially during change processes, a time when employee anxiety increases. Consequently, a series of questions related to internal communication tools was established.

In the research carried out in 2012 and 2014, the experts were required to choose exactly three key internal communication tools that are used most often in times of change in general. They could choose from among the 25 most commonly used internal communication tools. Also, three options to record alternative internal communication tools were available. Based on the experts' selection, a list of the 10 most frequently used internal communication tools during times of change was conceived.

In 2012 the first place on the list of internal communication tools was taken by meetings, which was partially expected as personal internal communication during change is usually the most preferred mode of communication within organizations (Figure 3). Other internal communication tools ranked as follows in terms of being the most appropriate: e-mails, internal events, intranet, internal magazines, leader's walkabout, reports, telephone, bulletin boards, and electronic bulletin boards.

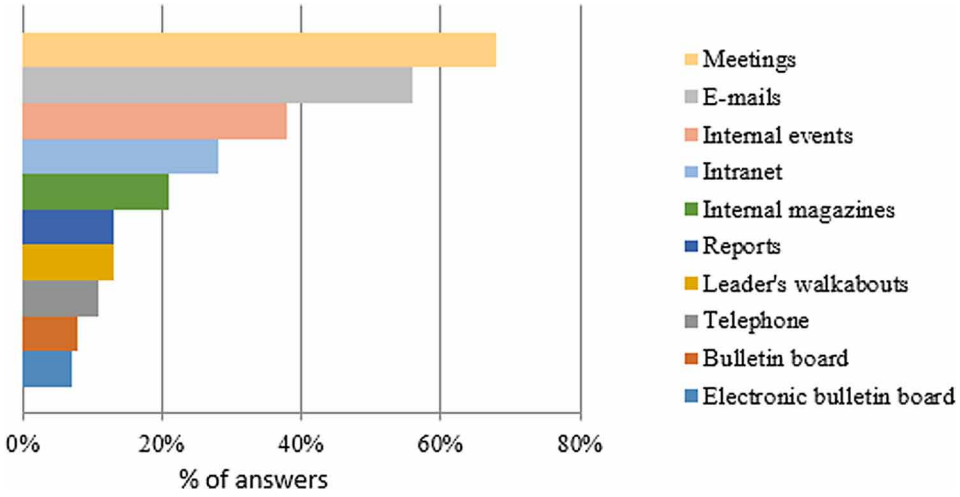
Of the 10 key internal communication tools listed, electronic and verbal communication tools dominate. Written tools are also well represented, but are mainly ranked in the lower half of the top ten list.

Among the verbal communication tools available, the most important are meetings, closely followed by internal events and management walkabouts. Of the electronic communication tools available, the most important are e-mails, which ranked the second most important tool on the list. The next most important electronic tool is the intranet, placing third among all the tools listed. Telephone communication and electronic news also feature. Reports, bulletin boards and internal magazines feature among the written communication tools, which are all ranked in the lower half of the list of all tools.

In 2014, meetings and e-mails remained in first and second place respectively on the list of internal communication tools (Figure 4). Interestingly, the intranet placed third on this occasion. Other internal communication tools ranked as follows in terms of being the most appropriate: internal events, electronic internal magazines, reports, leader's walkabout, telephone and internal research.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

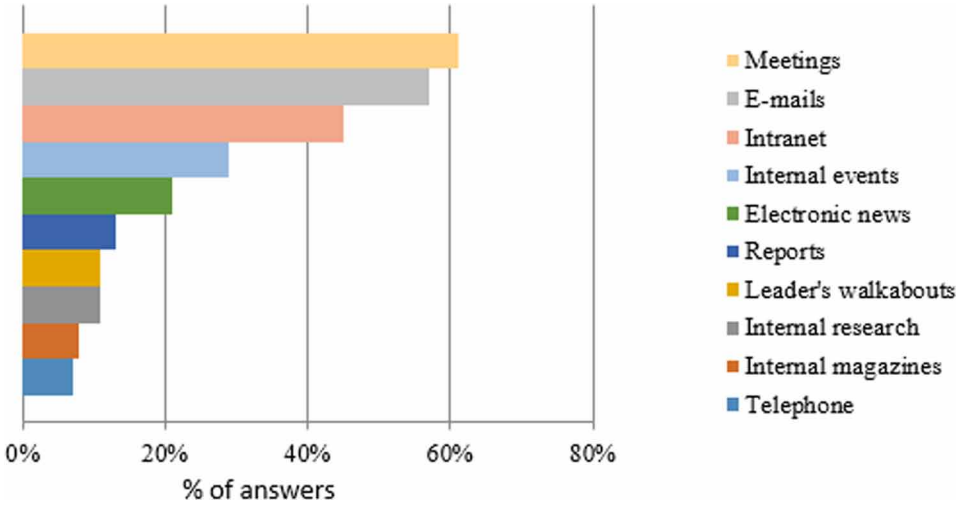
Figure 3. Key internal communication tools used during change in general 2012 (as a percentage)



Of the 10 key internal communication tools listed, electronic and verbal communication tools dominate. The share of written tools is the smallest and ranked in the lower half of the list.

Among verbal communication tools, the most important are meetings, followed by internal events and management walkabouts. Of the electronic communication tools available, the most important are e-mails, which ranked the second most important tool on the list. The next most important electronic tool is the intranet, placing third among all the tools listed. Telephone communication and e-news also feature. Reports and internal research as the written communication tools are all ranked in the lower half of the list of all tools.

Figure 4. Key internal communication tools used during change in general 2014 (as a percentage)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Internal Communication Tools Used during Change for Facilitating Feedback

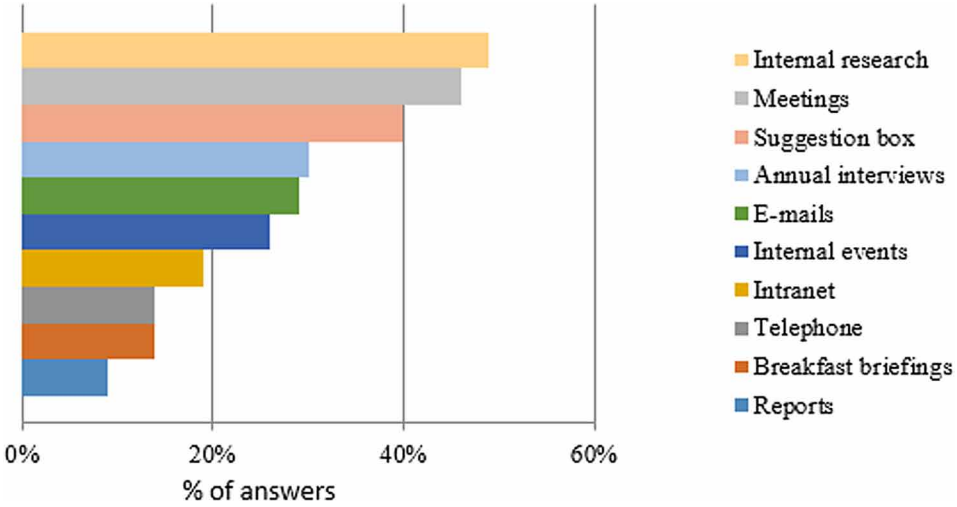
In the research carried out in 2012 and 2014, the experts were required to choose the three key internal communication tools for facilitating feedback that are used most often in times of change.

In 2012, internal research ranked first on the list of internal communication tools for facilitating feedback (Figure 5), with meetings placing second. Other internal communication tools ranked as follows in terms of being the most appropriate: suggestion box, annual interviews, e-mails, internal events, intranet, telephone, breakfast briefings and reports.

The list of ten key internal communication tools shows the importance of all types of internal communication tools, whether they are written, verbal or electronic. Written tools are considered the most important, however, since they ranked first and third on the top ten list.

Among the various written communication tools available, the most important is internal research. A suggestion box also ranks highly in third place on the list, with reports placing last. Among verbal communication tools meetings are in the foreground, followed by the annual interviews, internal events and breakfast briefings. Despite e-mails being the most important electronic tool, they nevertheless ranked only in fifth place, followed by intranet and telephone.

Figure 5. Key internal communication tools used during change for feedback 2012 (as a percentage)



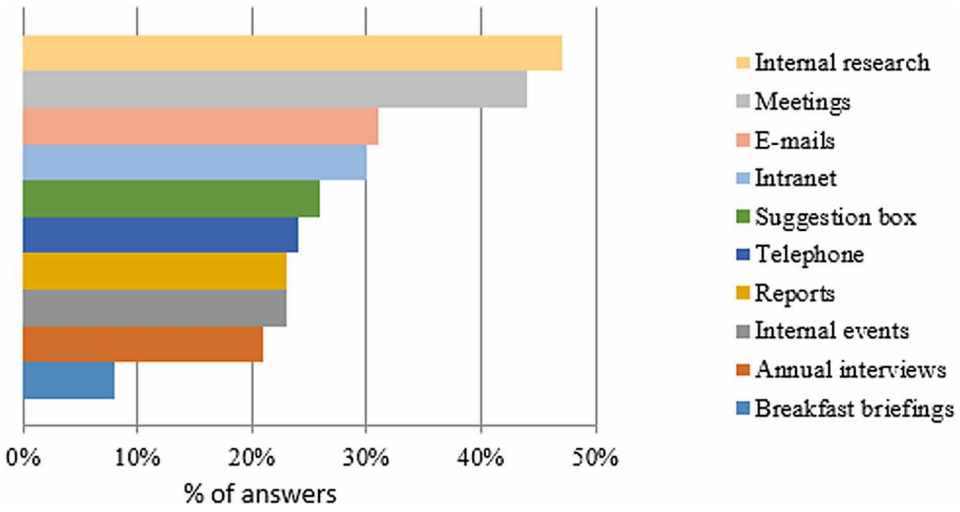
In 2014, internal research once again took first place on the list of the most popular internal communication tools (Figure 6), with meetings ranking second. Other internal communication tools ranked as follows in terms of being the most appropriate: e-mails, intranet, suggestion box, reports, telephone, internal events, annual interviews and breakfast briefings.

The list of ten key internal communication tools shows the importance of all types of internal communication tools, whether they are written, verbal or electronic.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Among the various written communication tools available, the most important is internal research. A suggestion box and reports also have a significant role, ranking fifth and sixth on the list respectively. Among the verbal communication tools, meetings placed first, followed by internal events, annual interviews and breakfast briefings. Despite e-mail being the most important electronic tool, it nevertheless ranked only third, followed by intranet and telephone.

Figure 6. Key internal communication tools used during change for feedback 2014 (as a percentage)



DISCUSSION

The business environment within which organizations operate has undergone rapid development, and organizations are required to cope with change more frequently than ever. Internal communications represent a key element in the success of organizational change (Goodman & Truss, 2004; Kalla, 2005; Kotter, 1996; Proctor & Doukakis, 2003; Young & Post, 1993) and this is the main reason why organizations must give more thought to internal communication tools (Merrell, 2012; Richardson & Denton, 1996; Wojtecki & Peters, 2000; Young & Post, 1993).

The research we have conducted in past years shows that the pace of change has not slowed down. Analysis conducted on research data gathered in 2012 and 2014 suggests that it has even slightly increased.

In the process of change, internal communications should not be underestimated or even neglected. Just because a message is delivered, this does not mean that it was delivered successfully. The mission of internal change communications is complete only when the receiver has understood and successfully integrated the message relayed.

In order to get the best results in communicating change, it is often necessary to deliver the message several times using different internal communication tools. The adequate combination of verbal, electronic and written internal communication tools is therefore essential in order to ensure that the communication process is being carried out effectively.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

After each internal communication especially during process of change, it is necessary to ensure a relevant follow up with possibilities for feedback to verify the employee's level of awareness, understanding as well as their emotional reactions and commitment to include it daily work. In fact, our research proves that in order to communicate change effectively in general meetings and e-mails are still the most important tools, although the difference between them is getting smaller. It can be noted that the position of electronic tools in internal communications is growing even stronger, when comparing the data for 2014 and 2012. Three electronic tools in fact rank among the first five places. In line with expectations, the role of written tools is less prominent in 2014 than was the case in 2012, as they are all ranked only in the lower half of the top ten list.

A comprehensive picture for facilitating feedback with internal communication tools during change shows another perspective. When experts have in their mind facilitating feedback, they ranked the importance of the internal communication tools entirely differently. At the top of the scale for the research conducted in 2012 and 2014 is internal research that represents written internal communication tools, while second place belongs to meetings. In addition to verbal and electronic internal communication tools, written tools have a significant role to play during change in this regard.

CONCLUSION

All organizations, regardless of their size, are required to change significantly in order to develop or survive in a new business environment. The way in which employees are kept informed and engaged in the workplace is also changing radically.

The research conducted confirms that the number of changes faced by organizations is increasing every year. The foundation of organizational success therefore lies in planning all the phases in the change process well, especially the ability to communicate change properly and provide the best and most appropriate range of internal communication tools.

When planning internal communications during change, it is important for experts to bear in mind how the feedback is exchanged. Previous research demonstrates that written internal communication tools should not be neglected, especially during periods of change. Despite the new media and tools at our disposal, it is vital to remember that change communications are not effective when a message is simply delivered; only when the message has been heard, understood and applied in practice can it be deemed a success.

Research shows that a healthy feedback system which comprises written, electronic and verbal internal communication tools is a viable approach for communicating change in organizations. It suggests that sensible planning and managing internal communication tools for facilitating feedback can improve the implementation of changes in organizations.

ACKNOWLEDGMENT

The authors would like to thank the anonymous reviewers and the editor for their insightful comments and suggestions.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Austin, J., & Currie, B. (2003). Changing organisations for a knowledge economy: The theory and practice of change management. *Journal of Facilities Management*, *3*(2), 229–243. doi:10.1108/14725960410808221

Balogun, J., & Hope Hailey, V. (2003). *Exploring Strategic Change*. London: Prentice Hall.

Barrett, D. J. (2002). Change communication: Using strategic employee communication to facilitate major change. *Corporate Communications*, *7*(4), 219–231. doi:10.1108/13563280210449804

Beshtawi, M., & Jaaron, A. (2014). Change Management in Telecommunication Sector: A Managerial Framework. *Review of Contemporary Business Research*, *3*(1), 127–141.

Bratton, J., & Gold, J. (1994). *Human Resource Management – Theory and Practice*. Houndmills, UK: The Macmillan Press Ltd.

Buckingham, I. (2008). Communicating in a recession: Employee must engage with the brand during tough times. *Strategic Communication Management*, *12*(3), 7.

Ćirić, Z., & Raković, L. (2010). Change Management in Information System Development and Implementation Projects. *Management Information Systems*, *5*(2), 23–28.

D'Aprix, R. (2008). Providing a frame of references is key during times of change. In G. Ginsberg (Ed.), *Mecum's Top 50 Internal Communication Case Studies: An Anthology of Best-selling Research to Tackle Key Communication Issues* (pp. 123–127). London: Melcrum Publishing Limited.

Elving, W. J. L. (2005). 'The role of communication in organisational change. *Corporate Communications*, *10*(2), 129–138. doi:10.1108/13563280510596943

Frahm, J., & Brown, K. (2007). First steps: Linking change communication to change receptivity. *Journal of Organizational Change Management*, *20*(3), 370–387. doi:10.1108/09534810710740191

Gilsdorf, J. W. (1998). Organizational rules on communicating: How employees are and are not learning the ropes. *Journal of Business Communication*, *35*(2), 173–201. doi:10.1177/002194369803500201

Goodman, J., & Truss, C. (2004). The medium and the message: Communicating effectively during a major change initiative. *Journal of Change Management*, *4*(3), 217–228. doi:10.1080/1469701042000255392

Harris, S. (2007). Supporting leaders through change. *Strategic Communication Management*, *11*(4), 12.

Hattie, J., & Timperley, H. (2007). The Power of Feedback. *The Journal of Educational Research*, *77*(1), 81–112.

Holtz, S. (2004). *Corporate Conversations: A Guide to Crafting Effective and Appropriate Internal Communications*. New York: AMACOM.

Holtz, S. (2005). The impact of new technologies on internal communications. *Strategic Communication Management*, *10*(1), 22–25.

Justinek, G., & Sedej, T. (2011). Knowledge sharing as a part of internal communication within internationalized companies. In *Knowledge as Business Opportunity: Proceedings of the Management, Knowledge and Learning International Conference 2011*. International School for Social and Business Studies.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kalla, H. (2005). *Integrated internal communications: a multidisciplinary perspective*. Corporate.

Kitchen, J. P., & Daly, F. (2002). Internal communication during the change management. *Corporate Communications*: *International Journal (Toronto, Ont.)*, *7*(1), 46–53.

Klein, S. M. (1996). A management strategic communication for change. *Journal of Organizational Change Management*, *9*(2), 32–46. doi:10.1108/09534819610113720

Koivula, J. (2009). *Succeeding in Project Communication – Effective Tools for the Purposes of Change Management Case Company: VR Ltd. – Passenger Services.* Retrieved 18 October 2010 from: http://enable06.myenable.com/fusion/apps/doc/public/130/Productivity%20Study/2008%20Proudfoot%20Global%20Productivity%20Study.pdf

Koonce, R. (1991). The people side of organizational change. *Credit*, *17*(6), 22–25.

Kotter, J. P. (1996). *Leading Change*. Boston: Harvard Business School Press.

Kotter, J. P., & Cohen, D. S. (2003). *Srce sprememb: resnične zgodbe o tem, kako ljudje spreminjajo svoje organizacije*. Ljubljana: GV Založba.

Kreps, G. L. (1990). *Organizational Communication: Theory and Practice* (2nd ed.). New York: Longman.

Lengel, R., & Daft, R. L. (1988). The selection of communication media as an executive skill. *The Academy of Management Executive*, *11*(3), 225–232. doi:10.5465/AME.1988.4277259

Luecke, R. (2003). *Managing Change and Transition*. Boston: Harvard Business School Press.

Lydon, S. (2006). *Common Sense in a Changing world: Ipsos MORI Employee Relationship Management.* Retrieved 20 January 2009 from: http://www.ipsos-mori.com/_assets/erm/common-sense-in-a-changingworld.pdf

Merrell, P. (2012). Effective change management: The simple truth. *Management Services*, *56*(2), 20–23.

Moran, J. W., & Brightman, B. K. (2000). Leading organizational change. *Journal of Workplace Learning: Employee Counselling Today*, *12*(2), 66–74. doi:10.1108/13665620010316226

Mumel, D. (2008). *Komuniciranje v poslovnem okolju*. Maribor: De Vesta.

Newton, R. (2007). *Managing Change Step by Step: All You Need to Build a Plan and Make It Happen*. Harlow: Pearson Prentice Hall Business.

Parker, J. (2009). Using informal networks to encourage change at BP. *Strategic Communication Management*, *13*(1), 24–27.

Proctor, T., & Doukakis, I. (2003). Change management: The role of internal communication and employee development. *Corporate Communications*: *International Journal (Toronto, Ont.)*, *8*(4), 268–277.

Ranken, N. (2007). Communicating an IT system change: Eight tips for success. *Strategic Communication Management*, *11*(4), 16–19.

Richardson, P., & Denton, K. (1996). Communicating change. *Human Resource Management*, *35*(2), 203–216. doi:10.1002/(SICI)1099-050X(199622)35:2<203::AID-HRM4>3.0.CO;2-1

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Russ, T. L. (2007). Communication Strategies for Implementing Organizational Change. *Proceedings of the 2007 Association for Business Communication Annual Convention*.

Sande, T. (2009). Taking charge of change with confidence. *Strategic Communication Management*, *13*(1), 28–31.

Sedej, T., & Mumel, D. (2013). How C-level views selection of internal communication tools in times of change. *Akademija MM*. *Slovenian Scientific Journal of Marketing*, *21*, 23–36.

Sedej, T. & Mumel, D. (2015). The optimal selection of internal communication tools during change in organisations. *International Journal of Globalisation and Small Business*, *7*(1), 6-25.

Theaker, A. (2004). *Priročnik za odnose z javnostmi*. Ljubljana: GV Založba.

Wojtecki, J.G. & Peters, R.G. (2000). Communicating organizational change: information technology meets the carbon-based employee unit. *The 2000 Annual*, *2*, 1–16.

Young, M., & Post, J. E. (1993). Managing to communicate, communicating to manage: How leading companies communicate with employees. *Organizational Dynamics*, *22*(1), 31–43. doi:10.1016/0090-2616(93)90080-K

KEY TERMS AND DEFINITIONS

Change Management: A process, approach or method that increases the likelihood that employees will successfully manage through a change process.

Internal Communications: Represent a function responsible for effective communications among employees within organizations.

Internal Communication Tools: Through internal communication tools with informing, creating dialogue and relationship among employee's communication objectives can be achieved.

Feedback in Internal Communications: Feedback in internal communications is a system where the reaction or response of the receiver after he has interpreted the message reaches the sender through one or more internal communication tools.

Organisational Change: An organizational transition from its current state to a desired future state.

ENDNOTES

[1] **European Commission criteria determining company size**: **micro companies** are defined as companies that employ fewer than 10 persons and whose annual turnover or annual balance sheet total does not exceed EUR 2 million; **small companies** are defined as companies that employ fewer than 50 persons and whose annual turnover or annual balance sheet total does not exceed EUR 10 million; **medium-sized companies** are defined as companies that employ fewer than 250 persons and whose annual turnover or annual balance sheet total does not exceed EUR 43 million; **large companies** are defined as companies that employ more than 250 persons and whose annual turnover or annual balance sheet total does exceed EUR 43 million.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

[2] The statistical classification of economic activities in the European Community, abbreviated as NACE, is the nomenclature for economic activities in the European Union.

This research was previously published in Organizational Productivity and Performance Measurements Using Predictive Modeling and Analytics; pages 261-276, copyright year 2017 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 23
Accessible and Inclusive Content and Applications

Tom Brunet
IBM, USA

P. G. Ramachandran
IBM, USA

ABSTRACT

As devices have become smaller and more pervasive, usage scenarios that have historically been common for people with disabilities are finding more general application for all users. Overall, the consideration of accessibility improves the usability of applications for all users. This chapter will discuss standards for accessibility, inclusive design, and topics related to the development of accessible mobile content and applications. The discussion will apply to mobile content, such as EPUB documents, and topics related to Web, native, and hybrid applications.

INTRODUCTION

The field of Accessibility is focused on ensuring that every person is able to access information and perform tasks regardless of that person's physical or cognitive capabilities at any given time. Practitioners in this field consider a wide range of capability types and impairment severities, including not only severe physical or cognitive disabilities, but also contextual limitations such as noisy environments.

The history of accessibility in the technology industry dates back to at least 1914, when IBM® hired its first employee with a disability. IBM® also led the evolution of assistive technologies with a Braille printer in 1975, a talking typewriter in 1980, and the IBM® Screen Reader product in the early 1980's (IBM, 2015). While this level of inclusion has been ingrained in companies like IBM®, legislation in this area is fairly recent - the Americans with Disabilities Act (ADA) was passed in 1990 and the Section 508 amendment to the Rehabilitation Act was passed in 1998.

DOI: 10.4018/978-1-7998-7297-9.ch023

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

For physical access, most local governments did not build accessible sidewalks and pathways until they were mandated by the ADA. In many cases, the need for these features was not immediately obvious since they do not impact everyone on a day-to-day basis. However, when the need arises, retrofitting can be difficult and costly. Due to cost, historical preservation, and other issues, retrofitting is still occurring for many buildings.

Technology access has been a different environment. Due to the rapid turnover of hardware and software, and the relative ease of modification, accessibility has evolved much faster than in the physical space. Additionally, relatively recent technologies, such as the World Wide Web, have improved access to information like never before.

The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect. (Tim Berners-Lee, 1997)

Now that mobile devices are commonplace, the universality of access has been unshackled. It is no longer available only from the desktop in your home, it is also available from the phone in your pocket.

This mobile evolution has brought two areas of Accessibility closer together. People who rely on assistive technologies are able to participate in ways that have been historically unavailable to them. On the other hand, as people are performing more tasks on devices that are smaller and using them in situations where they may not be able to look at or hear the device, these individuals require assistive technologies that have traditionally focused on people with severe disabilities.

In a less-obvious manner, our perception and abilities have not evolved, but we are using devices that are smaller than ever before. Therefore, there is a strong desire from all users for day-to-day interactions with their devices to become personal, aware, and cognitive. When outdoors, our displays need to be brighter, and when in noisy environments, the sound may need to be louder or captions may need to be provided.

Technology should adapt to humans, not the other way around. Multimodal interactions provide another interaction pattern to consider. If the same operation can be performed via various modalities, users have more flexibility and choice in how they perform the operation. During multi modal interactions, the systems also need to prioritize and be selective about how to respond to and process interactions in order to avoid accidental input. Humans are easily able to switch and prioritize. Devices will have to be smarter about processing. To some extent, multimodal interaction is already available. However, the means to enable these interactions needs to be further simplified. Development tends to prefer simplicity, so the means to enable accessibility will have to be simplified to the extent that this blends in with new development paradigms.

Wearable devices present another technology that can improve access for the general population and also for people with disabilities. Early wearable devices are similar to wristwatches and add abilities to provide feedback via vibrations and provide input via tap. Some companies are already building devices that can be woven into fabric, allowing for the integration of sensors and feedback in clothing, shoes, jewelry, glasses, etc. Each of these provides new opportunities for a user to interact with devices.

While the possibilities are endless, it is up to the technical community to prioritize simplification and enablement of accessibility. Sometimes more gadgets is not the answer; simplifying the existing ones and investing the time to understand the usage patterns can yield good results.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Many of the technologies that have enabled the mobile evolution have their roots in accessibility. Those with vision impairments leverage magnifiers and zoom technologies. Text-to-speech technology has provided additional information channels for those who are blind or have visual or cognitive impairments. Speech recognition has provided an input mechanism for those who cannot type, such as people with physical impairments.

In this chapter, we will discuss the importance of accessibility considerations throughout the content and application lifecycles, and applicable standards, techniques, and tools.

MOBILE ACCESSIBILITY

Business Imperative

In the 2010 US Census, 56.7 million people (19%) reported a disability, and more than half of these reported a severe disability (US Census Bureau, 2012). 40 million individuals were over the age of 65, and that number is expected to increase to 72 million by 2030. It is estimated that 1 billion people worldwide have a disability (WHO and World Bank, 2011).

In past decades, accessibility was largely a niche market, focused on by a handful of companies and advocacy groups. As world demographics shift to older populations and as more companies are sued to improve access to retail, services, and other offerings beyond brick-and-mortar locations, accessibility has shifted into a more visible mainstream role.

Recognition of the business imperative began with companies that were doing business with government entities, starting with the passage of the Section 508 Amendment to the US Rehabilitation Act of 1973. This amendment added accessibility considerations for US federal procurement, requiring that any company selling assets to the US government report their compliance. Many states followed suit, with similar requirements for sales to government entities at many levels. Therefore, companies that sold to US government entities were the first to develop accessibility practices, whereas other industries, such as retail, lagged behind. Other governments passed related legislation, such as the Ontarians with the Disabilities Act in 2005, and more recently due to the UN Convention on the Rights of Persons with Disabilities.

For retail entities, compliance was often deprioritized, with arguments that brick-and-mortar locations offered equivalent facilitation. This argument was used to deflect application of the Americans with Disabilities Act to Websites and other digital offerings. However, that changed with class-action lawsuits, such as National Federation of the Blind (NFB) v. Target® Corporation in 2006. These lawsuits aimed to highlight that the convenience of online shopping and discounts in online-only deals should not be available only to a subset of the population – brick-and-mortar locations are not suitable alternatives.

As more companies have reviewed their design and development processes to consider accessibility issues, these companies have recognized that design for accessibility also forces their design teams to create more organized and thoughtful user experiences. This provides critical impact for people with severe disabilities, major impacts for people with minor disabilities, and improved user experiences for all users.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Standards

There are multiple guidelines and standards that apply to the interface design of a mobile application. Individual device platforms provide basic recommendations, such as the iOS Human Interface Guidelines and the Android™ Guidelines. Following these guidelines can improve the usability and accessibility of an application, but they do not cover all aspects of accessibility.

The World Wide Web Consortium (W3C®) provides the current overriding standard for accessibility. When the W3C® started on the Web Content Accessibility Guidelines (WCAG) v2.0 (W3C, 2008), they set a goal to create a set of standards that was not focused on any particular technology and therefore would not become obsolete as technology evolved. This approach has been evident in that other standards have moved to align with WCAG 2.0 after it became a W3C® Recommendation in 2008. These standards focus on four key principles:

Principle 1 – Perceivable: Information and user-interface components must be presentable to users in ways they can perceive.
Principle 2 – Operable: User-interface components and navigation must be operable.
Principle 3 – Understandable: Information and the operation of user interface must be understandable.
Principle 4 – Robust: Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

When the checkpoints and guidelines of these principles are satisfied, applications and content can be consumed and interacted with reliably by people with a broad range of abilities to perceive and operate content.

In addition to platform guidelines, specific legislation may also apply for a given application or audience. Examples include the US Americans with Disabilities Act (ADA), Section 508 of the US Rehabilitation Act (US Access Board, 2000), Accessibility for Ontarians with Disabilities Act (AODA), EU Mandate 376, UK Disability Discrimination Act of 1995, and others. Generally speaking, following the WCAG guidelines will help you meet the content and applications components of this legislation, but often the legislation also comes with a reporting component that is specific to each.

Accessibility Starts with Design

Accessibility is a consideration of every stage of the application and content lifecycle, affecting design, development, test, and deployment.

For many development teams, their first introduction to accessibility starts with an audit, lawsuit, or other notification of accessibility issues in a released application. The common reaction to these events is remediation, which triggers a QA-driven process of identifying issues and sending them back to development to be fixed. Meanwhile, this expensive process is making changes without revisiting them in the context of the original design.

It is important that these teams take a step back and look at the larger development process. Accessibility, like all user experience and user interaction specification, starts with design. Designers should consider the user experience for a broad range of personas. Designers may already have training to consider personas in different job roles and with different lifestyles, but they also have to consider personas

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

that prefer different interaction styles. Inclusive Design refers to a design process that includes all of these personas.

When Inclusive Design is practiced, accessibility issues are considered at design time, and developers and testers include accessibility as part of the regular process of implementing the design.

There are a number of issues that designers should consider. The following list is not complete, but provides a significant review of issues that a designer might consider:

- **Alternatives for Non-Text Content:** All non-text content (for example, images) must have appropriate text alternatives. In some cases, images are used to supplement existing text, and therefore an empty alternative is appropriate to avoid redundancy. Additionally, for videos, captions must be provided.
- **Text Contrast and Color:** Ensure that text provides enough contrast to be readable per WCAG 2.0 1.4.3 and that links or hotspots are distinguishable from the surrounding text by color contrast or other formatting. Also, do not use color alone to convey information.
- **Multi-Device Access:** Different users may utilize a variety of different input devices or styles: mouse, keyboard, touch, voice, or sip/puff switch. Often, starting with basic mouse and keyboard access will assist with the other input methods, with additional fine-tuning for a specific device as desired.
- **Container Sizes:** Designs are often created for specific sizes or amounts of content. When content is altered by translation, zoom, or altered by a particular device, content may grow or shrink in unexpected ways. Designers must consider how content containers respond in these situations.
- **Semantics and Labels:** UI frameworks often provide ways to specify the semantics and labels for content. For example, in HTML, h1, h2, and other elements specify headings, ARIA landmarks mark important regions on the page, label elements help label form elements, and more. When content and applications choose elements based on semantics rather than default look and feel, the user interface and assistive technologies can use these semantics to provide a robust and consistent user experience across applications. For example, if a framework provides a checkbox widget, focus on making that checkbox adopt your look and feel rather than re-creating a partial checkbox behavior with a set of changing image widgets.
- **Form Flow and Guidance:** Ensure that there are instructions on how to fill out forms, that there are error messages when input is not properly specified, and that there are mechanisms to review or reverse submissions to avoid accidental submissions.

Mobile Application Development

An accessible mobile solution involves multiple components, consisting of at least an app, the operating system (OS) (for example, iOS, Android™), and assistive technologies (ATs) (for example, VoiceOver, Siri, TalkBack). In order to ensure that the app is accessible, the developers must ensure that the app communicates necessary information with the OS and ATs through the platform APIs. In this section, we will outline many of the significant platform APIs that affect accessibility.

iOS Native Applications

iOS provides a variety of properties that affect how VoiceOver reads content. Basic properties include:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **isAccessibilityElement:** VoiceOver will only read elements when this property is set to true. The default value is true for standard UIKit controls and false otherwise. Usually, this value should be set to true. However, some exceptions are outlined below.
- **UIAccessibilityContainer:** If a widget is a container of accessible controls (for example, a table containing rows), it should implement UIAccessibilityContainer. In this case, isAccessibility-Element should be set to false on the container and true for the enclosed elements. This allows VoiceOver users to visit the elements of the container.
- **accessibilityLabel:** The accessibilityLabel is spoken by VoiceOver for controls. For UIKit controls, this label is derived from the title value. In the case of a labelled input control, you may wish to set isAccessibilityElement to false on the related text element and specify the equivalent text as the accessibilityLabel of the input control.
- **accessibilityValue:** The accessibilityValue is used with elements with dynamic values, such as sliders and switches. For example, a switch that toggles visibility might use the following:

```
visibilitySwitch.accessibilityValue = bIsOn ? "Visible": "Invisible"
```

- **accessibilityTraits:** accessibilityTraits is a function that indicates the roles that a user interface elements implements, such as a button, static text, a search field, and more.
- **accessibilityHint:** accessibilityHint is used when the label is not descriptive enough and should be a brief phrase that starts with a verb. A button with the label "Add" probably does not need a hint. In a list of songs, the label might be the song name and the hint might be "Play the song".

There are also properties for how interfaces respond to user settings:

- **UIAccessibilityIsBoldTextEnabled:** Returns whether or not the user preference for bold text is set. For example it can be used as follows:

```
return UIAccessibilityIsBoldTextEnabled() ? "Avenir-Medium": "Avenir-Light"
```

- **UIAccessibilityIsReduceTransparencyEnabled:** Returns the setting for preferences regarding transparency. For example:

```
return UIAccessibilityIsReduceTransparencyEnabled() ? UIColor.whiteColor():
UIColor(white:1.0, alpha:0.8)
```

- **UIAccessibilityDarkerSystemColorsEnabled:** Determines if the user has asked for darker system colors.

```
return UIAccessibilityDarkerSystemColorsEnabled() ? UIColor.blackColor():
UIColor.grayColor()
```

- **UIAccessibilityIsReduceMotionEnabled:** Determines if the user has asked to reduce motion. If this is set, avoid using animations or other moving user interfaces that may be distracting to the user.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In addition to these basic properties, there are some more advanced characteristics for interacting with VoiceOver. Applications should avoid using these mechanisms for the purpose of providing a separate user interface for VoiceOver users, since some users may just be using VoiceOver as a cognitive assistant, or they may be seeking help from another user who is not using VoiceOver. These additional properties are:

- **UIAccessibilityIsVoiceOverRunning:** Determines if VoiceOver is turned on.
- **UIAccessibilityPostNotification(UIAccessibilityScreenChangedNotification, self.searchText):** Sends a notification for VoiceOver, which can be useful for elements that appear or disappear.
- **accessibilityElements:** Can be used to specify the order VoiceOver should read through elements if the default order is not working as desired.
- NSNotificationCenter.defaultCenter().addObserver(self, selector: "onVoiceOverStatusChanged", name: UIAccessibilityVoiceOverStatusChanged, object: nil): **This provides a mechanism to detect when VoiceOver is turned on and off.**

This listing is a sampling of the accessibility capabilities that iOS provides. For additional documentation and properties, see the UIAccessibility Protocol Reference in the UIKit Framework Reference (Apple, 2016).

Android™ Native Applications

The default screen reader for Android™ is TalkBack. Android™ supports third-party screen-reader applications, which can be found in the Play Store. Similar to iOS, Android™ provides applications with an API in order to interact with these assistive technologies. Basic properties include:

- **importantForAccessibility:** This property tells screen readers whether the given element should be read. It can have one of four values: IMPORTANT_FOR_ACCESSIBILITY_AUTO (0), IMPORTANT_FOR_ACCESSIBILITY_YES (1), IMPORTANT_FOR_ACCESSIBILITY_NO (2), or IMPORTANT_FOR_ACCESSIBILITY_NO_HIDE_DESCENDANTS (4). noHideDescendants means that both the current element and all of its descendants are not important.
- **android:focusable:** Sets whether or not the element is focusable. Focused elements have a number of related properties which are defined below.
- **nextFocusUp, nextFocusDown, nextFocusLeft, nextFocusRight:** Provides ways to indicate which element should receive focus if the user requests to move from the current element in the indicated direction. Some devices provide directional pads that can take advantage of all of these options, or they can be exercised via the keyboard.
- **requestFocus:** A view can request to gain focus. In some cases, this request can be blocked if the element is unable to gain focus.
- **android:contentDescription:** The contentDescription is spoken by TalkBack when the user interacts with controls. For labels that will not change, the label can be defined in the XML layout:

```
android:contentDescription="@string/prev"
```

Otherwise, the setContentDescription method can be used to set the label.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **android:labelFor:** This allows TextViews to indicate that they act as a label for other controls. For example:

```
<TextView android:id="@+id/user_nicklabel" android:labelFor="@+id/user_nick"
android:text="@string/txt_nickname"></TextView >
<EditText android:id="@+id/user_nick "></EditText>
```

- **android:hint:** User hints will display and will be conveyed to TalkBack when a field is empty. This can provide additional information to the user to help them understand the purpose of the field.

Web Applications

When discussing mobile applications, many people think of native applications, but disregard the many Web applications that are designed for mobile devices. With responsive design techniques via CSS media queries, user interface designers are finding ways to ensure that their applications work well across different device formats: desktop, tablet, and phone.

This section will highlight some significant techniques that can improve accessibility, but only covers a subset. WCAG 2.0 provides hundreds of techniques that can be found at http://www.w3.org/TR/WCAG20-TECHS/. Note that some of these techniques are noted as Advisory in the checkpoints, meaning that they are not required for compliance with WCAG, but can improve accessibility nonetheless.

Additionally, it is important to follow the HTML specification where possible. While Web browsers allow developers to deviate from the specification, they also provide default behaviors when the most appropriate elements are utilized to develop Web content and applications. When the most appropriate elements are used, and used properly, developers will get a variety of behaviors 'for free.' For example, when using a select element, the widget is styled based on the OS preferences specified by the user. This widget has a variety of keyboard behaviors: it can be reached by pressing the Tab key, it changes value with the up and down arrows, etc. In addition, JavaScript can respond to onchange events. When defining a custom version of a widget, it must consider these features that may be used by some users, but may not be obvious to the developer.

The following properties and techniques, in addition to issues addressed in the design, will help you to make your mobile applications accessible:

- **img/@alt:** The alt attribute is intended to be an inline replacement of the image, meaning that if the image is unable to load, the text provides a meaningful replacement of that image. If the image is decorative or redundant, the alt text should be empty. For example:

```
<a href="..."><img alt="Site Map" src="..."></a>
<a href="..."><img alt="" src="...">Site Map</a>
```

- **label/@for:** The for attribute of the label element is an id reference, which allows you to specify that this label is associated with the indicated input element. For example:

```
<label for="email">E-Mail:</label><input id="email">
```


EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **th@scope/td@headers:** The scope attribute of a table header may be set to a value of 'row' or 'col'. This indicates whether the header cell applies to elements in this row or column, respectively. In more complex tables, developers may need to use the headers attribute of a table cell, which takes a space-separated list of ids that act as headers for the specified cell. These techniques help assistive technologies understand the relationships between data table headers and data cells.
- **@role:** The role attribute is a mechanism provided by ARIA 1.0 to override the default semantics of an element. This is particularly helpful for conveying the behaviors of custom made widgets that may be created with a combination of div/span tags, CSS, and JavaScript. For example, role='checkbox' on a div would indicate that the div acts like a checkbox. The role attribute can also be used to indicate landmarks, such as main, navigation, and search. These landmarks help users of assistive technologies find key areas of a website without having to wade through large amounts of repetitive information. For a complete list of ARIA roles, see http://www.w3.org/TR/wai-aria/roles.

Hybrid Applications

Hybrid applications are native applications with embedded Web applications. For these types of applications, both the native and Web application sections above may apply.

Mobile Content Development

There are a variety of formats that content developers can use for electronic publications. Typically, for mobile content, developers require that the format support reflowable documents, so that the content will fill the screen, potentially using multiple columns, while not requiring scrolling on smaller devices. They also need the content to be viewable on a wide range of devices. The two most common formats for electronic publications that meet these needs are tagged PDF and EPUB®.

EPUB® is a free and open standard published by the International Digital Publishing Forum (IDPF). It has a number of characteristics that make it attractive for accessible mobile content development, many of which it inherits because it is based on HTML5:

- **Reflowable:** Aside from HTML being reflowable by default, EPUB® documents can leverage CSS media queries to precisely control the layout of content based on the width of the document. For example, decorative images might be hidden for smaller formats. This behavior not only assists with readers on mobile devices, but can also provide accessibility for users who need to zoom content.
- **Variety of Readers and Editors:** EPUB® documents utilize standard formats, so they are essentially a zip file of HTML documents with an XML description. Content developers can utilize any editor they prefer to modify the content. Additionally, there are various readers for EPUB® documents, so users can use the reader that works best for them.
- **Accessibility Standards and Documentation:** Since EPUB® is based on HTML, it is straightforward to apply WCAG 2.0 techniques to EPUB® documents.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

There is also a W3C® Working Draft, which defines roles, states, and properties specific to the digital publishing industry. The latest version can be found at http://www.w3.org/TR/dpub-aria-1.0/. For example, this chapter of the book in an EPUB® representation might be wrapped with:

```
<body role="doc-chapter">Accessible and Inclusive Content and Applications</
body>
```

Tools

There are a variety of tools to aid in the detection of accessibility issues. The capabilities and the level of automation provided depend on the platform of the application that is being tested. For some accessibility issues, tools are unable to automate detection because they are unable to infer intent. For example:

If an input error is automatically detected and suggestions for correction are known, then the suggestions are provided to the user, unless it would jeopardize the security or purpose of the content. (WCAG 2.0 3.3.3, 2008)

In this situation, the tools may be able to prompt a tester to assess whether a suggestion for correction is known or whether the correction would jeopardize the security or purpose of the content, but it is unlikely to be able to determine this automatically. Due to this range of complexity, some testing tools are just assistive technologies, or provide more assistance for performing manual analysis, while others provide full automation for some subset of the issues that need to be tested.

When assessing a tool, it is important to consider the role of the tool user, and the usage of the tool in the overall development lifecycle. Many tools are built by auditing teams who are performing post-deployment audits. These tools may provide wider coverage, but they also tend to have a higher false-positive rate because the results are reviewed by an expert who can further filter the list. Other tools are intended for developers and focus on high-impact issues with high reliability. These tools may not flag everything since quality assurance teams are expected to do a more thorough deep dive. These tools ensure that developers are considering accessibility issues and providing a solid foundation, and reduce the noise that may need to be sifted through as compared to other tools. In general, it is difficult to determine a "percent coverage" that can be reliably automated by a given tool since the set of possible user interfaces and situations that can cause accessibility issues is unbounded.

In this section, we will highlight some of the tools the authors have found helpful while developing mobile applications, with a short description of the ideal situation in which the tool provides value.

Screen Readers

The catchall test for any application is to perform a complete test of the application as an end user would experience it, whether without any additional assistive technologies or with assistive technologies such as screen readers.

For iOS, the built-in screen reader is called VoiceOver. If you are not primarily a VoiceOver user, it is useful to change in the Settings under the General, Accessibility section "Triple-click Home" to VoiceOver. With this setting in place, you can press the home button three times to toggle VoiceOver.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Without this setting enabled, it can be difficult for novice VoiceOver users to turn VoiceOver off again. For more information about VoiceOver, refer to VoiceOver for iOS (Apple, 2016).

For Android™, the built-in screen reader is called TalkBack. The settings for enabling and disabling Talkback are in the Accessibility, Vision section. The Accessibility Shortcut section explains methods for toggling TalkBack so that it can be quickly enabled when needed. For more information on TalkBack, refer to Google TalkBack (Google, 2016)

For mobile Web applications, desktop screen readers, such as JAWS or NVDA, can also provide some assistance, but may not accurately reflect the mobile screen-reader environment.

Accessibility Inspector (iOS)

The Accessibility Inspector is available in the iOS Simulator (Apple, 2013). When the Accessibility Inspector is turned on, the user can click on elements of the interface and see a pop-up with a listing of significant accessibility information. This will show event notifications and accessibility-related attributes such as label, traits, frame, etc.

Since VoiceOver is not available in the iOS Simulator, the Accessibility Inspector can help developers who are working in the iOS Simulator determine how VoiceOver might behave, or determine why VoiceOver is behaving a certain way on an actual device.

Lint (Android™)

The Android™ SDK includes a static code analysis tool called lint (Google, 2016). When you compile your program, these checks run, but you can also run them manually via Analyze, Inspect Code. The lint tool, in addition to checking items for correctness, will check for some issues related to security, performance, usability, accessibility, and internationalization.

Only three rules are categorized as accessibility: ClickableViewAccessibility, ContentDescription, and LabelFor. However, there are various other rules that improve the accessibility of applications, such as those categorized as Usability. These rules may not provide significant coverage of accessibility standards, but provide quick feedback to Android™ developers so that accessibility issues are detected early.

Accessibility Scanner (Android™)

The Accessibility Scanner is an app provided by Google® that is available in the Google Play™ store (Google, 2016). This app provides a button that allows the user to scan apps on their mobile device. It will report common accessibility issues such as color contrast, small buttons, and missing labels.

The Accessibility Scanner is useful for checking individual states of an app, such as when testing a specific page or UI element. This tool requires the user to push the button to obtain a report, so it is not ideal for large scale automated testing.

AMP for Mobile

SSB Bart's Accessibility Management Platform (AMP) for Mobile uses a component that is built into an iOS or Android™ native or hybrid application (SSB Bart Group, 2015). The component just needs to be linked with your app and does not require any code changes. With the component linked with an

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

app, the app can be used and tested normally. Each time the user interface changes, the user interface is evaluated in the background and the results are sent back to the AMP server.

AMP for Mobile is useful for developers and testers since it can be run in both a simulated environment or on an actual device.

The AMP for Mobile solution relies on technology from the IBM® Mobile Accessibility Checker, which provides the instrumentation, rules, and scanning of the mobile applications. AMP then provides the reporting and business process related to that data.

IBM® Automated Accessibility Tester

The IBM® Automated Accessibility Tester is a service available from IBM® Bluemix™(IBM, 2015). The Automated Accessibility Tester wraps the Selenium WebDriver, which is a browser-automation framework. Using Selenium, you can programmatically drive your mobile Web applications in standard Web browsers, such as Firefox® and Chrome™. During the automated testing process, accessibility checks can be run and the results are returned to the Automated Accessibility Tester.

This service can be used for testing at various stages in the development process, such as for unit testing or system testing. It is primarily focused on usage in a continuous integration process. In these continuous integration processes, after a developer checks in a change, the application is automatically rebuilt and deployed to a test or stage environment. Once deployed, tests, which can include the Automated Accessibility Tester, can be automatically run. In these scenarios, the functionality and accessibility can be tested together with every change that a developer commits.

This service provides good coverage of mobile Web applications, but is unable to test mobile native and hybrid applications.

Table 1. Summary of available tools

Tool	Target	Test Usage
VoiceOver	iOS Device	• Learn VoiceOver specific user interactions • Learn expected behavior of VoiceOver • Manually interact with applications and identify unexpected behaviors
Accessibility Inspector	iOS Simulator	• Learn expected API values • Manually interact with applications and identify unexpected API values
TalkBack	Android	• Learn TalkBack specific user interactions • Learn expected behavior of TalkBack • Manually interact with applications and identify unexpected behaviors
Lint	Android, Compile Time	• Review results of static analysis • Note: Coverage is relatively small
Accessibility Scanner	Android	Push button and review report
AMP for Mobile	iOS or Android	• Interact with application normally – reports gathered automatically • Review report after interacting with the application
Automated Accessibility Tester	Mobile Web Applications	• Create a test script to automatically interact with application • Run automated script • Review report after automated script runs
Digital Content Checker	EPUB and static HTML content	• Submit content manually or via API • Review report of results

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

IBM® Digital Content Checker

The IBM® Digital Content Checker is also a service available from Bluemix™, and is focused on accessibility checking of digital publications (IBM, 2015). It supports HTML and EPUB® formats. The service can be used by submitting an individual file to the service, or by utilizing the available API.

Using the API, accessibility testing of EPUB® documents can be included in a variety of publishing processes. For example, an extension can be built for rich-text editors such as CKEditor™, allowing content authors to check their content as they develop it. In an automated workflow, an accessibility check might be performed as an automated review process. In other cases, teams may have a build process that pulls in content from a repository and builds an EPUB® document. In this case, the build process can submit the document to the API and include the results of the check in the build logs.

FUTURE OF ACCESSIBILITY TESTING

Accessibility incorporated into design of software is the best approach that is going to yield exceptional results. Retrofitting software after testing is not only time consuming but also prone to delayed release schedules. As it evolves some of the tools will be embedded into design and how each user with a unique perspective can have a delightful experience. Software projects are becoming more and more about composing and reusing rather than building from scratch, the need for prolonged regression testing is less. Pretty soon the big difference between mediocre software and exceptional software will be based on how much accessibility and usability is built in during design rather than the length and extensiveness of test cycles.

REFERENCES

Apple Inc. (2013, April 23). *Debug Accessibility in iOS Simulator with the Accessibility Inspector*. Retrieved from https://developer.apple.com/library/ios/technotes/TestingAccessibilityOfiOSApps/TestAccessibilityiniOSSimulatorwithAccessibilityInspector/TestAccessibilityiniOSSimulatorwithAccessibilityInspector.html

Apple Inc. (2016a). *VoiceOver for iOS*. Retrieved from http://www.apple.com/accessibility/ios/voiceover/

Apple Inc. (2016b). *UIKit Function Reference*. Retrieved from https://developer.apple.com/library/ios/documentation/UIKit/Reference/UIKitFunctionReference/#//apple_ref/doc/uid/TP40006894-CH3-SW39

Apple Inc. (2016c) *UIAccessibility Protocol Reference.* Retrieved from https://developer.apple.com/library/ios/documentation/UIKit/Reference/UIAccessibility_Protocol

Google Inc. (2016). *Lint*. Retrieved from http://developer.android.com/tools/help/lint.html

Google Inc. (2016a). *Google TalkBack*. Retrieved from https://play.google.com/store/apps/details?id=com.google.android.marvin.talkback&hl=en

Google Inc. (2016b). *Accessibility Scanner*. Retrieved from https://play.google.com/store/apps/details?id=com.google.android.apps.accessibility.auditor&hl=en

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

IBM Corp. (2015a, June 24). *IBM's commitment to people with disabilities*. Retrieved from http://www.ibm.com/able/product_accessibility/ibmcommitment.html

IBM Corp. (2015b). *Automated Accessibility Tester*. Retrieved from http://ibm.biz/bluemix-aat

IBM Corp. (2015c). *Digital Content Checker*. Retrieved from http://ibm.biz/bluemix-dcc

SSB Bart Group. (2015, Mar 6). *AMP for Mobile*. Retrieved from http://info.ssbbartgroup.com/AMP-forMobile.html

US Access Board. (2000, December 21). *Section 508 Standards for Electronic and Information Technology*. Retrieved from https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards

US Census Bureau. (2015, July 25). *Nearly 1 in 5 People Have a Disability in the U.S., Census Bureau Reports*. Retrieved from https://www.census.gov/newsroom/releases/archives/miscellaneous/cb12-134.html

W3C. (2008, December 11). *Web Content Accessibility Guidelines (WCAG) 2.0*. Retrieved from https://www.w3.org/TR/WCAG20/

World Health Organization and The World Bank. (2011). *World Report on Disability*. Retrieved from http://www.who.int/disabilities/world_report/2011/en/

This research was previously published in Mobile Application Development, Usability, and Security; pages 54-67, copyright year 2017 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 24
How Internet of Things Is Transforming Project Management

Marisa Analía Sanchez
Universidad Nacional del Sur, Argentina

ABSTRACT

Organizations are experiencing a transformation as a consequence of digital technologies such as social, mobile, big data, cloud computing, and internet of things. The transformation presents challenges at several levels, and project management is not an exception. There are changes in the project environment, the power structures, capabilities, skills, and standard practices, just to name a few. Considering the eventual obsolescence of many project portfolio management practices, the aim of this chapter is to discuss the influence of internet of things in this discipline. The analysis departs from rethinking project management insights and describes the impact of smart and connected products considering many dimensions. Recommendations for each PPM stage are developed, followed by a brief discussion of future research directions.

INTRODUCTION

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it. (Weiser, 1991)

Organizations are experiencing a transformation as a consequence of digital technologies such as social, mobile, big data, cloud computing, and Internet of Things (IoT). The impact of information technology is important even in sectors that are not information intensive such as the agricultural or mining. The digital transformation presents challenges at several levels, namely in leadership, management of markets, management of processes, in how to integrate technologies to transform the organization, and project management. Organizations that do not adapt to this new context will probably lose markets and

DOI: 10.4018/978-1-7998-7297-9.ch024

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

will vanish. Weill and Woerner (2015) point out that organizations not only fail to take the opportunities given by the digitization but fail to adapt their business models to reflect the economic characteristics and underlying mechanisms of digitization.

Porter and Heppelmann (2014) indicate that Information Technology (IT) is becoming an integral part of the product itself. Embedded sensors, processor, software, and connectivity in products, coupled with a product cloud in which product data is stored and analyzed and some applications are run, are driven dramatic improvements in product functionality and performance.

The evolution to smart, connected products requires a traditional manufacturer to build what is essentially an internal software company (Porter & Heppelmann, 2015). Building software related characteristics is not usually part of the traditional product engineering process. Slama *et al.* (2015) indicate the IoT involves a clash between two worlds in which those in the machine camp and those in the Internet camp will be required to work together to create products that combine physical products with Internet-based application services. Regarding Project Management (PM), the IoT changes the project environment, the power structures, capabilities, skills and standard practices, just to name a few.

Considering the eventual obsolescence of many Project Portfolio Management practices, the aim of this chapter is to discuss the impact and influence of IoT in this discipline. The work is divided in five sections. First, a background on digital transformation helps to put in context the topic of the chapter and explain the influences affecting organizations. Second, the main focus of the chapter is introduced describing how IoT impacts PPM. Then, taking into account the challenges posed by IoT, a discussion for each PPM stage is developed. Future research directions are briefly described. Finally, a conclusion stressing the main challenges for current leaders closes the chapter.

BACKGROUND

Digital Transformation

The corporate strategy is the input to the creation of initiatives, comprising any number of portfolios of programs and projects, which are the vehicles for executing the organization´s strategy. The nature of IoT projects, immersed in a dynamic environment, characterized by a rapid technological change, and part of a digital ecosystem, require looking at projects in a more strategic way. Hence, it is necessary to give an overview of the influence of information technology from a strategic perspective.

In the past, most information technologies adopted by organizations were a means to lower operational costs and increase productivity. Hence, the broad strategic view was that IT strategy must be aligned with the firm's business strategy (Henderson & Venkatraman, 1993). In the last years, the digital infrastructure of organizations and society has radically changed and both researchers and managers have acknowledged that the role of IT has undergone a transformation (Oestreicher-Singer & Zalmanson, 2013). El Sawy (2003) was one of the first to refer to the IT fusion model in which technology is fused in the business environment.

Porter and Heppelmann (2014) provide an historic view to the analysis of the influence of technology, and describe three "waves" as follows:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **The First Wave of IT (1960s – 1970s):** Automated individual activities in the value chain. The productivity of activities increased because huge amounts of new data could be captured and analyzed in each activity.
- **The Second Wave (1980s – 1990s):** Given by the rise of Internet with its inexpensive and ubiquitous connectivity. This enabled coordination and integration across individual activities, with outside suppliers, channels, and customers; and across geography.
- **The Third Wave (Now):** Of IT is becoming an integral part of the product itself. Embedded sensors, processor, software, and connectivity in products, coupled with a product cloud in which product data is stored and analyzed and some applications are run, are driven dramatic improvements in product functionality and performance.

Porter and Heppelmann (2014) argue that although the IoT shows a new set of technological opportunities, the rules of competence and competitive advantage remain the same. The authors analyze IoT impact on industry structure and the limits of industry to understand the effects of intelligent and connected products. They also describe some strategic options. In a more recent article, the authors analyze the internal implications, such as how the nature of intelligent and connected products redefine the work in each function (product development, IT, manufacturing, logistics, marketing, sales and post-sales service) (Porter & Heppelmann, 2015).

Loebbecke and Picot (2015) use the term "digitization" to refer to changes of established patterns caused by the digital transformation and complementary innovations in economy and society. Digitization penetrates all areas of life and creates new ways of working, communicating and cooperating. Shirky (as cited in (Loebbecke & Picot, 2015)) mentions that connecting individuals, enterprises, devices and governments enables easier transactions, collaboration and social interaction and results in enormous accessible data sources. The interaction between objects adds a multitude of data sources throughout organizations and society. The focus on connected sensors and appliances defines challenges to data flow management. More connections are required with a broad spectrum of organizations and this depends on an adequate management of new relations with stakeholders such as customers, suppliers and rivals.

The improvements in business models that derive from digitization aim to optimize existing processes to increase global efficiency and services and products quality. Digitization enables and makes easier data collection, communication and control activities and in that way reduces transaction costs. However the standardization and massive adoption of these solutions are not sufficient to get a sustainable competitive advantage (Markus & Loebbecke, 2013).

The MIT Sloan Management Review and Deloitte conducted a research and the authors highlight that strategy, not technology, drives digital transformation. Maturing digital businesses are focused on integrating digital technologies, such as social, mobile, analytics and cloud, in the service of transforming how their businesses work (Kane, Palmer, Phillips, Kiron, & Buckley, 2015). The findings of this research show that organizations where digital has transformed processes, talent engagement and business models have a clear and coherent digital strategy. Also, digitally maturing organizations are more comfortable taking risks than their less digitally mature peers.

More recently, a research on designing digital organizations also emphasizes the importance of developing a business strategy that takes advantage of digital technologies (Ross, Sebastian, & Beath, 2016). The authors distinguish two kinds of strategies: a customer engagement strategy which targets to superior, personalized experiences that engender customer loyalty; and a digitized solutions strategy

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

aimed at information enriched products and services that deliver new value for customers. In addition, the research observes that operational excellence is the minimum requirement for doing business digitally.

Internet of Things

In this technology-rich scenario, real world components interact with cyberspace via sensing, computing and communication elements, thus driving towards what is called the Cyber-Physical World (CPW) (Conti et al., 2012). The CPW is characterized by a large number of mobile devices that the users bring around or that are spread into the environment. This scenario enables the automatic observation and measurement of human behavior and the data captured in this way supports data-driven dynamic adaptation of systems in response to observed user habits, preferences and routines.

Various concepts have been coined and promoted by different scholars and technologist. Olson *et al.* present a collective of concepts that are used in depicting future visions of society as affordable by technology (Olson, Nolin, & Nelhans, 2015). In this section, concepts closer to the purpose of the chapter are included: ubiquitous and pervasive computing, and IoT. Ubiquitous computing refers to a society in which human computer interaction is seamlessly and unnoticeably integrated into everyday life. Weiser (1991) describes this concept based on ideas arising from anthropological studies of work practices. Later, IBM coined the term pervasive computing which has a focus more on technological issues. According to Orwat et al. (2008) pervasive computing is associated with the further spreading of miniaturized mobile or embedded information and communication technologies (as cited in Olson, Nolin, & Nelhans, 2015). IoT was introduced by Kevin Ashton in 1999 (Ashton, 2009). Ashton visualized that a physical world can be connected to the internet via sensors and actuators which are capable of providing real time information and hence benefit our lives. With time, this notion has been considerable broadened (Olson, Nolin, & Nelhans, 2015). Gubbi *et al.* (2013) defined IoT as the interconnection of sensing and actuating devices providing the ability to share information across platforms through a unified framework, developing a common operating picture for enabling innovative applications.

Current application domains of IoT include home and personal (control of home equipment, smart sensors in healthcare), enterprise (RFID in retail, industrial ecosystems), utilities (smart grid and household metering), transport (smart traffic, automatic driven vehicles, and intelligent logistics).

Role of Platforms

While considering IoT, it is unavoidable to discuss the role of platforms. Information technology (Internet, mobile, cloud computing, social) has reduced the need to own physical infrastructure and assets giving raise to platform businesses such as Amazon, Uber, Airbnb or eBay. A platform provides the infrastructure and rules for a marketplace that brings together producers and consumers. Platforms comprise four types of players enabling value-creating interactions. The owners of the platforms control their intellectual property and governance (Google owns Android). Providers serve as the platforms' interface with users (mobile devices are providers on Android). Producers create their offerings (for example, apps on Android), and consumers use those offerings (Van Alstyne, Parker, & Choudary, 2016). This shift from pipeline business models to platforms has profound consequences in enterprises. Parker, Van Alstyne and Choudary (2016) have extensively discussed the rise of the platform as a business and organizational model. With the advent of IoT, the concept extends to the "Internet of Things as Platform" to handle device connections and allow users to specify the meaning of the device interactions. For

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

example, smart cities (Wang, He, Huang, & Zhang, 2014), energy grids (Tanoto & Setiabudi, 2016), manufacturing (Woo, Jung, Euitack, Lee, Kwon, & Kim, 2016) or healthcare (Ishii, Kimino, Aljehani, Ohe, & Inoue, 2016) as platforms.

MAIN FOCUS OF THE CHAPTER

Classical Project Management is highly institutionalized and strongly supported by "de facto standards" or "best practices", like PMBok (Project Management Institute, Inc., 2008). On the other hand, the Rethinking Project Management (RPM) concept understands project management as a holistic discipline for achieving organizational efficiency, effectiveness and innovation (Jugdev, Thomas, & Delisle, 2001). RPM perspective adopts a broader conceptualization of projects as being multidisciplinary, having multiple purposes, not always pre-defined, but permeable, contestable and open to renegotiation throughout (Winter, Smith, Morris, & Cicmil, 2006). Svejvig and Andersen (2015) present the results of a structured review of the rethinking project management literature. Through the analysis the authors identified global topics and then categorized each contribution within one of six overarching categories: contextualization, social and political aspects, rethinking practice, complexity and uncertainty, actuality of projects and broader conceptualization. This section aims to highlight a perspective on issues related to project management in the context of IoT. The organization of the presentation is based on the categories identified by Svejvig and Andersen. These categories are rather broad and emerged from the analysis of RPM literature whose concerns are more close to the challenges posed by smart and connected products development.

Contextualization

Contextualization describes how projects need to expand beyond the narrow goals of isolated projects and encourage thinking about projects in a broader context by focusing in the management of multiple projects, the organizational strategy and the project environment (Svejvig & Andersen, 2015).

Management of Multiple Projects

The standard documents of project management currently issued by international project management organizations represent an excellent overview of what the management of a single project includes in its application area (Artto & Kujala, 2008). One limitation of this view is that it does not take into account project interdependencies. In addition, for the case of IoT, several firms participate in projects. Then, the management of a project network or of a business network framework may be more adequate.

Organizational and Ecosystem Strategy

RPM view encourages thinking in organizational strategy, IoT projects need to expand to an ecosystem strategy. For the case of organizations attempting to create value from IoT innovations, the role of stakeholders is essential. In order to define a value proposition, the abilities, knowledge and collaboration of different stakeholders is required. Stakeholders may be defined as individuals, groups and organizations that are affected by or can affect a decision or action (Freeman, 1983). Stakeholder theory recognizes

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

that organizations have obligations not only to shareholders but also to other interest groups such as customers, employees, suppliers and the wider community; amongst many others (Asif, Searcy, Zutshi, & Fisscher, 2013). Addressing the needs of internal and external stakeholders has been identified as a key element of successful product development (Majava, Harkonen, & Haapasalo, 2015). The role of partnerships has also been addressed more thoroughly by digital ecosystem research (Iansiti & Levien, 2004, 2004a). The digital ecosystem theory is adequate to analyse the role of IT in organizations that operate in complex networks and has its origins in complexity theory (Stacey, 1995) and organizational ecology (Hannan & Freeman, 1977). Business ecosystems are networks of organizations that are held together through formal contracting and mutual dependency. The entities of a business ecosystem are structured around core firms, whose centrality is established on the basis of control over the dominant technological architecture or brand that structures value in the ecosystem, or other factors such as product characteristics or geography (Teece, 2007). To summarize, organizations are part of a digital ecosystems, and project success depend on the success of the ecosystem strategy.

Products Part of Broader Systems

IoT-enabled products are part of broader systems. They are composed of components and delivered services depend on other systems. This has been the challenge for Systems Engineering field for many years. Software systems are deployed as part of a large set of components and hence software practitioners are comfortable with a systems thinking approach during all the development processes. For example, during design software teams are aware of issues regarding compatibility and safe integration among software components. These issues are also present during implementation, testing, and deployment. There is a body of experience, methods and tools to cope with systems development. And the challenge for a non-IT organization is to learn from that experience.

Social and Political Aspects

The category social and political aspects include literature with a focus on how social and political processes shape projects, *e.g.* power structures, emotionality and identities (Svejvig & Andersen, 2015). IoT-enabled products offer the opportunity to create new value with data and organizations should have data analytics capabilities. Organizations require expertise at working with large volume of data and also capability of helping leaders reformulate their challenges in ways that big data can tackle. It is also necessary to increase cooperation between the people who understand the problems and the ones who master problem-solving techniques and can generate value from data. Successful information technology organizations will train and recruit people with a new set of skills who can integrate analytic capabilities into their production environments (Davenport, Barth, & Bean, 2012). On the other hand, a data-driven decision making poses managerial challenges related with how decisions are made and who gets to make them (Klotz, 2016). Regarding leadership, Bennis (2013) argues that information-driven transparency will change the way that power is delivered by top leaders, and that leaders need to embrace that transparency.

Another implication of the digital ecosystem environment is that companies can co-create business with people. Co-creation refers to the scenario in which individuals or consumer communities produce marketable value in voluntary activities conducted independently of any established organization, although they may be using platforms provided by such organizations (Karhu, Botero, Vihavainen, Tang, & Hämäläinen, 2011). The management of such platforms needs to address social issues.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Rethinking Practice

Rethinking practice encompasses literature that suggests alternative methods, perspective and approaches to rethink the ways in which practitioners work with projects. Regarding IoT, there are several issues that emerge and have implications on project management: the shift to a product-as-a-service business model; the focus on customer success; and data analytics as a source of value creation.

Product-As-A-Service Business Model

Companies in search of growth are working on integrating products and services. Reim *et al.* (2015) provides a literature review to understand implementation of product-service systems business models and tactical practices. IoT-enabled products which can track customer usage and satisfaction represents an opportunity for manufacturers to leverage technology to create new business models that shift focus from standalone products to service-based offerings. As described by Porter and Heppelman (2015) the new data available to companies, together with new configurations and capabilities of smart, connected products, is restructuring the traditional functions of business and this transformation started with product development.

Focus on Customer Success

Users are at the center of intelligent environments, in that respect this area overlap with the efforts of the scientific community focused on Person-Centric Computing (Augusto, Callaghan, Cook, Kameas, & Satoh, 2013). The introduction of technology has to be sensitive to the user and abide to the principle that the human is the master and the computer the slave and no the other way round (Dertouzos, 2001) cited in (Augusto, Callaghan, Cook, Kameas, & Satoh, 2013)). Smart, connected products capture usage data that allows segmenting customers, customizing products, setting prices to better capture value, and extending value-added services (Porter & Heppelmann, 2014). Organizations that focus on customer success and experience are more prepared to enhance differentiation.

Analytics as a Competitive Advantage

Project managers should integrate data analytics as a core capability since it supports many activities from design, production and even innovation. The creation of new value with data requires data capabilities. Social networks, mobile and IoT products generate huge amount of data that may be used to improve product or services design and support a differentiation strategy. Hence, organizations must add talent in data analytics area. Software companies providing e-commerce solutions have long understand the power of data analytics in generating customer value (Porter & Heppelmann, 2015). For the case of Big Data, Davenport (2012) describes several ways it can be used to enhance a business, such as making routine business decisions faster, supporting new decisions and developing new product and services. Any of these applications may contribute to cost savings or improve differentiation. Progress in data storage and processing technology led to more data-driven decision making. Brynjolfsson *et al.* (2016) found that between 2005 and 2010, the share of manufacturing plants that adopted data-driven decision-making early tripled to 30 percent but the rapid diffusion is uneven. McAfee and Brynjolfsson describe

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

five management challenges related with Big Data that are related with leadership, talent management, technology, decision making and culture (McAfee & Brynjolfsson, 2012).

Complexity and Uncertainty

The category complexity and uncertainty consists of contributions that deal with the increasing uncertainty and complexity in projects and project environments (Svejvig & Andersen, 2015). Shenhar and Dvir (2007) have proposed a framework known as the "Diamond of Innovation" which provides a framework for project classification. Each one of its dimensions of novelty, technology, complexity and pace consists of four possible project categories, and by selecting a category in each dimension, one creates a specific diamond-shaped view for each project. Once a classification is selected, the model helps identify the unique impact of each dimension, and provides recommendations for a preferred style of management for increasing the likelihood of the project's success. Novelty refers to how new is the product to the market, users, and customers. Technology innovation describes how much new technology is used and it impacts product design, development, testing, and the required technical skill. Complexity represents the complexity of the product or the organization and impacts the degree of formality and coordination needed to effectively manage the project. Pace denotes the urgency of the innovation and impacts the time management and autonomy of the project management team. Table 1 summarizes the values that each dimension may assume. The dimensions proposed by the framework take into account not only the organizational readiness to develop the project but also the external issues related to suppliers, subcontractors or the market. Then, it results in an adequate framework to support the analysis of projects developed in an ecosystem environment. In what follows, there is a discussion about complexity and uncertainty based on the "Diamond of Innovation" dimensions.

Table 1. Dimensions of the Diamond of Innovation Model

Dimension	Categories in Each Dimension
Complexity	Assembly: subsystem, performing a single function. System: collection of subsystems, multiple functions. Array: widely dispersed collection of systems with common mission.
Technology	Low-tech: no new technology is used. Medium-tech: some new technology. High-tech: all or mostly new, but existing technologies. Super high-tech: necessary technologies do not exist at project initiation.
Pace	Regular: delay not critical. Fast-competitive: time to market is important for the business. Time-critical: competition time is crucial for success-window of opportunity. Blitz: crisis project-immediate solution is necessary.
Novelty	Derivative: improvement of an existing product. Platform: a new generation of existing product line. Breakthrough: a new-to-the world product.

Source: Adapted from (Shenhar & Dvir, 2007)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Novelty of Innovation

Even digital technologies pose some opportunities, there are uncertainties about the market needs and hence which is the right value proposition to develop. There are no clear rules about how to proceed. Slama *et a*l. (2015) suggest building a minimum viable product and get to market fast. Hence, firms have first-mover advantages by collecting and accumulating product data and using it to improve product and services. Companies that aim to produce smart products require getting new products to market quickly and responding fast to customer need. A first-mover strategy may imply shorter development cycles and the requirement to optimize development. And this drives to the next dimension of the diamond, the pace of innovation.

Pace of Innovation

The pace measurement captures the urgency of time in the success of the project (Shenhar, Holzman, Melaned, & Zhao, 2016). The pace of digital improvement is making strategy complex. In general, IoT-enabled solutions are time-critical since the failure to meet the project milestone deadlines can result in project failure because a window to opportunity will close. For many years, the software industry had evolved software development methods from the traditional waterfall model to agile product development process. The software industry was motivated not only by the need to shorten development cycles but to develop solutions that satisfy the customer requirements. Agile product-development processes emphasize daily collaboration between developers and marketers, weekly delivery of enhancements, continual course corrections, and ongoing testing of customer satisfaction. While this is quite incorporated in any software team, IoT's project team are integrated by people from different backgrounds (engineers, software developers) and cultures so the adoption of agile techniques may not necessarily occurs in the short term. Agile requires training, behavioral change and is not adequate for all innovation types or organizations (Conforto, Salum, Amaral, da Silva, & Magnanini de Almeida, 2014). For example, public agencies and governmental organizations have been slow in adopting agile practices (Nuottila, Aaltonen, & Kujala, 2016). Also, agile methods are not recommended for system critical projects such as those related with nuclear facilities and power grids.

Technology Innovation

Most IoT developments involve new technology (*e.g.* smart homes) and even critical technologies that do not exist (*e.g.* energy grids).

Complexity

The amount of complexity is given by how complex is the product. Smart and connected products may range from discrete components (for example, a thermostat) or an array of widely dispersed collection of systems (for example, smart grid).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The Actuality of Projects

the actuality of projects covers literature that underlines the need for empirical studies of projects as its own point of departure (Svejvig & Andersen, 2015). To review this topic a retrieval of literature related with project management and IoT is analyzed.

The review aims to analyze contributions that have emerged as a result of challenges posed by IoT projects. For this reason, the key terms are based on Svejvig and Andersen (2015) review of Rethinking Project Management literature with the addition of the theme "internet of things". Considering the novelty of these topics, the search strings include "project management" and "internet of things" (Sevjvig and Andersen do not consider the term "project management" as a unique term). Also, given that some proposals may be included in digital transformation literature; both "internet of things" and "digital transformation" search strings were considered. Tables 2, 3 and 4 depict a summary of the publications search in Scopus for the last five years (2012-May 2017). The search strings included in Table 5 provided zero results.

Papers are categorized according to their type (descriptive, prescriptive, conceptual, theory, other) (Ahlemann, El Arbi, Kaiser, & Heck, 2013). Descriptive research answers the questions regarding what and how as well as Yes/No questions. Prescriptive research seeks to help people solve practical problems by developing and testing artifacts (method, model, framework, ontology, reference model, system). Conceptual papers present assumptions, premises, axioms, assertions without empirical work. A theory should fulfill three criteria: (1) a theory must have clear constructs; (2) the relationships between the constructs must be defined; and (3) a theory must be testable. Finally, a category referred to as Other includes Literature analysis, editorials, reports, book reviews, and calls for papers/abstracts/participation. Table 6 depicts the result of the categorization. Only 7 contributions were classified as descriptive (empirical).

Table 2. Publications by year

Search expression (Scopus search format)	2012	2013	2014	2015	2016	2017	Total
TITLE-ABS-KEY ("digital transformation") AND TITLE-ABS-KEY ("project management")	-	-	-	-	3	-	3
TITLE-ABS-KEY ("internet of things") AND TITLE-ABS-KEY ("project management")	1	4	6	9	14	2	36
TITLE-ABS-KEY ("internet of things") AND TITLE-ABS-KEY ("conventional project management")	-	-	-	1	-	-	1

Broader Conceptualization

Broader conceptualization deals with contributions that offer alternative perspectives on, for example, projects, project management and project success, outline how the field is broadening beyond is current limits or describe the existing perspectives within the field. Prescriptive, conceptual and review categories in Table 6 may offer a broader conceptualization (36 papers). These papers refer to specific issues but none of them cover the impact of IoT in PM.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Publications by subject areas. Scopus classifies each publication in one or more subject areas

Search expression (Scopus search format)	Business, Management and Accounting	Computer Science	Engineering	Mathematics	Social Sciences	Decision Sciences	Earth and Planetary Sciences	Energy	Pharmacology, Toxicology and Pharmaceutics
TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“project management”)	1	1	1	1	1	-	-	-	-
TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“project management”)	-	23	11	10	-	4	2	1	1
TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“conventional project management”)	-	1	-	1	-	-	-	-	-

Table 4. Publications by type (Scopus classification)

Search expression (Scopus search format)	Article	Conf. review	Conf. paper	Review	Total
TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“project management”)	2	1	-	-	3
TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“project management”)	9	8	17	2	36
TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“conventional project management”)	-	-	1	-	1

Table 5. Search strings (Scopus format) separated by “;” that produced zero results

TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“rethinking project”)) ; TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“complexity theory”) AND TITLE-ABS-KEY (“project management”) ; TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“complexity theory”) AND TITLE-ABS-KEY (“project management”); TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“reinventing project”) ; TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“beyond project”); TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“conventional project management”) ; TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“project management theory”) ; TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“perspectives on projects”); TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“project management”) AND TITLE-ABS-KEY (“complexity theory”); TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“project management”) AND TITLE-ABS-KEY (“complexity theory”) ; TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“rethinking project”); TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“project management”) AND TITLE-ABS-KEY (“complexity theory”); TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“reinventing project”); TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“project management theory”); TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“perspectives on projects”

Table 6. Type of research contribution

Search expression (Scopus search format)	Descriptive (empirical)	Prescriptive	Conceptual	Review	Conf. Proc.
TITLE-ABS-KEY (“digital transformation”) AND TITLE-ABS-KEY (“project management”)	1	1	-	-	1
TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“project management”)	6	15	5	2	8
TITLE-ABS-KEY (“internet of things”) AND TITLE-ABS-KEY (“conventional project management”)	-	1	-	-	-

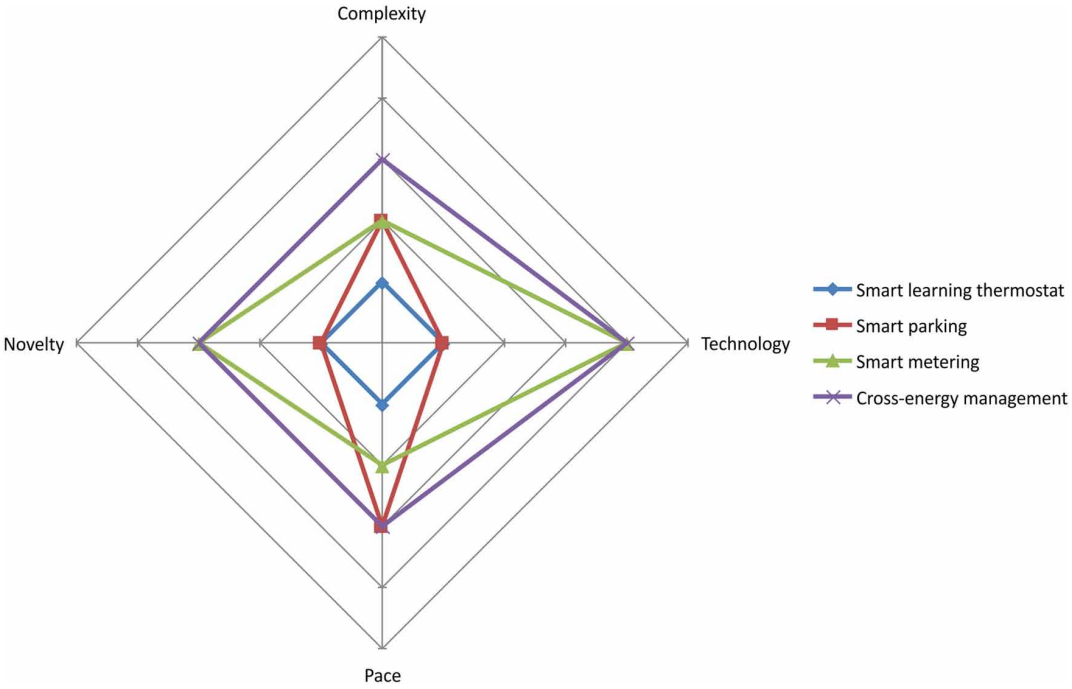
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

SOLUTIONS AND RECOMMENDATIONS

In this section, an overview of each Portfolio Project Management phase is provided with a discussion about IoT impact. The framework proposed by Bible and Bivins (2011) is used because it takes into account a strategic and portfolio management perspective. In addition, an operations and maintenance phase is considered. The assumption underlying the portfolio management project is that products are released and after-sales support requires fewer resources than those required during development. That is, the need of resources tends to decline in traditional projects. However, IoT-enabled products may require additional resources after deployment. Therefore, a solution operation and maintenance phase is included.

As mentioned earlier in this chapter, the nature of IoT projects, immersed in a dynamic environment, characterized by a rapid technological change, and part of a digital ecosystem, require looking at projects in a more strategic way. In order to support this vision, Shenhar and Dvir's "Diamond of Innovation" (Shenhar & Dvir, 2007) appears as necessary framework to classify a project and recommend a managerial style. The classification depends on the project and the organization. A project may represent a high technology level for an organization but a low level for another. For example, Shenhar and Dvir (2016) describe that the technology used in Boeing's Deamliner project represented a "next generation in an existing line of projects" for Boeing but for subcontractors, it was new. Hence, it is not possible to define a generic innovation diamond. However, for the sake of illustrative purposes, Table 7 briefly describes four projects and Figure 1 depicts the innovation diamonds for each case. The classification of projects early at this stage provides clues to a recommended style of management, activities and resources required by the project.

Figure 1. Projects classification based on the Diamond of Innovation Model



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. Brief description of illustrative projects

Smart learning thermostat. A connected thermostat that can be controlled through an Internet connection and is able to learn when each room of a house is normally occupied and automatically schedule the heating for that room appropriately.
Smart parking solution for smart cities to allow citizens to find available parking spots. Assume the solution should be available promptly.
Smart metering project aims to provide accurate, near real-time consumption information to end consumers; the potential for users to save money and reduce emissions using consumption management tools and more highly differentiated tariffs. The project is owned by the government and it is immersed in a complex ecosystem including multiple smart meter manufacturers, communication service providers, data service providers, electricity suppliers, and meter operators.
Cross-energy management project aims to build the IT architecture for energy supply optimizing multiple heterogeneous energy resources and consumers. The ecosystem is integrated by company and private consumers, electricity suppliers and grid operators.

Strategic Phase

During the strategic phase the organization establishes or revises its strategic plan, including mission, vision, goals, and objectives. This phase provides the foundation for effective PPM as the strategic plan establishes the goals and objectives to which project portfolios contribute. The organization should define the strategic importance of connected products in the context of the strategy. The IoT may contribute to define new business or to improve internal process. Also, at this stage CEOs should work on partnerships.

According to Ron Adner (Klotz, 2016), given the relevance of partnerships in a IoT development, the CEO-level should establish partner relationships for the project to be feasible. The answer to this question depends on to the extent that the project depends on collaborating in a new ways with other partners. If the answer is very much then management of co-innovations is an issue (Klotz, 2016). The transition to a successful digital enterprise requires expertise in using digital technologies such as cloud, social, mobile and analytics. In the case of smart products building software related characteristics is not usually part of the traditional product engineering process.

The partnerships concept may go further when the organization becomes part of an ecosystem. In that case, CEOs should define an ecosystem strategy that takes into account expectations, requirements, and capabilities of all the partners across the ecosystem. For each partner there should be a definition of what connected things will develop, and which information and services will deliver.

Screening Phase

The screening phase begins the process of soliciting proposals for potential projects with a reasonable expectation of contributing to goals and objectives. Potential projects that support strategic goals and objectives and seem to be feasible are included in the list of candidate projects that will be evaluated during the selection phase (Bible & Bivins, 2011). In a portfolio approach to project management, projects that are already in progress will be assessed as well to determine whether they continue or should be postponed or cancelled. Also, mandatory projects that arise as a government requirement are included in the pool of candidate projects. The screening phase provides the opportunity to create and analyze the business case (also known as project proposal) for each project against the criteria and assumptions.

Given the requirement of shorter development cycles, this poses restrictions to all project development phases. In particular, during selection phase when projects are prioritized, managers should derive

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a prioritized list of projects. For the case of IoT products, the window opportunity is shorter and hence they might start as soon as possible.

Screening criteria represent factors against which the pool of potential projects is evaluated to determine whether a business case is sufficient to include the project in the candidate project pool. Screening criteria and assumptions provide a scenario under which the project portfolio will be selected.

Each organization may choose the most convenient tools to develop a project specification according to the organizational available tools, expertise or preferences. However, the Business Model Canvas proposed by Osterwalder and Pigneour (2010) has proven its effectiveness on the preliminary definition of projects. It is a tool to describe the way value is created and delivered in an organization. Consisting in nine building blocks arranged in a template, the model offers a visual representation that allows a better comprehension of business and its dynamics. In the center of the template there is the value proposition which describes the products or services provided by the company to satisfy the needs of one or several customer segments. By designing different channels, the company reaches and communicates with its customers, delivering value. Customer relationships describe particular relationships the company wants to establish with their customers and the means to do so. The complete interaction between these four blocks results in revenue streams which take into consideration the cash that customers generate when paying for the value that is being offered.

The Innovation Canvas (Ahmed, et al., 2014) is a framework that guides teams to develop integrated product designs and business models. There are some different templates to guide the value proposition development (Canvanizer 2.0, 2017; Willness & Bruni-Bossio, 2017). The canvas itself supports a number of design tools, methods, and approaches (Kline et al., 2013). The Innovation Canvas incorporates all the themes of the business Model Canvas in the Market quadrant. The Explore, Ideate and Design quadrants have been added to include the key themes of a meta-model of a system and are described as follows:

- **The Explore Section:** Provides a detailed description of the project goals, collect stakeholder and voice of the customer input, clarify benefits and values of a product and provide context for the project.
- **The Ideate Section:** Describes what the product will do and the external systems that the product interacts with.
- **The Design Section:** Includes a formal requirements analysis, key components or modules, critical success factors of the product, and critical risks of product failure that require special attention.
- **The Market Section:** Includes the nine constructs from the Business Model Canvas (Osterwalder & Pigneur, 2010).

Selection Phase

Each project contributes to the realization of different goals, and some projects may contribute better than others. The objective of the selection phase is to derive a portfolio of projects providing maximum benefit subject to resource constraints and other limitations imposed by the organization. The challenges in PPM selection are how to assess contribution to strategic goals, the one-time portfolio implementation costs (infrastructure, labor, services), the future operational (and maintenance) expenditures entailed (the costs that the organization will incur after closing a project), and environmental and social impacts. In what follows, there is a brief description of how different methods tackle these issues.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

There are many possible methodologies that can be used in selecting a portfolio and evaluating projects. A detailed description of methods is out of the scope of this chapter. Methodologies range from easy to use ones that require little information but fail to assess a portfolio of projects, to more sophisticated techniques which limitation may be amount of data required to generate a prioritized list of projects.

Whatever the business case definition approach used by an organization, there are some challenges that arise for IoT products. In order to define the cost structure it is necessary to calculate costs across all parties in the network. Hence, access to information and confidence among partners is required in order to calculate accurate costs. In addition, IoT-enabled connected products require a backend infrastructure that generates operating costs on an ongoing basis (Slama, Puhlmann, Morrish, & Bhatnagar, 2015).

Implementation Phase

The implementation phase transitions the approved project portfolio into execution. Projects are monitored in order to track their development (updating costs and benefits estimates to detect deviations) and re-prioritize them when strategic goals (or their target values) change or new initiatives appear.

As mentioned earlier in the chapter, smart products are dominated by shorter development cycles. Sting *et al.* (2015) address the problem of accelerating product cycles by prioritizing project delivery. The authors mention two characteristics that make optimal delivery times elusive: uncertainty (for example, they develop a new product function whose feasibility has not been established); and the workers have information about the status of their project tasks that is not observable to anyone but themselves, which many don´t share. The authors describe a management innovation at Roto Frank, a German company that produces hardware for industrial and residential window and doors. While this is not a case of IoT-enabled products the difficulties of project planning and execution referred to by authors are valid for smart product development. The management innovation is based on establishing psychological safety and encouraging cooperative behavior by emphasizing interdependence among workers. The control chart was relocated from the meeting room to each project desk where the engineer's critical tasks for every day of the week would be clearly written. In addition, engineers were asked to put up a red flag whenever a critical task was becoming late enough to affect other tasks. Management promised that anyone who raised a red card would not be criticized, and would receive help within 30 minutes. This innovation enabled the organization to react more rapidly to problems.

Evaluation Phase

Projects are monitored in order to track their development (updating costs and benefit estimates to detect deviations) and re-prioritize them when strategic goals (or their target values) change, new initiatives appear, or projects are finished. The purpose of the evaluation phase is to re-prioritize projects and decide whether to cancel, postpone, delay or add projects.

Project managers measure project performance through the triple constraints of scope, cost, and schedule and make adjustments if performance is outside of tolerances. At the same time, the organizational strategy is in constant update as new goals are set or existing goals are dismissed as a result of changes in organizational strategy. Hence, some projects may become obsolete; or newly defined goals may not be supported by any project. Also, newly defined goals may not be supported by any project. Both of these situations reveal that some projects are not creating business value and provide the basis for determining modifications during the evaluation phase. While project managers report on the indi-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

vidual performance of projects, portfolio managers, analyze the overall performance to determine areas of concern and gather information to support decision taking during the evaluation phase.

Operations and Maintenance Phase

The Close Project Phase, as described in the PMIBook is the process of finalizing all activities across all of the Project Management Process Groups to formally complete the project. The key benefit of this process is that it provides lessons learned, the formal ending of project work, and the release of organization resources to pursue new endeavors (Project Management Institute, Inc., 2008). While this process is necessary, smart products lifecycle is different and requires more resources after deployment. In the context of a software development, maintenance is required to fix defects, adapt to changes in the environment, and meet new or changed user requirements. Software cost estimation techniques are based on source lines of code as the software size input measure, due to high correlation with effort; and function points as a measure of software size by functions or modifications to functions. On the other hand, IoT relevant activities are operating the IoT platform; collecting data from the product and end-user behaviour in real time; analyze large volumes of data, and share it with other stakeholders. Costs related with these activities are not adequately estimated using software approaches. More research is required to answer the question of which are appropriate approaches and techniques to support cost calculations.

FUTURE RESEARCH DIRECTIONS

As mentioned previously in this chapter, strategy, not technology, drives digital transformation (Kane, Palmer, Phillips, Kiron, & Buckley, 2015). Also, forecasts suggest that technology will evolve, software will be cheaper an even free (*e.g.* open-source solutions). Therefore, the challenges seem to lay in having the capabilities to get value from technology. In what follows, there is a list of firm specific capabilities that can be a source of advantage, and studies that will expand both the scientific and practice-oriented foundations of these themes are encouraged:

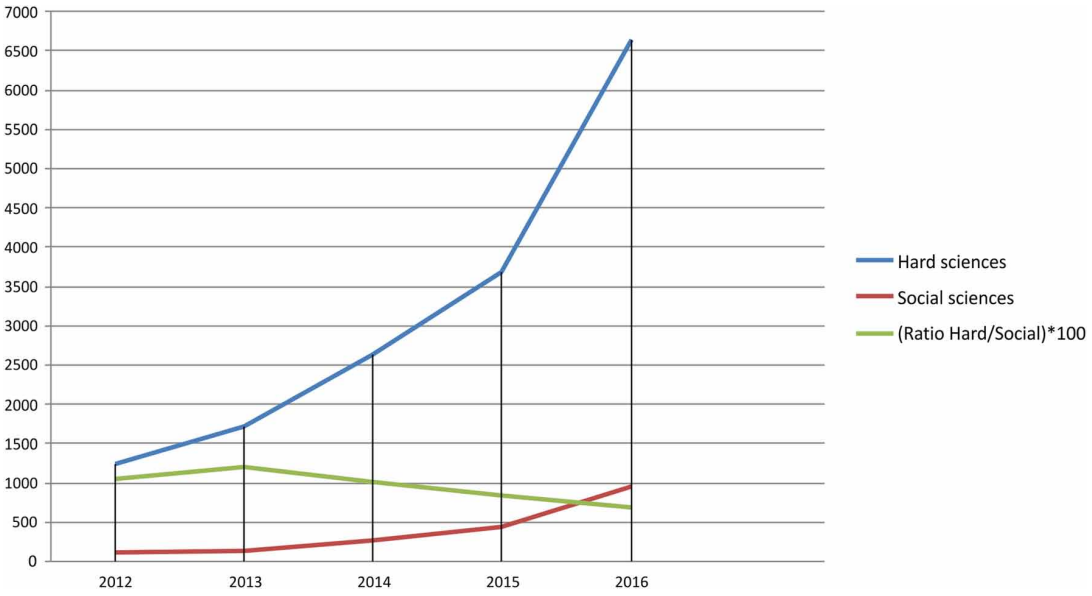
- **Leadership:** The digital transformation context requires new ways of leading. Companies need leaders who can spot a great opportunity, understand how a market is developing, think creatively and propose truly novel offerings, articulate a compelling vision, persuade people to embrace it and work hard to realize it, and deal effectively with all stake holders (Davenport, Barth, & Bean, 2012). Research on new models for understanding and practicing leadership in a complex world is suggested.
- **Collaborative Culture:** IoT developments are knowledge intensive projects, sometimes agile methodologies are used, or they involve co-production. In any of these scenarios, collaboration is a critical success factor. As summarized by Lloyd-Walker *et at.* (2014), relationships are generally enhanced and reinforced through collaborative problem-solving that increases absorptive capacity and generates new knowledge about the project context. This begs the question on how to foster collaboration among groups.
- **Partnerships:** Can be a source for new organizational learning and can enable firms to bring new strategic assets into the firm from external sources. Closely related to collaborative projects, partnership focus on external actors. Gama *et al.* (2017) considers inter-organizational technology

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

development is problematic because firms lack sufficient partner understanding and struggle with aligning their project management practices with those of their partners. The authors identify PM practices of coordination and control to fit the contingencies of each type of partner collaboration and set the stage for future research.

- **Management of a Project Network and the Management of a Business Network:** As discussed earlier in this chapter, these approaches would help to think about projects in a broader context. Examples of themes from existing literature are found in (Artto & Kujala, 2008).
- **Data Analytics:** One of the most critical resources today is the availability of qualified data scientists capable to apply statistical and data mining techniques, cooperate with the people who understand the problems and create new value from data. Data flowing to and from products provides a picture of product use, which features customers prefer and identify the reason for failure. PM should adapt to integrate these insights in their practices. Research on adequate team organization, how decisions are taken.

Figure 2. Number of articles retrieved in a Scopus search using the term "Internet of Things". Contributions are classified according to the subject area of interest (Hard and Social sciences), and the ratio series illustrates the relationship between the number of articles in each area



CONCLUSION

The rapid diffusion of IoT technology is reflected by the offering of new services, new opportunities for innovation based on usage and customer behavior data, and the emergence of disruptive business models even before any academic conceptualization. At the same time, PM has long been belatedly in adapting to a broader context. The digital transformation accentuates the need to update best practices. The literature review provides a small number of contributions on the intersection of project management and IoT (in the academic world). On the other hand, there is an increasing interest in IoT within

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

social sciences subject area. Figure 2 shows the number of retrieves articles in a Scopus search using the term "Internet of Things", including the period from 2012 to 2016. The series "Hard sciences" groups contributions in engineering and computer science areas; the series "Social sciences" includes papers in social sciences, business, management and economy. The trend of the ratio over time shows IoT topic is becoming of interest in both research areas. This observation is consistent with the fact that a common theme along the chapter was the increasing relevance of managerial and cultural aspects. This is not surprising since technology evolves much faster than an organization ability to adapt to it. Leaders need to reframe the way strategy is formulated and define the key steps to leverage the entire organization behind a well-defined vision.

REFERENCES

Ahlemann, F., El Arbi, F., Kaiser, M., & Heck, A. (2013). A process framework for theoretically grounded prescriptive research in the project management field. *International Journal of Project Management*, *31*(1), 43–56. doi:10.1016/j.ijproman.2012.03.008

Ahmed, J., Rogge, R., Kline, W., Bunch, R., Mason, T., & Wollowski, M. (2014). The innovation canvas: An instructor's guide. In *121st ASEE Annual Conference and Exposition* (pp. 1-12). Indianapolis, IN: American Society for Engineering Education.

Artto, K., & Kujala, J. (2008). Project business as a reseach field. *International Journal of Managing Projects in Busines*, *1*(4), 469–497. doi:10.1108/17538370810906219

Ashton, K. (2009). That "Internet of Things" thing. *RFID Journal*, *22*, 97–114.

Asif, M., Searcy, C., Zutshi, A., & Fisscher, O. (2013). An integrated management systems approach to corporate social responsibility. *Journal of Cleaner Production*, *56*, 7–17. doi:10.1016/j.jclepro.2011.10.034

Augusto, J., Callaghan, V., Cook, D., Kameas, A., & Satoh, I. (2013). Intellignet Environments: a manifesto. *Human-centric Computing and Information Sciences, 3*(12).

Bennis, W. (2013). Leadership in a Digital World: Embracing Transparency and Adaptive Capacity. *Management Information Systems Quarterly*, *37*(2), 635–636.

Bible, M., & Bivins, S. (2011). *Mastering Project Portfolio Management. A Systems approach to Achieving Strategic Objectives*. Fort Lauderdale, FL: J. Ross Publishing.

Brynjolfsson, E., & Mcelheran, K. (2016). The Rapid adoption of Data-Driven Decision Making. *The American Economic Review*, *106*(5), 133–139. doi:10.1257/aer.p20161016

Canvanizer 2.0. (2017). *Canvanizer*. Retrieved from https://canvanizer.com/new/open-innovation-canvas

Conforto, E., Salum, F., Amaral, D., da Silva, S., & Magnanini de Almeida, L. (2014). Can Agile Project Management be Adopted by Industries Other than Software Development? *Project Management Journal*, *45*(3), 21–34. doi:10.1002/pmj.21410

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Conti, M., Das, S., Bisdikian, M., Kumar, M., Ni, L., Passarella, A., ... Zambonelli, F. (2012). Looking ahead in pervasive computing: Challenges and opportunities in the era of cyberphysical convergence. *Pervasive and Mobile Computing*, *8*(1), 2–21. doi:10.1016/j.pmcj.2011.10.001

Davenport, T., Barth, P., & Bean, R. (2012). How "Big Data" Is Different. *MIT Sloan Management Review*, 22–24.

Dertouzos, M. (2001). Human-centered Systems. In P. Denning (Ed.), The Invisible Future (pp. 181-192). ACM Press.

El Sawy, O. (2003). The IS Core IX. The 3 Faces of IS Identity: Connection, Immersion, and Fusion. *Communications of the Association for Information Systems*, *12*, 588–598.

Freeman, R., & Reed, D. L. (1983). Stockholders and stakeholders: A new perspective on corporate governance. *California Management Review*, *25*(3), 88–106. doi:10.2307/41165018

Gama, F., Sjödin, D., & Frishammar, J. (2017). Managing interorganizational technology development: Project management practices for market- and science-based partnership. *Creativity and Innovation Management*, *26*(2), 115–127. doi:10.1111/caim.12207

Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, M. (2013). Internet of Things (IoT): A vision, architectural elements, and future directions. *Future Generation Computer Systems*, *29*(7), 1645–1660. doi:10.1016/j.future.2013.01.010

Hannan, M., & Freeman, J. (1977). The population ecology of organizations. *American Journal of Sociology*, *82*(5), 929–964. doi:10.1086/226424

Henderson, J., & Venkatraman, N. (1993). Strategic Alignment: Levering Information Technology for Transforming Organizations. *IBM Systems Journal*, *32*(1), 4–16. doi:10.1147j.382.0472

Iansiti, M., & Levien, R. (2004). *The keystone advantage: what the new dynamics of business ecosytems mean for strategy, innovation and sustainability*. Boston: Harvard BusinessSchool Press.

Iansiti, M., & Levien, R. (2004a). Strategy as ecology. *Harvard Business Review*, *82*, 68–78. PMID:15029791

Ishii, H., Kimino, K., Aljehani, M., Ohe, N., & Inoue, M. (2016). An Early Detection System for Dementia using the M2M/IoT Platform. *Procedia Computer Science*, *96*, 1332–1340. doi:10.1016/j.procs.2016.08.178

Jugdev, K., Thomas, J., & Delisle, C. (2001). Rethinking project management old truths and new insights. *Project Management*, 36-43.

Kane, G., Palmer, D., Phillips, A., Kiron, D., & Buckley, N. (2015). *Strategy, not technology, drives digital transformation*. MIT Sloan Management Review.

Karhu, K., Botero, A., Vihavainen, S., Tang, T., & Hämäläinen, M. (2011). A Digital Ecosystem for Co-Creating Business with People. *Journal of Emerging Technologies in Web Intelligence*, *3*(3), 197–205. doi:10.4304/jetwi.3.3.197-205

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kline, W., Hixson, C., Mason, T., Brackin, P., Bunch, R., & Dee, K. (2013). The Innovation Canvas - A Tool to Develop Integrated Product Designs and Business Models. In *120th ASEE Annual Conference and Exposition* (pp. 1-11). Atlanta, GA: American Society for Engineering Education.

Klotz, F. (2016, August). Navigating the Leadership Challenges of Innovation Ecosystems. *MIT SMR Frontiers*, 1-5.

Lloyd-Walker, B., Mills, A., & Walker, D. (2014). Enabling construction innovation: The roles of a no-blame culture as a collaboration behavioural driver in project alliances. *Construction Management and Economics*, *32*(3), 229–245. doi:10.1080/01446193.2014.892629

Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *The Journal of Strategic Information Systems*, *24*(3), 149–157. doi:10.1016/j.jsis.2015.08.002

Majava, J., Harkonen, J., & Haapasalo, H. (2015). The relations between stakeholders and product development drivers: Practitioners' perspectives. *International Journal of Innovation and Learning*, *17*(1), 59–78. doi:10.1504/IJIL.2015.066064

Markus, L., & Loebbecke, C. (2013). Commositized digital processes and business community platforms: New opportunities and challenges for digital business strategies. *Management Information Systems Quarterly*, *37*(2), 649–653.

McAfee, A., & Brynjolfsson, E. (2012). Big Data: The Management Revolution. *Harvard Business Review*, *10*, 60–79. PMID:23074865

Nuottila, J., Aaltonen, K., & Kujala, J. (2016). Challenges of adopting agile methods in a public organization. *International Journal of Information Systems and Project Management*, *4*(3), 65–85.

Oestreicher-Singer, G., & Zalmanson, L. (2013). Content or Community? A Digital Business Strategy for Content Providers in the Social Age. *Management Information Systems Quarterly*, *37*(2), 591–616. doi:10.25300/MISQ/2013/37.2.12

Olson, N., Nolin, J., & Nelhans, G. (2015). Semantic web, ubiquitous computing, or internet of things? A macro-analysis of scholarly publications. *The Journal of Documentation*, *71*(5), 884–916. doi:10.1108/JD-03-2013-0033

Orwat, C., Graefe, A., & Faulwasser, T. (2008). Towards pervasive computing in health care - A literature review. *BMC Medical Informatics and Decision Making*, *8*(26). PMID:18565221

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Hoboken, NJ: John Wiley & Sons, Inc.

Parker, G., Van Alstyne, M., & Choudary, S. (2016). *Platform Revolution. How networked markets are transforming the economy and how to make them work for you*. New York: W. W. Norton & Company.

Porter, M., & Heppelmann, J. (2014). How Smart, Connected Products Are Transforming Competition. *Harvard Business Review*, 4–23.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Porter, M., & Heppelmann, J. (2015). How Smart, Connected Products are Transforming Companies. *Harvard Business Review*, 1–19.

Project Management Institute, Inc. (2008). *A Guide to the Project Management body of Knowledge (PMBOK Guide)-Forth Edition*. Newtown Square, PA: PMI Publications.

Reim, W., Parida, V., & Örtqvist, D. (2015). Product-Service Systems (PSS) business models and tactics - a systematic literature review. *Journal of Cleaner Production*, *97*, 61–75. doi:10.1016/j.jclepro.2014.07.003

Ross, J., Sebastian, I., & Beath, C. (2016). How to Develop a Great Digital Strategy. *MIT Sloan Management Review*.

Shenhar, A., & Dvir, D. (2007). *Reinventing project management: The diamond approach to successful growth and innovation*. Boston: Harvard Business Press.

Shenhar, A., Holzman, V., Melaned, B., & Zhao, Y. (2016). The Challenge of Innovation in Highly Complex Projects: What Can We Learn from Boeing's Dreamliner Experience? *Project Management Journal*, *47*(2), 62–78. doi:10.1002/pmj.21579

Shirky, C. (2008). *Here Comes Everybody: How Change Happens when People Come together*. London: Penguin Books.

Slama, D., Puhlmann, F., Morrish, J., & Bhatnagar, R. (2015). *Enterprise IoT*. O'Reilly Media, Inc.

Stacey, R. (1995). The science of compelxity: An alternative perspective for strategic change processes. *Strategic Management Journal*, *16*(6), 477–495. doi:10.1002mj.4250160606

Sting, F., Loch, C., & Stempfhuber, D. (2015). Accelerating Projects by Encouraging Help. *MIT Sloan Management Review*, 5–13.

Svejvig, P., & Andersen, P. (2015). Rethinking project management: A structured literature review with a critical look at the brave new world. *International Journal of Project Management*, *33*(2), 278–290. doi:10.1016/j.ijproman.2014.06.004

Tanoto, Y., & Setiabudi, D. (2016). Development of autonomous demand response system for electric load management. In *2016 Asian Conference on Energy, Power and Transportation Electrification, ACEPT 2016* (pp. 1-6). Marina Bay Sands: IEEE. 10.1109/ACEPT.2016.7811532

Teece, D. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, *28*(13), 1319–1350. doi:10.1002mj.640

Van Alstyne, M., Parker, G., & Choudary, P. (2016, April). Pipelines, Platforms, and the New Rules of Strategy. *Harvard Business Review*, 54-60, 62.

Wang, W., He, Z., Huang, D., & Zhang, X. (2014). Research on Service Platform of Internet of Things for Smart City. In J. Jiang, & H. Zhang (Ed.), *ISPRS Technical Commission IV Symposium. XL-4* (pp. 301-303). Suzhou: Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci. 10.5194/isprsarchives-XL-4-301-2014

Weill, P., & Woerner, S. (2015). Thriving in an increasingly digital ecosystem. *MIT Sloan Management Review*, *56*(4), 27–34.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Weiser, M. (1991). The computer for the twenty-first century. *Scientific American*, *290*, 46–55.

Willness, C., & Bruni-Bossio, V. (2017). The curriculum innovation canvas: A design thinking framework for the engaged educational entrepreneur. *Journal of Higher Education Outreach & Engagement*, *21*(1), 134–164.

Winter, M., Smith, C., Morris, P., & Cicmil, S. (2006). Directions for future research in project management: The main findings of UK government-funded research network. *International Journal of Project Management*, *24*(8), 638–649. doi:10.1016/j.ijproman.2006.08.009

Woo, C., Jung, J., Euitack, J., Lee, J., Kwon, J., & Kim, D. (2016). Internet of Things Platform and Services for Connected Cars. In M. Ramachandran, G. Wills, R. Walters, V. Mendez Muñoz, & V. Chang (Ed.), *Proceedings of the International Conference on Internet of Things and Big Data* (pp. 469-478). Rome: Science and Technology Publications, Lda. 10.5220/0005952904690478

KEY TERMS AND DEFINITIONS

Collaborative Culture: It is teamwork based on trust, communication, and a shared vision or purpose.

Competitive Advantage: Competitive advantage results from a firm's ability to perform the required activities at a collectively lower cost than rivals, or perform some activities in unique ways that create buyer value.

Data Analytics: A process that uses quantitative and qualitative techniques to uncover knowledge from raw data with the aim of generating value.

Diamond of Innovation: A framework for project classification based on novelty of the product, extent of new technology to the organization used by the project, complexity of the product, and project urgency.

Digital Ecosystem: An ecosystem is composed of consumers, producers, and competitors, and as a result of their interactions over a platform driven by the ecosystem leader, innovations (planned or not anticipated) emerge.

Digital Transformation: A digitization resulting from the combination of mobile, cloud computing, social, big data, and internet of things technologies with impact on organizations and society.

Management of a Business Network: The management of network including several firms, where the firms engage from time to time in mutual projects.

Management of a Project Network: The management of a network including several firms that are participating in a project.

Portfolio Project Management: The belief that family is central to wellbeing and that family members and family issues taking precedence over other aspects of life.

Product-as-a-Service Business Model: Product-as-a-service blends physical products, accompanying services, and monitoring software where the buyer may no longer own a physical thing.

This research was previously published in Smart Grid Analytics for Sustainability and Urbanization; pages 73-102, copyright year 2018 by Engineering Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 25
Graph Tools for Social Network Analysis

Nadeem Akhtar
Aligarh Muslim University, India

Mohd Vasim Ahamad
Aligarh Muslim University, India

ABSTRACT

A social network can be defined as a complex graph, which is a collection of nodes connected via edges. Nodes represent individual actors or people in the network, whereas edges define relationships among those actors. Most popular social networks are Facebook, Twitter, and Google+. To analyze these social networks, one needs specialized tools for analysis. This chapter presents a comparative study of such tools based on the general graph aspects as well as the social network mining aspects. While considering the general graph aspects, this chapter presents a comparative study of four social network analysis tools—NetworkX, Gephi, Pajek, and IGraph—based on the platform, execution time, graph types, algorithm complexity, input file format, and graph features. On the basis of the social network mining aspects, the chapter provides a comparative study on five specialized tools—Weka, NetMiner 4, RapidMiner, KNIME, and R—with respect to the supported mining tasks, main functionality, acceptable input formats, output formats, and platform used.

1. INTRODUCTION

In present era, social networks are the fastest growing applications over the web. It has become the main interaction medium among people around the world. A social network can be considered as a graph having nodes and edges, where nodes represents actor or people and edges connect actors in communication (Alan Mislove, 2007). Social networks and the techniques to analyze them existed since decades (Carrington, 2011). In earlier decades, social networks are analyzed to understand the behavior and evolution of human networks (J. Scott., 1994; S. Wasserman, 1994). A social network can be an email network, a telephone network or a collaborative network. But nowadays, most popular and most visited social

DOI: 10.4018/978-1-7998-7297-9.ch025

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

networks are Facebook, Twitter, LinkedIn, Myspace and Google+ which have acquired huge number of users. Facebook is said to have about 1.71 billion monthly active users, as of second quarter of 2016.

The structure of social networks and their analysis has evolved from graph theory, statistics and sociology. Social network analysis is used in several other fields like information science, business application, communication, economy etc. Since, social network mimics the structure of graphs, analyzing a social network is quite similar to the analysis of a graph. There are a number of tools for graph analysis that are in existence from decades. But they are not able to analyze a social network graph because of its huge size and complex properties. It may contain millions of nodes and edges. Social networks are dynamic i.e. there is continuous evolution and expansion. In a social network, a node or actor usually has several attributes. There can be small and large communities within social networks. Because of the complex structure and very large size of the social networks, old graph analysis tools are not designed to analyze social networks.

In this chapter, we present a comparative study of such tools based on the general graph aspects as well as the social network mining aspect. While considering the general graph aspects, we present the comparative study of some social network analysis tools based on the platform, execution time, Graph types, algorithm complexity, input file format, graph features. Under the social network mining aspect, we are dedicated to provide a comparison study of some specialized tools with respect to the supported mining tasks, main functionality, acceptable input formats, output formats, and platform used.

2. SOCIAL NETWORK ANALYSIS

The internet has revolutionized the sharing of information through number of information sharing systems, including the Web. As of July 2015, number of internet users are 3.17 billion. Out of them, 2.3 billion users are active on social media having an average of 5.54 social media accounts. As of April 2016, Instagram has over 400 million users, and LinkedIn has over 450 million users. Facebook is said to have about 1.71 billion monthly active users, as of second quarter of 2016. These numbers significantly shows how popular social networks are.

Social network analysis (SNA) is the methodical analysis of social networks through the use of network structure and graph theories. Social network analysis views social relationships in terms of network theory, consisting of nodes (representing individual actors within the network) and ties (which represent relationships between the individuals, such as friendship, kinship, organizational position, social relationships, etc.) (Monclar, 2011).

Analysis tasks of social networks includes following:

- Discovering the structure of social network
- Finding various attribute values for the network- Ex. radius, diameter, centrality, betweenness, shortest paths, density etc.
- Finding communities in the social network
- Visualizing the whole or part of the social network

Several works has been done on various social networks to analyze and discover various kinds of relationships and information (N. Akhtar, 2013; Zelenkauskaite, 2012; Li, 2010; Alan E. Mislove, 2009).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2.1 Kinds of Network Analysis

There are two basic kinds of social network analysis, ego network analysis, and complete network analysis. Ego network analysis is concerned with analysis of individual nodes. A network can have as many egos as nodes in the graph. Egos can be persons, organizations or whole society. In ego network analysis, individual behavior and its variation is mined and described. Complete network analysis is concerned with the analysis of all the relationships among a set of nodes. Techniques such as subgroup analysis, equivalence analysis and measures like centrality (closeness, degree, and betweenness) all require complete networks (NextMEDIA, 2010).

2.2 Applications of Social Network Analysis

Following are some applications of social network analysis: (BASNA, 2013; INSNA, 2016)

- Identify new scientific trends becoming commercially viable, e.g. RFID, Genome sequencing, tissue engineering.
- Analyze expert network, Co-authorship networks, cocitation networks, patent networks.
- Measurement of success.
- Ranking of trends, of authors, of companies commercializing trend.
- Analyzing page importance Page Rank (Related to recursive in-degree computation), Authorities/ Hubs.
- Discovering Communities: Finding near-cliques.
- Analyzing Trust: Propagating Trust.
- Using propagated trust to fight spam: In Email, In Web page ranking.

3. SOCIAL NETWORK ANALYSIS TOOLS

Social network analysis tools are used to identify, analyze, visualize or simulate nodes (organizations, or knowledge) and edges (relationship or interaction) from various types of input data including mathematical models of social networks. There are several tools available for analysis of social networks. The International Network for Social Network Analysis (INSNA) maintains a large list of software packages and libraries.

We have selected four analysis tools for comparison namely Gephi, Networkx, IGraph and Pajek. The selection is based on several facts. All four selected software are freely available for use and they can handle large graph size. Network analysis tools are either GUI based or packages/libraries which can be used in a programming language. Gephi and Pajek are GUI based network tools whereas Networkx and IGraph are packages based tools. Following are the brief detail about each of these four tools-

- **Networkx:** Is a Python language software package for the creation, manipulation and the study of structure and functions of the complex networks. With this tool you can load and store networks in standard data formats, can generate many types of random and classic networks, analyze network structure, build network models, draw networks, and much more. Networkx has many features like language data structures for graphs, dIGraphs, and multIGraphs. Nodes can be "anything"

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(e.g. text, images), Edges can hold arbitrary data (e.g. weights, time-series), Standard graph algorithms, Network structure and analysis measures etc.

- **Gephi:** Is an interactive visualization and exploration platform for all kinds of networks, dynamic and hierarchical graphs. Runs on Windows, Linux and Mac OS X. Gephi are a tool for people that have to explore and understand graphs. Like Photoshop but for data, the user interacts with the representation; manipulate the structures, shapes and colors to reveal hidden properties.
- **Pajek**: A widely used Software for drawing networks, Pajek also has analytical capabilities, and can be used to compute most centrality measures, identify structural holes, blockmodel, and so on.
- **IGraph:** Is a free software package for creating and manipulating graphs. It includes implementations for classic graph theory problems like minimum spanning trees and network flow, and also implements algorithms like community structure search. The efficient implementation of IGraph allows it to handle graphs with millions of nodes and edges. IGraph can be installed as libraries for C, R, Python and Ruby. Above four tools are compared on the following six criterion- platform, Graph types, algorithm time complexity, graph layout, graph input file format, graph features
- **Dataset for SNA Tools Comparisons:** We have used Slashdot dataset (J. Scott, 1994). It contains 77317 nodes and 982787 edges (Directed). Slashdot is a technology-related news website features user-submitted and evaluated news stories about science and technology related topics.

4. SOCIAL NETWORK SOFTWARE TOOLS COMPARISON

In this section, we have compared the four selected social networking analysis tools on the basis of various criterion. Following sub-sections describes each of the selected criterion and comparison of the tools.

4.1 Comparison Based on Platform

Social network analysis tools Pajek and Gephi are standalone software, Networkx and IGraph are libraries. Pajek/gephi runs on windows platforms and Networkx use python library and IGraph use python/r/c library for social network analysis. Networkx, IGraph or Pajek can handle more than one million nodes and Gephi can handle up to 150000 nodes.

Table 1. General Comparison of Tools

Software	NETWORKX	IGRAPH	GEPHI	PAJEK
Type	Library	Library	Stand Alone	Stand Alone
Platform	Python	Python\R\C Library	Windows	Windows
Computational Time	Fast	Fast	Fast	Medium
No. Of Nodes	1 Million	1 Million	0.15 Million	1 Million

4.2 Comparison Based on Network Types

In social network Analysis there are four types of network Graph (Monclar, 2011).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In a one-mode network, each vertex can be related to each other vertex. In one mode network we have only one set of nodes and ties are connected to these nodes. In a two-mode network, vertices are divided into two sets and vertices can only be related to vertices in the other set.

Two mode network Graph are a particular type of networks with two sets of nodes and ties are only established between nodes belonging to different sets. Techniques for analyzing one-mode networks cannot always be applied to two-mode networks without modification or change of meaning. Special techniques for two-mode networks are very complicated. We can create two one-mode networks from a two-mode network

In Multi relational network there will be multiple kinds of relations between nodes. Nodes may be closely-linked in one relational network, but distant in another.

In temporal networks (dynamic graphs) networks can change over time. The lines and vertices in a temporal network should satisfy the consistency condition: if a line is active in time t then also its end-vertices are active in time t. For one mode or two mode network analysis we can use any of software tools but for multi relational network graph we have only Pajek software tools .for temporarily network graph we have Networkx and Pajek tools.

Table 2. Comparison Based on the Network Types Supported by Tools

Graph Type	NETWORKX	IGRAPH	GEPHI	PAJEK
1-Mode Network	Yes	Yes	Yes	Yes
2-Mode Network	Yes	Yes	Yes	Yes
Multi Relational Network Graph	No	No	No	Yes
Temporarily Network Graph	Yes	No	No	Yes

4.3 Comparison Based on Graph Layout

In social network analysis we have many layout algorithms. IGraph or Pajek have most famous and recent layout algorithms Fruchterman Reingold or Kamanda Kawai. All of them software have circular or spring layout. Gephi provide user friendly layout capability for user. Gephi provide capability like Photoshop where users have many additional facilities. Force layout is another famous layout algorithm given by Gephi software. For user friendly visualization we can use Gephi software but it cannot handle large or complex graphs. For large and complex network we can use either Networkx or IGraph. IGraph or Networkx provide support for many other tools for visualization. For small dataset we can use stand-alone software (Gephi, Pajek) because we can handle standalone software easily.

4.4 Comparison Based on Algorithm and Running Time Complexity

For analyzing large graphs, processing time is very critical. We compared the selected four tools on the basis of algorithmic as well as running time complexities of available features.

Table 4 shows the comparison among the four tools on the basis of algorithmic time complexities. To find the time complexities of various algorithms, we first found the algorithm for the feature and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Comparison Based on Graph Layout Supported by Tools

Layout	NETWORKX	IGRAPH	GEPHI	PAJEK
Circular Layout	Yes	Yes	Yes	Yes
Random Layout	Yes	Yes	Yes	No
Spectral Layout	Yes	No	No	No
Spring Layout	Yes	Yes	Yes	Yes
Graphviz Layout	Yes	No	No	No
Kamanda Kawai	No	Yes	Yes	No
Fruchterman Reingold	No	Yes	Yes	No
Force Atlas Layout	No	No	Yes	No

then searched for the literature associated with the algorithm. After studying the literature, we found the algorithmic complexity of the feature. We are unable to find the algorithmic complexity for some of the features. These are shown as NA (Not Available) in the Table.

Table 5 shows the comparison among the running time of listed features of graph tools. A computer with normal configuration is used for performing all the experiments. Based on algorithms running time, we can say that IGraph is more useful software compare to other. IGraph provide efficient algorithms for page rank, all types of centrality, density, MST and shortest path. Networkx is comparatively too slow for large graphs.

Table 4. Algorithmic Time Complexities

FEATURES	NETWORKX	IGRAPH	GEPHI	PAJEK
Isomorphism	$O(N^2)$	exp	Na	Na
CORE M M=No. Of Lines	O(M)	O(M)	O(M)	O(M)
Cliques	O(|V|/(Log)2)	O(3|V|/3)	Na	O(N)
Shortest Path	O(|V|.|E|)	O(|V|+|E|)	O(|V|+|E|)	O(|V|+|E|)
Clustering	O(V)	Na	O(V)	Na
All Simple Path	O(|V|+|E|)	O(|V|+|E|)	Na	Na
Closeness Centrality	O(N.|E|)	O(N.|E|)	Na	Na
Density	$O(N^3)$	O(1)	Na	Na
MST	Na	O(|V|+|E|)	Na	Na
Cycles	O((|V|+|E|).C+1)	Na	Na	Na
PageRank	Na	O(E)	O(E)	Na
Betweenness	Na	O(|V|.|E|)	Na	Na
Eigenvector	Na	O(|V|+|E|)	Na	Na

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Execution Time for Various Features

SNA FEATURES	NETWORKX	IGRAPH	GEPHI	PAJEK
Load time	54.67 sec	3.707 sec	29 sec	3 sec
Degree centrality	58.57 sec	6.199 sec	4 sec	2 sec
Graph degree	60.87 sec	6.22 sec	4 sec	2 sec
Page rank	120.78 sec	9.81 sec	10 sec	Na
Hits	57.23 sec	15.43 sec	8 sec	Na
Cliques	66.98 sec	9.35 sec	Na	Na
Density	58.94 sec	3.302 sec	4 sec	Na
Modularity	81.4 sec	9 sec	30 sec	6 sec
Network diameter	35 sec	3.51 sec	120 sec	Na
Core	65.84 sec	6.532 sec	Na	1 sec
Cohesion	Na	8.943 sec	Na	Na
Clustering coefficient	3303.99 sec	1800 sec	1200 sec	108 sec
Hub	76.57 sec	5.831 sec	3 sec	Na
Authority	Array is to big	6.783 sec	3 sec	Na

4.5 Comparison Based on Graph Features and Input File Formats

Social network analysis tools has many algorithms for graph features. We compare these tools on the basis of availability of these graph features. We have selected only a few important graph features for comparison due to space problem. Table 6 lists these important graph features and their availability in the four graph mining tools. IGraph, Gephi and Networkx have algorithms for maximum number of features. Pajek lags in supporting several of the main graph features like flow, cohesion, clique and isomorphism.

A graph can be stored in a variety of file formats. Supporting multiple file formats allows flexibility. Table 7 summarizes the various file formats supported by the graph tools. Networkx and IGraph supports almost all the available graph file formats. Pajek supports only .Net and .Dat file formats, besides supporting its own format.

5. SOCIAL NETWORK MINING TOOLS

Recently, social networks are the fastest growing applications over the web. It has become the main interaction medium among people around the world. Easy access of social network sites such as Twitter, Facebook and LinkedIn making them more and more popular. Users are accessing social networks for news updates, trending topics information, collecting opinion of other users on some topics, connecting to a community, etc. The usage list of social networks are endless nowadays, that's why it is generating massive data which are dynamic and sometimes noisy. Due to the dynamic and noisy nature of the huge data coming from social networks, it is almost impossible to analyze it manually. Data mining is a set of techniques for extracting useful information from massive datasets coming from the social media.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 6. Various Graph Features Supported by Tools

GRAPH FEATURE	Networkx	Igraph	Gephi	Pajek
Approximation	Yes	No	No	No
Assortivity	Yes	Yes	No	No
Centrality	Yes	Yes	Yes	Yes
Network Diameter	Yes	Yes	Yes	Yes
Clustering	Yes	Yes	Yes	Yes
Flow	Yes	Yes	Yes	No
Communities	Yes	Yes	No	Yes
Cohesion	No	Yes	No	No
Block Modeling	Yes	No	Yes	No
Dendrogam	Yes	Yes	Yes	No
Clique	Yes	Yes	Yes	No
PageRank	Yes	Yes	Yes	Yes
BFS	Yes	Yes	Yes	No
DFS	Yes	Yes	Yes	No
HITS	Yes	Yes	Yes	Yes
Density	Yes	Yes	Yes	Yes
CORE	Yes	Yes	Yes	No
Isomorphism	Yes	Yes	Yes	No
Partition	No	No	Yes	No
Powerlaw	Yes	Yes	No	No
MST	Yes	Yes	Yes	No
BI PARTILE	Yes	Yes	Yes	No
BRIDGE	Yes	Yes	Yes	No
DYAD	Yes	Yes	Yes	No
HITS	Yes	No	No	Yes

The primary objective of data mining is to process huge dataset and extract meaningful, actionable information. Very huge amount of valuable and actionable information is hidden in various social networks. This valuable information can be sentiment analysis data, trust analysis data of actors in the social network, friend recommendation, actor relationship analysis data, etc. This is the primary cause which provides us opportunities to use specialized social network analysis tools to mine the above mentioned information. In social network analysis, text data is heavily involved. It is a challenging task to choose the best social network analysis tool for mining text data. Social networks also have very complex relationship among its actors and hence it is very difficult to find required relationship information such as friend recommendation from the social network.

Under the social network mining aspect, we are dedicated to provide a comparison study of five specialized tools - Weka, NetMiner, RapidMiner, KNIME and R.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. File Formats Supported By Tools

Input File Format	NETWORKX	IGRAPH	GEPHI	PAJEK
.Net Format	Yes	Yes	Yes	Yes
.Gml	Yes	Yes	Yes	No
.Graphgml	Yes	Yes	Yes	No
Edgeslist(.Txt)	Yes	Yes	No	No
Edgeslist(.Csv)	Yes	Yes	No	No
.Dot	Yes	Yes	Yes	No
.Pajek	No	Yes	No	Yes
.Dat	No	No	No	Yes
Adjacency List	Yes	Yes	No	No
.Gdf	No	No	Yes	No
Graph Db	No	Yes	Yes	No

- **Weka:** Is an open source, free data mining tool consists of machine learning algorithms for different data mining tasks. It is java based data mining tool which supports data pre-processing, classification, regression, clustering, association rules mining, and data visualization. It also includes advanced text mining features.
- **NetMiner:** Is a data mining tool for data analysis and data visualization of large network data. It analyzes the social network data interactively and provides visual representation of that data, also detects patterns and structures of social networks. NetMiner supports different social analysis tasks such as data transformation, network analysis, statistics, data visualization, etc. It is based on the Python programming language and provides following features in support to social network analysis:
  - Network analysis of more than a million of nodes in a network
  - Data visualization and interactive network analysis
  - Provides facilities for data management, etc
- **RapidMiner:** A data mining tool that is based on client-server model with the server offers its services as SaaS. It supports integrated environments for machine learning, data mining, text data mining, predictive & business analytics, recommendations, etc. It supports all steps of the data mining task and applicable in all areas like business, academic researches & training, prototyping & application development.
- **KNIME** (Konstanz Information Miner): Is another open source tool that supports all data mining steps. KNIME is based on the Eclipse platform and it can be easily integrated with Weka tool and R.
- **R:** Is an open source tool for statistical analysis as well as a programming language. The R language is widely used for developing statistical data analysis.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

5.1 Comparison Based on Functionality, Supported File Format, Language and Platform

In table 8, comparison among the five social networks mining tools is shown on the basis of functionality, input file supported, output file supported, platform, programming language and database supported, open source and community support.

Table 8 shows that Weka, RapidMiner, KNIME and R are open source and supported by windows, Linux and Mac based operating systems. NetMiner is not an open source software and supported by windows operating system only. All of the above social media mining tools supports .txt and .csv file formats in addition to other formats supported by different tools separately. Each of the above mentioned tool have database support associated with them. Weka, KNIME and R supports MySQL, Postgre SQL & Microsoft SQL whereas other tools only support SQL Server in addition to tool specific database supports. RapidMiner and R tools are best for machine learning, statistical analysis and data visualization, whereas, NetMiner can be used at its best for network analysis and data visualization. Weka, RapidMiner and R support very large number of users in comparison to NetMiner and KNIME.

5.2 Comparison Based on Different Data Mining Tasks

Table 9, shows comparisons among the above mentioned social networks mining tools on the basis of different data mining tasks.

Data mining over social media can be done by using a number of methods & machine learning algorithms and data mining. Machine learning algorithms for data mining can be categorized into supervised, unsupervised, and semi-supervised machine learning algorithms. Classification is an example of supervised machine learning approach, whereas, clustering is an example of unsupervised machine learning approach. Data mining also includes other approaches for data analysis such as association rule mining, instance based learning, and data visualization. All of the above mentioned tools supports CART and Naïve Bayes classification algorithms under supervised learning approach. In unsupervised machine learning, all of them support k-means clustering, DBSCAN and EM clustering (Except NetMiner). Weka, RapideMiner and KNIME support FP-Growth algorithm under association rule mining, whereas NetMIner and R support frequent subgraph and Apriori algorithms respectively. To visualize data, all of them support histograms, whereas RapidMiner, KNIME and R also support scatterplots.

6. TEXT MINING IN SOCIAL NETWORKS

A social network can be considered as a graph having nodes and edges, where nodes represents actor or people and edges connect actors in communication. Social networks allow users to communicate with other users in the network having different moral and social values, and different goals for generating information. Social networks can take any form such as, an email network, a telephone network or a collaborative network. But nowadays, Facebook, Twitter and LinkedIn are most popular and most visited social networks, acquiring large number of users. Facebook is said to have about 1.71 billion monthly active users, as of second quarter of 2016. The social network provides a way for communication among different users which enables them to share valuable information.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 8. Comparison based on functionality, supported file format, language & platform

	Weka	NetMiner	RapidMiner	KNIME	R
Functionality	machine learning, data pre-processing, classification, clustering, and association rule mining	Network Analysis and Visualization	machine learning, Statistical analysis, data mining, predictive analytics.	Enterprise Analytics & Reporting, Business Intelligence, Data mining	machine learning, Statistical analysis and graphics,
Input format supported	textual files (.txt, .csv) .arff, .libsvm, database table, Data from URL	.xls,.xlsx, .csv, .dl(UCINET), .net, .vec, .clu, .per (pajek), .dat(StOCNET), .gml; NMF(proprietary)	textual files (.txt, .csv) .arff, .xrff, Excel/ Spreadsheet (.xls, .xlsx), database table	textual files (.txt, .csv), database table, Data from URL	textual files (.txt, .csv), .xlsx, database table (RODBC), Online Data from Web
Output format	textual files (.txt, .csv) .arff, .libsvm, etc	.xls,.xlsx, .csv, .dl(UCINET), .net(Pajek), .dat(StOCNET), .gml; NMF(proprietary)	textual files (.txt, .csv) .arff, .xrff, Excel/ Spreadsheet (.xls, .xlsx), database table	.csv, .xls, .pmml, .xml, .arff, etc	textual files (.txt, .csv) Excel/ Spreadsheet (.xlsx), etc
Programming Language Support	Java	Python	Java	Java	C, FORTRAN, R
Platform Support	Cross Platform	Windows	Cross Platform	Linux, Windows, OS X	Windows, Linux, Mac
Database Support	MySQL Database, Postgre SQL, MSQL Server, Oracle Database	SQL Server, Oracle Database	Oracle, DB2, MSQL Server	MySQL, SQLite, Postgre SQL, Hive	SQLite, MySQL and Postgre SQL
GUI	YES (Command Line also)	YES	YES	YES	YES (Command Line also)
Community support (no of users)	~200,000 Users	NA	~200,000 Users	~ 15000 Users	~ 2 M Users
Open Source	YES	NO	YES	YES	YES

Table 9. Comparison based on data mining tasks

	Weka	NetMiner	RapidMiner	KNIME	R
Classification Algorithms	ID3, C4.5, CART	CART, Multilayer Perceptron, SVMs	ID3, C4.5, CART	ID3, CART	C4.5, CART
Bayesian Networks	Naive Bayes, full bayesian network	Naïve Bayes	Naive Bayes, full bayesian network	Naive Bayes	Naive Bayes
Instance based Learning Algorithms	kNN, LWL	kNN	kNN	kNN	LBR
Clustering	linkage-based, K-Means, EM clustering, DBSCAN, OPTICS	K-Means, GMM	linkage-based, K-Means, EM clustering, DBSCAN	linkage-based, K-Means, Fuzzy c menas, EM clustering, DBSCAN	linkage-based, AGNES, BIRCH, K-Means, EM clustering, DBSCAN
Association Rule Mining Algorithms	FP-Growth, Apriori	Frequent Subgraph	FP-Growth, Apriori	FP-Growth, Apriori	Apriori (arules)
Data visualization Techniques	histograms	NA	histograms scatterplots	histograms scatterplots	histograms scatterplots

Text mining in social networks can be considered as the process of extracting the high-quality information from text generated from social network interactions. From past few years, text mining in social networks has gained high popularity because users are sharing textual data in abundance. Textual data, generated in social networks, can be characterized by its unstructured nature. Text mining is basically the analysis of data to produce previously unknown pattern (Hearst, 1999). Generally, text mining consists of different tasks such as text pre-processing, text categorization, text clustering, concept/feature extraction, etc. Applications of text mining in social networks include Topic Modeling, Sentiment & Opinion Analysis, Recommendations, Summarization of text documents, etc.

6.1 Topic Modeling

In social networks, the amount of the text information generated every day is far away from currently available processing capacity. Topic modeling provides insights analytics in order to understand huge repository of unstructured text documents. Topic modelling employs different techniques to extract hidden topics behind textual documents shared as a part of social network communications (Youngchul Cha, 2012). Topic Modeling is used as text mining approach and can be used extracting the latent topics from a collection of text documents generated in social networks. If a document is given about a particular topic, one would expect particular words to appear in the document more or less frequently such as “lion” and “roar” will appear more often in documents about lions.

6.2 Sentiment Analysis and Opinion Mining

Sentiment analysis, sometimes also referred as opinion mining, is the collection of natural language processing and text mining approaches, to analyze the textual information from social networks. The basic aim of sentiment analysis is to determine the attitude of a user in social network towards a topic or emotional reaction to a document, interaction, or event.

6.3 Recommendations in Social Networks

Recommender system is a subclass of information retrieval and filtering system that recommends the “rating” or “preference” that a user would give to a particular topic, item or text document (Francesco Ricci, 2011). Recommendation in social networks is based on the fact that users who connected in a social network have greater possibility to share the similar interests, and can be easily influenced by the friends in that network (Pritam Gundecha, 2012). Recommender systems have become increasingly popular in a variety of areas such as research articles, search queries, social tags and recommender systems for experts, (H. Chen, 2015) & Twitter pages (Pankaj Gupta, 2013).

6.4 Automatic Text Summarization

Automatic summarization (which is a part of machine learning and text data mining) is the process of reducing a text document to create a summary automatically, that consists of the most important points of the input text document. The idea behind automatic text summarization is to extract a representative summary of the data, which contains the information of the entire set of documents.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 10 shows that, RapidMiner provides Edda (Extensions for Binominal Text Classification for Topic Modeling. The text analysis extension in RapdMiner AYLIEN extracts insight from textual data such as news articles, social comments, tweets and reviews. RecSys framework is used as recommendation extension in RapidMiner for recommendations, which consists of item rating prediction and item ranking recommendation.

In R, topicmodels and TraMineR packages are used to perform topic modeling over text documents. "topicmodels" package provides an interface to LDA (Latent Dirichlet Allocation) algorithm and Correlated Topics Models (CTM) for topic modeling. TraMineR is an R package for text data mining, which describes and visualizes the sequence data. The "sentiment" package is the most general package for sentiment analysis with machine learning in R. RTextTools is an R package for automatic text classification by using the classification algorithms: svm, slda, boosting, bagging, random forests, glmnet, decision trees, neural networks and maximum entropy. The "recomederlab" R package provides an interface to test and develop recommender algorithms. The "genericSummary" package selects sentences from a text that best describe its topic. Package 'lexRankr' is used for automatic summarization of text data.

Table 10. Comparison based on text mining tasks

	Topic Modeling	**Sentiment Analysis & Opinion Mining**	**Recommendations**	**Text Summarization**
RapidMiner	Edda - Extensions for Binominal Text Classification	AYLIEN – Text Analysis Extension	RecSys (RapidMiner Recommender Extension)	--
R	topicmodels, tm, TraMineR	twitterR, tm, sentimentR, RTextTools	recommenderlab, tm	genericSummary, tm, lexRankr

7. CONCLUSION

In this chapter, we have compared and summarized four network analysis tools Networkx, Pajek, Gephi and IGraph on the basis of their general graph features. We also compared and summarized five social network mining tools Weka, NetMiner, RapidMiner, KNIME and R on the basis of their general functionality, data mining and text mining tasks. In the following paragraphs, we summed up our conclusions:

Stand-alone software is very useful for graph Visualization (up to a maximum of few thousands of nodes), data format conversion. IGraph is fastest tools that provide most of graph features and handle large and complex network. Libraries (Networkx or IGraph) are more useful for tasks involving millions of nodes and for operations such as the union and the difference between sets of nodes or for the clustering. Stand-alone software are easy to use and easy to learn so for beginner Pajek and Gephi is suitable software. For complex dataset and research purpose we can use Networkx and IGraph software.

For one mode or two mode network analysis we can use any of software tools but for multi-relational network graph, we have only Pajek software tools. For temporarily network graph we have Networkx and Pajek tools. All of the software can handle .Net file format. But mostly data are present in .txt format. We can easily understand or handle .txt format or many websites provides data set in .txt format so we can use IGraph or Networkx software tools. We have many file format conversion software they can

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

convert .txt file format into .Net file format but these software can handle only small size file. So for large size data set we use IGraph or Networkx software tools.

IGraph provides mostly graph features and it also handle large and complex network. All of them software can compute centrality, clustering coefficient, network diameter, page rank, density. But if we want to compute some specific feature we choose different software. If we want to compute Cohesion, we can Use Networkx or IGraph tools. If we want to compute Bridge and dyad, we can use Networkx, IGraph and Pajek software tools. Gephi does not provide the facilities for dyad or bridge computation. IGraph and Pajek are faster software Tools compare to others. But Pajek does not provide all graph features. So if we want to analyse all graph features we can use IGraph software. IGraph gives fastest result to almost all graph features. Load time is minimum for Pajek software. Execution time for centrality, page rank, graph degree and cliques is minimum in IGraph software. So based on execution time IGraph is better software.

The primary objective of data mining is to process large amount of data and extract meaningful, actionable information. In social network analysis, text data is heavily involved. It is a challenging task to choose the best social network analysis tool for mining text data. Social networks also have very complex relationship among its actors and hence it is very difficult to find required relationship information such as friend recommendation from the social network. There are huge number of Social Network Mining tools available which can be used to mine social network data to extract meaningful information. Every tool has its own pros and cons. Among all tools, Weka, NetMIner 4, RapidMiner, KNIME and R are most of the desired characteristics for a fully-functional DM platform and therefore their use can be recommended for most of the DM tasks.

Weka, RapidMiner, KNIME and R are open source and supported by windows, Linux and Mac based operating systems. NetMiner is not an open source software and supported by windows operating system only. All of the above social media mining tools supports .txt and .csv file formats in addition to other formats supported by different tools separately. Each of the above mentioned tool have database support associated with them. Weka, KNIME and R supports MySQL, Postgre SQL & Microsoft SQL whereas other tools only support SQL Server in addition to tool specific database supports. RapidMiner and R tools are best for machine learning, statistical analysis and data visualization, whereas, NetMiner can be used at its best for network analysis and data visualization. Weka, RapidMiner and R support very large number of users in comparison to NetMiner and KNIME.

Weka, RapidMiner, NetMiner, KNIME and R supports CART and Naïve Bayes classification algorithms under supervised learning approach. In unsupervised machine learning, all of them support k-means clustering, DBSCAN and EM clustering (Except NetMiner). Weka, RapideMiner and KNIME support FP-Growth algorithm under association rule mining, whereas NetMIner and R support Frequent subgraph and Apriori algorithms respectively. To visualize data, all of them support histograms, whereas RapidMiner, KNIME and R also support scatterplots.

Text mining in social networks, can be considered as the process of extracting the high-quality information from text generated from social network interactions, having applications in social networks include Topic Modeling, Sentiment & Opinion Analysis, Recommendations, Summarization of text documents, etc. RapidMiner provides Edda (Extensions for Binominal Text Classification for Topic Modeling, AYLIEN extension for text analysis and RecSys framework is used as recommendation extension. In R, topicmodels and TraMineR packages are used to perform topic modeling over text documents. TraMineR is an R package for mining, describing and visualizing sequences of states or events, and more generally discrete sequence data. The "sentiment" package is the most general package for sentiment analysis with

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

machine learning in R. RTextTools is a machine learning package for automatic text classification. The "recomederlab" R package used for providing recommendations. The "genericSummary" and 'lexRankr' packages are used for automatic summarization of text data.

REFERENCES

Akhtar, Javed, & Sengar. (2013). Analysis of High Degree Nodes in a Social Network. *International Journal of Electronics, Communication and Computer Engineering, 4*(3).

Akhtar, N., Javed, H., & Sengar, G. (2013). Analysis of Facebook Social Network. *IEEE International Conference on Computational Intelligence and Computer Networks (CICN).*

Automatic Summarization. (n.d.). In *Wikipedia.* Retrieved from https://en.wikipedia.org/wiki/Automatic_summarization

Business Application of Social Network Analysis (BASNA). (2013). Retrieved from www.basna.in

Carrington, P. J., & Scott, J. (2011). Introduction. In *The Sage Handbook of Social Network Analysis*. SAGE. Retrieved from http://www.facebook.com/notes/facebook/500millionstories/409753352130

Cha, Y., & Cho, J. (2012). Social-Network Analysis Using Topic Models. *SIGIR'12*. 10.1145/2348283.2348360

Chen, Ororbia II, & Giles. (2015). *ExpertSeer: a Keyphrase Based Expert Recommender for Digital Libraries.* arXiv preprint.

Combe, D., Largeron, C., Egyed-Zsigmond, E., & Géry, M. (2010). A comparative study of social network analysis tools. *International Workshop on Web Intelligence and Virtual Enterprises, 2*.

Gephi. (n.d.). Retrieved from https://gephi.org

Gundecha, P., & Liu, H. (2012). *Mining Social Media: A Brief Introduction. In Tutorials in Operations Research*. INFORMS.

Gupta, Goel, Lin, Sharma, Wang, & Zadeh. (n.d.). WTF: The who-to-follow system at Twitter. *Proceedings of the 22nd international conference on World Wide Web*.

Hearst, M. A. (1999). Untangling text data mining. *Proc. of 37th ACL*, 3- 10.

Huisman & van duijn. (2011). *Software for social network analysis*. 2004 Graph and Network Analysis Dr. Derek Greene Clique Research Cluster. University College Dublin.

IGraph. (n.d.). Retrieved from IGraph.sourceforge.net

International Network of Social Network Analysis (INSNA). (n.d.). Retrieved from www.insna.org

J. Scott. (1994). *Social Network Analysis: A handbook*. Newbury Park, CA: Sage Publications.

Li, J., Chen, Y., & Lin, Y. (2010). Research on traffic layout based on social network analysis. *Education Technology and Computer (ICETC), 2010 2nd International Conference on*. IEEE.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Measurement and Analysis of Online Social Networks by Alan Mislove. (2007). Max Planck Institute for Software Systems.

Monclar, R. S. (2011). Using social networks analysis for collaboration and team formation identification. *Computer Supported Cooperative Work in Design (CSCWD), 2011 15th International Conference on*. IEEE. 10.1109/CSCWD.2011.5960128

NetMiner. (n.d.). Retrieved from http://www.netminer.com/

Networkx. (n.d.). Retrieved from http://Networkx.lanl.gov/index.html

Pajek. (n.d.). Retrieved from vlado.fmf.uni-lj.si/pub/networks/pajek

Ricci, F., Rokach, L., & Shapira, B. (2011). *Introduction. In Recommender Systems Handbook* (pp. 1–35). Springer.

Sentiment Analysis. (n.d.). In *Wikipedia.* Retrieved from https://en.wikipedia.org/wiki/Sentiment_analysis

Stavrianou, Andritsos, & Nicoloyannis. (2007). Overview and Semantic Issues of Text Mining. *SIGMOD Record, 36*(3).

Topic Model. (n.d.). In *Wikipedia.* Retrieved from https://en.wikipedia.org/wiki/Topic_model

Wasserman, S., & Faust, K. (1994). *Social Network Analysis*. Cambridge University Press. doi:10.1017/CBO9780511815478

Zelenkauskaite, A. (2012). Interconnectedness of complex systems of internet of things through social network analysis for disaster management. *Intelligent Networking and Collaborative Systems (INCoS), 2012 4th International Conference on*. IEEE. 10.1109/iNCoS.2012.25

This research was previously published in Graph Theoretic Approaches for Analyzing Large-Scale Social Networks; pages 18-33, copyright year 2018 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 26
Impact of Evaluating the Usability of Assisted Technology Oriented by Protocol

Ana Carolina Oliveira Lima
University of Aveiro, Portugal

Maria de Fatima Queiroz Vieira
Federal University of Campina Grande, Brazil

Ana Isabel Martins
Institute of Electronics and Informatics Engineering of Aveiro, Portugal

Nelson Pacheco Rocha
https://orcid.org/0000-0003-3801-7249
University of Aveiro, Portugal

Joana Catarina Mendes
Instituto de Telecomunicações Campus Universitário de Santiago, Portugal

Ronaldo da Silva Ferreira
https://orcid.org/0000-0002-1966-8081
Universidade de Aveiro, Portugal

ABSTRACT

The main objective of this research is to provide a procedure set, oriented by a clear and rigorous protocol that allows the replication of results regarding the accessibility claims of products and systems available for the blind community, thus validating their robustness. The goal during the experiment was to compare user preferences and effectiveness when performing tasks with the voice synthesizers JAWS and DOSVOX and a braille keyboard. The adopted evaluation protocol includes the following methods: usability testing, focus group, and user satisfaction survey. The study developed with the proposed protocol investigates assistive technology adequacy to target users. The tasks performed by 30 users were categorized as activities of entertainment, learning, and social inclusion. It is considered that the main contribution of this chapter is to provide the protocol and methodology, adapted for use in evaluations of accessibility products and devices.

DOI: 10.4018/978-1-7998-7297-9.ch026

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Accessibility has become a major concern of computer system developers. However, unlike its counterpart usability, there is no established protocol that can be used to evaluate the quality of products and systems developed for particular users or communities.

For many interactive software systems, a large part of the interaction between user and technology depends on the use of visually presented material (ISO, 2008). In particular, the individuals typically use the keyboard, mouse, or other pointing devices to provide information and various screen types as output devices. On the other hand, blind or visually impaired users employ their auditory and tactile senses as visual sense. In this case, the typical non-visual forms of interface used in interactive software are auditory or tactile (Sodnik, Grega & Tomazic, 2011). Screen readers, the software tool most commonly used by visually impaired users, are based on speech synthesizers that read the contents of the computer screen using synthesized artificial speech (Chen & Raman, 2008).

Although the scientific literature presents several studies evaluating the accessibility and usability of assistive technologies for blind people (e.g. (Sanchez & Hassler, 2017; Pascual, Ribera, Granollers & Coiduras, 2014; Ferreira, Silveira, Capra & Ferreira, 2012)), a general experimental protocol able to be instantiated for the evaluation of different devices and systems is still lacking. Targeting to overcome this issue, the present chapter presents an experimental protocol that provides a script with procedures that is aided by documents that guide the evaluator during experiments planning and conduct.

Successfully designing universally accessible interfaces requires technical and cultural changes and strategic commitment: Usability and accessibility must be an objective of system development (Queirós, Silva, Alvarelhão, Rocha & Teixeira, 2015).

In a general way, there are some examples of how Human Computer Interaction has been shaping the new demands of market, social, economic and user specificities, which is very clear in several studies (Smith-jacksonb & Hartsona, 2009; Jokinen, 2015; Findlater & McGrenere, 2010).

In terms of accessibility: software should be as accessible as possible so that it can be used by as many individuals as possible, including people with physical, mental or sensory disabilities.

Some people cannot see clearly or distinguish certain colors, and some cannot operate a normal keyboard or mouse. Access to sites of the future by people with physical disabilities requires new forms of interaction based on the use of, for example, voice.

Software should be inclusive and universal, so it favors not only the disabled people, as well as all others, whether they have a limitation or not.

The evaluation of usability applied to the universal project brings impacts in different areas, among which are:

- Multicultural interfaces: these are factors to be analyzed in the new conceptions of interfaces. Creating a solution that is usable by people in many different countries and cultures is a great challenge. The reader should be led to understand that creating a version for a specific group of users based on language or location could be important, just as colors and icons have different representations for different cultures (Miah, 2004).
- Multiplatform software: which is a technological challenge for programmers to adapt their software to be used by different software platforms. It is noted that in many cases, the newly developed software needs to run on several platforms and integrate with each one of them. The main problem

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

with cross-platform software is consistency and lack of interoperability (Dias, Martins, Queirós & Rocha, 2018).

- Multimedia Interfaces: graphics and text are not the only ways to provide information, it is currently possible to use sound and, in some cases, tactile feedback to convey information. The issue of discussion is how use these output devices to produce a good quality user interface in the future (Sangiorg, 2014).

Originally designed to evaluate the interactive products and systems usability, this protocol was adapted to evaluate the usability level of accessibility resources available to the visually impaired, thus evaluating the accessibility level from the utilitarian point of view. Help resources can consist of specific systems and components designed to increase accessibility levels, such as hardware, software, or input / output devices. The protocol was conceived, formalized and adopted over the years in research and products usability evaluation in the Laboratory of Human Machine Interfaces (LIHM) of the Federal University of Campina Grande (UFCG) (Aguiar & Vieira, 2009), (Lima, Vieira & Aguiar, 2010).

The suitability of the adapted protocol to evaluate screen readers accessibility level and Braille keyboard, when used by blind and visually impaired people, was validated. Moreover, factors that can lead to a prediction of the impact a certain assistive technology can have on the target population were also analyzed.

BACKGROUND

Ideally, the usability evaluation should be present at all stages of development, and should be iterative, allowing a continuous evolution of the product quality. The literature describes several methods and tools to ensure the usability of a product or service.

The evaluation can be done in the laboratory, but since the context of use is very important, whenever possible it should be carried out under real conditions of use (Simes-Marques & Nunes, 2012).

Some methods use user data, while others rely on usability experts. There are usability assessment techniques for all phases of design and development, from product definition to the latest changes in the final product (Hanington & Martin, 2012). Many of the methods and techniques are suitable for a specific developmental stage (Simes-Marques & Nunes, 2012).

Usability evaluation methods can be analytical (based on expert analysis of an interactive system and / or potential interactions) or empirical (based on actual user data). Usability evaluation methods are usually specified in a rather incomplete way, which makes it difficult to apply them consistently. For this reason, the usability assessment can be expected to involve a combination of several methods that, together, can contribute to the understanding of potential users (Hanington & Martin, 2012).

The usability assessment methods mainly used are test methods, inquiry and inspection.

Test methods are user-centered methods that involve observation while the user performs tasks with a particular product or service (Nielsen, 1993). Usability testing methods aim at observing and measuring the interaction of the user with the interface and consist of collecting mostly quantitative data (Afonso, Lima, & Cota, 2013). These methods focus on people and their tasks and look for empirical evidence on how to improve the usability of an interface (Hanington & Martin, 2012). Testing usability usually involves systematic observation under controlled conditions to determine how well participants can use the product or service. The focus of usability testing focuses on what the user does, rather than on what

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the user says, and therefore the focus is on the behavior (Mitchell, 2007). Within the test methods, the most frequently used techniques are: rapid prototyping, performance evaluation, observation, think-aloud, remote usability testing and simulation (Martins, Queirós, Silva & Rocha, 2014).

Moreover, inspection methods involve the participation of experts to evaluate the different aspects of user interaction with a given product or service. The inspection methods are mainly based on heuristic evaluation technique, cognitive walkthrough techniques and task analysis (Martins, Queirós, Silva & Rocha, 2015).

Finally, inquiry methods involve the collection of qualitative user data. Although the data collected is subjective, it provides valuable insight about what users want. The questionnaires are the most frequent of the inquiry methods, followed by the interview focus group and diary study methods (Martins et al., 2015).

To optimize the usability assessment, the use of a combination of methods is a common practice, especially a combination of test and inquiry methods (Martins, Queirós, Silva & Rocha, 2016). Usability evaluation is a complex task even when it comes to assessing the usability of relatively simple systems. Given the complexity of new assistive products and services it is clear that the use of only one method may not be sufficiently comprehensive to thoroughly assess all relevant issues associated with a given product or service.

The combination of methods allows a comprehensive assessment of the various characteristics of a product or service. Hanington & Martin (2012) suggest that the combination of various methods for usability assessment is required because the specifications of the different methods is too incomplete to allow for a consistent and systematic use. In addition, the various methods have different capabilities and limitations, and provide information of different types, so their combination is very important (Hanington & Martin, 2012).

Concerning the evaluation of usability and accessibility features, few studies have been found mentioning the adoption of a protocol during the evaluation of devices usability and of resources for accessibility.

The research cited in (Sanchez & Hassler, 2017) reports an evaluation of speech synthesizers. However, these assessments were qualitative in nature, e.g. based on user opinion and focused exclusively on screen readers and speech synthesizers used to access Internet sites. The evaluation experiments cited did not mention the support of an experimental protocol and were limited to a small number of participants. Samples of users with fewer than ten participants were not significant to support the reported inferences. In addition, the mechanisms used for data collection and analysis were only superficially addressed. In the researched literature, few reports of usability tests applied to evaluate the accessibility of devices for visually impaired users were found. Here follows a brief presentation of the relevant work found on this subject.

Pascual et al., (2014) evaluate the mood of disabled users while interacting with two websites with parallel content, but opposite accessibility characteristics (A-website, an accessible website, and NA-website, a non-accessible website). The authors used a JAWS screen reader to do the survey. The results confirm that the A-website had better results than the NA-website in terms of efficiency, effectiveness and user satisfaction.

The research described in (Ferreira et al., 2012) analyzes two observation methods involving people with totally impaired vision in order to develop a protocol with recommendations that can assist professionals in the identification of characteristics and problems, which can be solved or minimized during the interface's evaluations thus facilitating the process of system access focusing on users with totally impaired vision. The usability test was performed with fifteen participants: four blind, two with low

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

vision, three with learning disabilities, two deaf, two deaf-blind and two without any type of disability. Despite its contribution, this protocol is focused on evaluating a screen reader when accessing the Internet and is not comprehensive enough to be used in the evaluation of other resource types. The need of specific participants during the tests (such as human assistants to act as interpreters) is not mentioned.

In (Sánchez & Hassler, 2017), a protocol to evaluate the usability of AUDIOMUD, a virtual reality software game for blind users, is described. The game goal is to place the player in the human body in order to cure diseases, based on the listed symptoms, changing the conditions to which the body is subjected. The interaction with this virtual environment is based on a text reader (synthesizer) that guides the player along the navigation allowing interactions with other players, through a system of chat.

It is important to note that in most of the cited publications the experiments were designed to evaluate a specific device or help resource designed to improve the accessibility of web browsing activity.

Gahlawat and co-workers (Gahlawat, Malik & Bansal, 2014) discuss an approach to develop a natural sound speech synthesizer. Five parameters (naturalness, intelligibility, usability, localization awareness and expressions) were considered for analysis of the speech synthesizer (Gahlawat et al., 2014).

From the review, it was clear that in rare cases where an experimental protocol is described, this is too shallow to answer the questions raised regarding the conditions under which the tests were performed. In addition, the sample size was too small to support the conclusions drawn. Hence the need to propose an experimental protocol to support the evaluation of usability devices and systems designed to support the accessibility, as well as the accessibility level achieved. Therefore, the authors adopted an experimental protocol was adopted to provide a set of procedures and related documents to guide the evaluator during experiments planning and conduction.

MATERIALS AND METHODS

The experiment consisted in evaluating the usability of three accessibility aid features: a Braille keyboard and two voice synthesizers (DOSVOX and JAWS) for blind users. DOSVOX software was developed for Portuguese language and is available for free for blind people. The software tools evaluated were: text editor, screen reader and e-mail. JAWS is marketed by Freedom Scientific and the features tested were the screen reader and the internet browser. The version chosen for tests was the most recent one at the time of the test preparation (version 4.1), with a platform developed for DOS environment instead of Windows. The JAWS version was 12.0, also the latest available at the time. JAWS and DOSVOX, as well as the Braille keyboard, were chosen because of their popularity amongst users of the Institute for Blind People.

An experimental usability protocol consists of a set of interrelated steps, processes and activities to guide an evaluation team during the phases: planning, conducting, collecting data, analyzing and reporting the results. These steps are presented in (Aguiar & Vieira, 2009). The adapted protocol supported the planning and evaluation phases of usability assessment experiences during which people with visual impairment performed tasks to demonstrate the suitability of specific accessibility features. As the protocol proposed by (Aguiar & Vieira, 2009) has a comprehensive and modular structure, the adaptation required to accommodate the usability assessment of the accessibility of systems and devices resulted in small changes in the steps and processes, without changes in the structure. Its application is to verify that a visual support, under evaluation, conforms to an adequate technical standard of accessibility. The adequacy requirements are presented in (Lima et al., 2010) and (Lima et al., 2018).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Inference of the User's Help Towards Performance and Motivation Levels

The protocol used during the experiment, aimed to investigate the hypothesis that the users' performance and motivation level can be affected by the particular usability tool used to perform a certain task. In order to achieve this goal, the protocol included activities that can be classified in the categories learning, leisure and social inclusion.

Before starting the activities, users were asked to express their preferences by choosing the keyboard type (Braille or conventional keyboard) and the desired media on which they wanted to read the script describing the tasks (Ledor, JAWS or DOSVOX system or printed Braille). Likewise, users had different possibilities to answer the questions at the end of each task: writing in Braille, typing on the keyboard, or having their voice responses recorded. The tasks to be performed consisted of:

- **Task 1 (task category: learning):** The user alone or, when needed, with the help of a team member expert, was asked to read and understand a predefined text using speech synthesizer support. The user had to choose between three texts, in different themes (1- World Cup, 2- Brazilian dance festival and 3- explanations on how to apply for jobs in the public sector). After reading, the user was asked to answer related questions.
- **Task 2 (task category: fun, entertainment):** The user alone or, when needed, with the help of a team member expert, was asked (i) to access a news site, (ii) to elect and read news and (iii) to highlight (orally or in writing) the aspects considered most relevant and interesting.
- **Task 3 (task category: social inclusion):** The user alone or, when needed, with the help of a team member expert, was requested to access a specific financial website (http://www.caixa.gov.br), which is the financial agent from the Brazilian government's program that offers loans to low-income families to buy houses, and to simulate the application for a loan, filling out the necessary forms.

User Group Recruitment

Recruitment of participants (users) was carried out through interviews based on the profile of the individuals and their availability and interest in participating in the research; the selected user group consisted of thirty-two people that perceived the relevance and potential impact the tool to be tested would have on their community. The group of participants consisted of 30 individuals, aged between 18 and 60, both genders, with blindness or acquired blindness, from a generalized background (teachers and students of a school for blind people).

This study focused on participant's computing skills and familiarity with screen readers. According to their abilities they were classified as inexperienced (rarely used computers and had poor screen reader skills), intermediate (were learning to use screen readers) and experienced (highly skilled in using screen readers and computers) users. Ten participants were identified as inexperienced, ten as intermediate and ten as experienced users of JAWS and DOSVOX screen readers; it should be noted that these resources offer similar features.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Group Performance: Testing Criteria

The groups were compared in performance using the ANOVA test with classification criteria and with the Tukey test, to evaluate the conditions of normality and homogeneity necessary for the tests validation. The system used for analysis was Minitab 15 (Minitab - 2012). The ANOVA and Tukey (Box, Hunter & Hunter, 1978; Hoaglin, Mosteller & Tukey, 2009) tests were chosen to compare the averages among the three groups of users, depending on the characteristics in the sampling universe (size and homogeneity) and the significance criterion for the two tests. In order to support this analysis, the following metrics were considered: total number of errors, time spent on the task, number of times help was requested, number of errors due to interpretation of the text, number of times participants reported difficulty understanding audio and number of incorrect actions.

Group Performance Testing

The usability test followed the steps of the experimental protocol, with preparation of materials followed by a pilot test to validate the adequacy of resources and materials directed to the data collection and analysis of variables of interest. The experiments were carried out at the Laboratory of Human Machine Interfaces (LIHM) of the Federal University of Campina Grande (UFCG), and at the Institute of blinds in Campina Grande (Brazil). Users and usability specialists followed the procedures specified in the experimental protocol, duly adapted to the specific context of working with visually impaired people.

As specified in the protocol, participants were invited to sign an agreement stating the purpose of the experiment and the rules of participation, including their right to anonymity. The right to stop participation at any time during the test was highlighted. Conditions accepted, participants were also asked to state otherwise if they agreed to the recording of video images. All participants agreed to video recording. At the beginning of the session, participants received the test script containing a description of each task to be performed. The script was available in Braille printed form and in electronic format, which could be read using a screen reader.

After introducing the participants to the test, they were asked to perform the tasks specified in the script. Inexperienced users were previously given a brief training. The participants were filmed during the test and data were pooled for further analysis.

User Satisfaction

The satisfaction of the 30 participants was evaluated by means of a quiz following the standards adopted by LIHM - WebQuest (Queiroz, 2001); the satisfaction index was calculated from the collected data using the model in (Bailey & Pearson, 1983). The quiz is composed by ten questions associating a three-level relevance indicator to each researched characteristic. The model followed by quiz was adapted from the model proposed in (Bailey & Pearson, 1983) and is described in the following paragraphs:

1. The scale used to measure the participants reactions has three levels (-1, 0 and 1), instead of the seven levels between -3 and 3 adopted by the LIHM.
2. Only one semantic scale was associated with the quiz questions, instead of the four differential semantic scale of the original model.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

3. The importance of the items was evaluated using a three point scale with values comprised between 0.1 and 1.0 and a gap of 0.5; on the other side, the original scale has seven points and the values lie between 0.1 and 1.0 with a gap of 0.15.
4. An importance index was associated with each question of the quiz, as suggested by Bailey and Pearson.

The equations of the original model by Bailey and Pearson were modified accordingly to the changes made.

Equation (1) is originally used in a scenario where each factor is characterized with four adjectives; in the current case only one adjective is used. The modified equation used in the current study is the following:

$$R_{ij} = \sum_{j=1}^{n} I_{ijk} \tag{1}$$

where R_{ij} is the reaction of a user and I_{ijk} is a numerical response of the user to the adjective k of the factor j.

Similarly, only one adjective term, instead of four, was used for Equation (2):

$$S_i = \sum_{j=1}^{n} \frac{w_{ij}}{j=1} I_{ijk} \tag{2}$$

where S_i is the survey satisfaction index and w_{ij} is the importance given to factor j by user i.

In Equation (3), the modification consisted of using the value one as the maximum level instead of the value three:

$$NS_i = \frac{S_i}{F_i} \tag{3}$$

where NS_i is the normalized satisfaction index for each user i, and F_i is the number of significant factors.

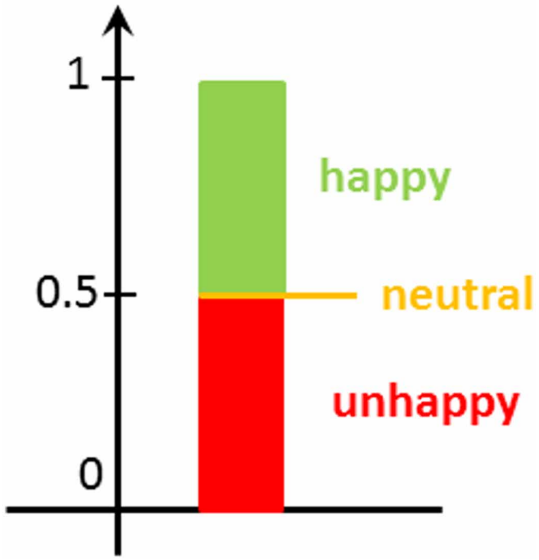
The three-point scale and the normalized satisfaction levels are depicted in Figure 1; values between 0 and 0.49 are associated with a positive response from the participant, 0.5 reflects a neutral reaction and values between 0.5 and 1 translate a negative reaction from the participant.

Focus Group

The focus group is a qualitative data collection technique involving a small number of participants in an informal discussion group, focused on a specific subject (Bevan & Bruval, 2003). A moderator introduces topics and guides the discussion. The objective is to extract perceptions, feelings, attitudes and ideas from the participants on a certain subject. This technique is often used in the design and development of new products or services (Wilkinson, 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Levels used for the satisfaction index



The usability of a tool, when assessed from the point of view of the user, includes a component that reflects the subjectivity related with the individual differences and goals of the different users. To overcome this issue, it was decided to introduce a focus group evaluation; the users were required to give their opinion about the strong and weak points of the accessibility resources and were encouraged to give suggestions for improvements. The focus group was composed by 16 individuals, 15 of them were blind and 1 was visually impaired. Only 2 out of the 16 individuals of the focus group did not participate in the usability text. The procedure that was followed is described in the following paragraphs.

At the beginning of the session, the moderator presented the goal of the discussion and encouraged the participants to identify themselves in a quick presentation. The moderator guided the discussion and motivated the participants with previously chosen topics of interest; the chosen topics were related with the issues detected during the usability tests and aimed at evaluating the ease of learning and use of the following resources: Braille keyboard and *JAWS* and *DOSVOX* screen readers. The session took place on the Instituto of the Blind in Campina Grande, taking advantage of the familiarity of the participants with the place, and lasted for two hours. The session was divided in three parts dedicated to the three accessibility resources. The discussion was organized around the following topics:

1. General opinion about the resource;
2. General feeling about the resource;
3. Suggestions for the improvements required to facilitate the interaction with a computer;
4. Description of the characteristics of an ideal resource to facilitate the interaction with a computer.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

RESULTS

Performance Indicators

In order to calculate the performance indicators, each task was considered to be performed (i) successfully, (ii) with help or (iii) incompletely; in case the task was not successfully concluded, it was considered that the participant (iv) failed to perform the task. Table 1 shows the performance indicators for the three tasks, based on the type of participant.

Table 1. Performance levels (% of participants) versus nature of tasks

Task name	Task 1 learning			Task 2 fun			Task 3 social inclusion		
	Experienced	Intermediate	Beginner	Experienced	Intermediate	Beginner	Experienced	Intermediate	Beginner
Performed successfully	0	0	13	0	0	19	0	0	40
Performed with help	36	32	0	0	0	0	0	0	0
Incomplete	0	0	0	43	0	0	0	0	0
Failed	0	0	19	9	0	29	0	0	60

Only Task 1 was finished by all the participants, and in most cases help from the evaluation team was required. These results reflect the participants' generalized lack of knowledge about the tools. On the other hand, the group of experienced users was able to complete Tasks 1, 2 and 3, although some of them with errors. The participants familiar with JAWS and DOSVOX systems were, as expected, more successful in performing the tasks, irrespectively of their nature.

Parametric Tests

In order to take into account the different backgrounds of the participants, the results of the groups were compared using parametric tests. The performance of the groups was compared using the ANOVA test, with classification criteria and the Tukey test. The normality and homogeneity conditions required for the validation of the tests were accepted. The results of the statistical test are shown in Table 2.

Regarding the number of requests for assistance and incorrect actions, the p-value obtained and used was lower than the criterion of significance adopted for the ANOVA test described in section *Group Performance: Testing Criteria*, which allowed rejection of their respective null hypothesis. Thus, Tukey's test was applied, resulting in statistically significant differences between the averages of the two groups (experienced and intermediate) and (experienced and inexperienced). Therefore, since the value zero does not belong to the confidence interval, it follows that the group of experienced users shows better performance.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Regarding incorrect actions, differences can be found between the average results of experienced and inexperienced participants with inexperienced users exhibiting better performances (section *Group Performance: Testing Criteria*). This result could be explained by considering that inexperienced users were submitted to a brief training (section *Group Performance Testing*) and being less experienced were more careful in performing their tasks, thus reducing the errors incidence.

Table 2. Results and relevance of ANOVA and Tukey tests for the adopted metrics

Metric	Average			ANOVA (p)	TUKEY
	Experienced	Intermediate	Beginner		
Total task time	14.6	14.2	14.5	0.98	
Total number of errors	2.4	4.9	3.8	0.9	
Number of help requests	0.01	4.6	4.2	0.0	Group3= Group2 (0,9 a 1,7) Group1 ≠ Group3 (3,1 a 5,8) Group1 ≠ Group2 (2,7 a 5,4)
Text interpretation error	2.9	2.9	2.4	0.08	
Difficulty to understand audio	0.2	0.9	0.9	0.05	
Number of incorrect actions	0.5	0.4	0.0	0.03	Group3= Group2 (0 a 0,8) Group1 = Group3 (0,5 a 0,3) Group1 ≠ Group2 (0,9 a 0,2)

Thus, with the presented inferences, the previous experience of participant with the resource did not interfere with the performance level of Task 1. The analysis of the usability results based on the nature of the task was performed only for the group of participants enabled in the Using the JAWS and DOS-VOX systems, since this was the only group able to perform all tasks, considering the null hypothesis for the ANOVA test.

There were no significant differences between the averages of the groups nor in the total number of errors incurred in performing Tasks 1, 2 and 3. This suggests that the number of errors is reduced when the participant is highly motivated to accomplish the task.

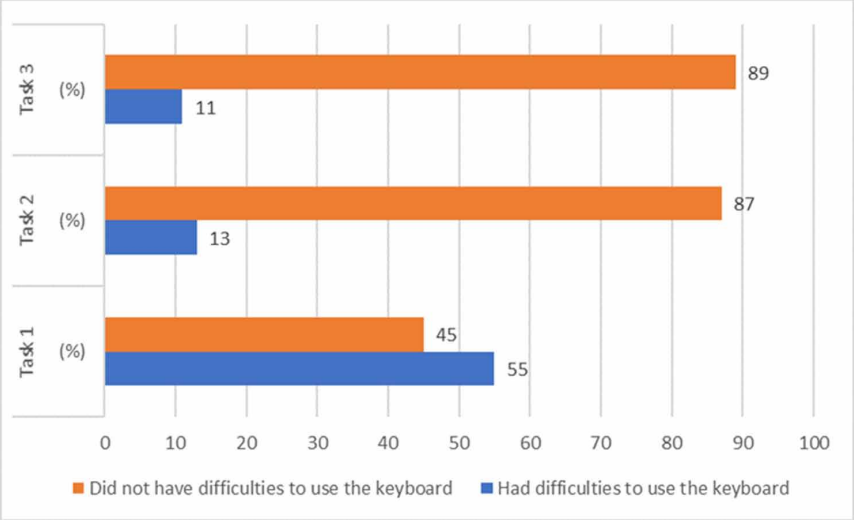
For the ANOVA test, the average of the total number of errors decreased in the following order: the highest was obtained for Task 2 ($T_2 = 7.7$) followed by Task 1 ($T_1 = 2.4$) and finally by Task 3 ($T_3 = 1,2$). The value of the significance criterion p ($p = 0.01$) was lower than the level of significance adopted for the hypothesis test, therefore, the null hypothesis was rejected. The Tukey test suggests that:

- The average of total number of errors incurred during Task 1 and Task 3 is the same, since the confidence interval does not exclude zero (-3.9 to 6.3);
- The average of total number of errors incurred during Task 3 and Task 2 is different, since the confidence interval excludes zero (1.3 to 11.6), meaning that the participants achieved a better performance during Task 3;
- The average of total number of errors identified during Task 1 and Task 2 is different because the confidence interval excludes zero (0.1 to 10.4), meaning that the participants achieved a better performance during Task 3.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The usability of Braille keyboard was evaluated considering the difficulty felt by the participant in locating characters during the evaluation test (Figure 2). As none of the participants had prior experience with the Braille keyboard, the predominant feature during the analysis was the participant's previous knowledge about Braille, rather than previous experiences with the keyboard itself. Among the 30 participants in the test, the clear majority (27 out of 30) opted for Braille.

Figure 2. Ability to use the Braille keyboard during the test



Regarding Task 1, 45% of the participants did not have any difficulties in using the Braille keyboard; on the other hand, for Task 2, only 13% of the users had difficulties in using the Braille keyboard. During this task, all participants reported some kind of difficulty in using the keyboard. Finally, the majority of participants were able to perform Task 3; thanks to the familiarity obtained during the execution of the previous tasks, the reported level of difficulty was low.

Group Performance Testing

Given the experimental protocol modularity, the changes that were made in order to adapt it to accessibility assessment consisted of small adjustments in some steps, processes and activities; these consisted mainly in planning the stages of the experiment in order to adapt the test environment to the specific needs of the group of participants.

The protocol described in section *Group Performance Testing* proved to be adequate for the purpose of supporting the usability evaluation of the accessibility resources, promoting an appropriate ethical treatment to the participants of the experiment. Given the metrics: total task time, total number of errors and errors in text interpretation due to the difficulty in understanding the audio produced by the synthesizer, the results obtained from usability point of view, indicate that previous experience with specific help resources does not directly influence the performance of the user. According to the results, it was verified that the inexperienced users, in some tasks, presented better performance than experienced

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

users, which can be explained by the introductory training session, as well as by their behavior: being less confident and therefore less experienced, these participants asked for help more often than experienced participants. This result is evidenced by the fact that only the experienced participants completed Tasks 1 and 2. It is important to mention that, despite the experience of experienced participants with computer systems and accessibility aids, difficulties were observed in the group, which prevented them from performing tasks more efficiently.

On the other hand, without the help of the evaluation team, inexperienced users would not have been able to participate in the experiment. Regarding the Braille keyboard usage, according to results, the difficulties observed in Tasks 1, 2 and 3 were higher among participants who did not know the Braille method. During the last step of the experiment, participants were encouraged to discuss their experience; at this stage the participant's educational background impact on the expectations and opinions on the accessibility aids evaluated was highlighted.

The participants incurred in some errors when performing the different tasks. According to the LIHM experimental protocol, errors can be classified as:

- **Serious:** errors that cause discomfort and seriously compromise the regular action flow, preventing the user from reaching the desired goal;
- **Moderate:** errors that cause some discomfort and force a change in the regular action flow but don't prevent the user from reaching the desired goal;
- **Light:** errors that cause some discomfort and required the user do adapt his/her actions but don't compromise him/her from reaching the desired goal.

Table 3 lists the errors incurred by the participants while performing the different tasks.

Table 3. Participant knowledge about Braille versus ability to use the Braille keyboard during the test

Task	Error type	Error name	Error description	# Occurrences
1	Serious	JAWS1	Time-out control mechanisms are missing	26
		JAWS3	Information related with interface elements is missing	28
		JAWS3	Spelling checker is missing	15
	Moderate	JAWS4	Explicit and implicit information related with commands is missing	45
2	Serious	DOSVOX1	Names of interface elements are inappropriate and don't follow the conventions of the platform	20
		DOSVOX2	"Undo" or "confirm" buttons are missing	21
	Moderate	DOSVOX3	Explicit and implicit information related with commands is missing	45
		DOSVOX4	Mechanisms that redirect the user to the error location are missing	40
	Light	DOSVOX5	Mechanisms that allow for the reduction of the number of steps required to perform a task are missing	40
		DOSVOX6	The aesthetic appearance of the interface is not minimalist	21
3	Serious	JAWS5	Alternative access to relevant audio and video tasks is missing	12

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

User Satisfaction

Table 4 lists the results of DOSVOX and JAWS user satisfaction quiz. The satisfaction indexes attributed by the users are described in Figure 1. The general satisfaction of the DOSVOX users was, for most items of the quiz, quite good. All the satisfaction indexes were higher than 0.51 with the exception of "Browsing simplicity", for which both inexperienced and experienced users revealed a neutral position (index of 0.5).

Table 4. Satisfaction indexes for DOSVOX and JAWS systems

Quiz questions	DOSVOX				JAWS			
	Experienced	Intermediate	Beginner	All	Experienced	Intermediate	Beginner	All
Ease of use	1.0	0.9	0.7	0.8	0.9	0.7	0.3	0.6
Required learning time	0.9	0.9	0.7	0.8	1.0	0.7	0.7	0.8
Initial learning difficulty	1.0	0.7	0.7	0.8	0.8	0.9	0.5	0.7
Voice quality	0.6	0.8	0.7	0.7	0.9	0.8	0.6	0.8
Help	0.9	0.9	0.8	0.9	0.9	0.7	0.8	0.7
Browsing simplicity	0.5	0.6	0.5	0.6	0.9	0.8	0.3	0.7
Arithmetic average	0.8	0.8	0.7	0.8	0.9	0.8	0.5	0.7

Relatively to JAWS system, the satisfaction indexes and the arithmetic average are, for experienced and intermediate users, much higher than 0.51 (0.9 and 0.8, respectively), revealing a generalized satisfaction with the system. However, the arithmetic average of the satisfaction indexes of inexperienced users is 0.5, revealing a neutral position. This happens because the satisfaction indexes of "Ease of use" and "Browsing simplicity" questions is lower than 0.49 (0.3 in both cases); in addition, for the question "Initial learning difficulty" the inexperienced users revealed a neutral position. Relatively to the other questions, the satisfaction of inexperienced users was also high.

Considering the arithmetic average of all the satisfaction indexes for all the users (0.8 for VOSDOX and 0.7 for JAWS), the participants evaluated both systems in a positive way.

Table 5 lists the results of Braille and conventional keyboards user satisfaction quiz. The users revealed a general satisfaction with both keyboards.

Table 5. Satisfaction indexes for Braille and conventional keyboards

Quiz questions	Braille keyboard				Conventional keyboard			
	Experienced	Intermediate	Beginner	All	Experienced	Intermediate	Beginner	All
Ease of keyboard use	0.9	1.0	0.6	0.8	0.8	0.9	0.6	0.8

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Focus Group Results

In order to analyze the data related with the opinions of the users from the institute *Instituto dos Cegos,* they were organized as teachers (T) and student (S) groups. The teachers and students group were composed by 3 and 13 individuals, respectively, of the institute. Like was mentioned in the section ***Erro! A origem da referência não foi encontrada.***, only 2 out of the 16 users had not participated in the usability test.

Table 6 summarizes the opinions (A – agree, D – disagree, and N – neutral opinion) of the participants of the teachers and students' groups regarding the different q that were arisen by each group.

Table 6. System flaws identified by the Focus Group and participants opinion; A – agree; D – disagree; N – neutral opinion

Resource	Question	Source group						
			A	D	N	A	D	N
DOSVOX	Appropriate for teaching usability resources	Teachers	3	0	0	4	0	9
	Adaptable to web browsing	Teachers	3	0	0	13	0	0
	Facilitates access to text and spreadsheet editors, graphical objects and pdf documents	Teachers	3	0	0	5	1	7
	Difficulties in web browsing	Students	3	0	0	10	0	3
	Improvements in navigation mechanisms required	Students	3	0	0	9	0	4
	Good voice quality	Students	1	2	0	11	0	2
	Accessible tutorial missing	Students	3	0	0	13	0	0
JAWS	Limited screen readers	Students	3	0	0	7	0	6
	Quality of automatic voice is not good	Teachers	3	0	0	13	0	0
	Spelling checker is missing	Teachers	3	0	0	3	0	10
	Screen readers are flexible to use	Students	0	0	3	8	0	5
	Screen readers influence the learning process of formal written language	Teachers	3	0	0	2	8	3
Braille keyboard	Facilitates learning process	Teachers	3	0	0	10	3	0
	Problem with signal standards	Students	3	0	0	5	0	8
	Useful for home and teaching/learning use but not for work environment	Teachers	3	0	0	7	6	0
	Appropriate for users with low vision	Teachers	1	0	2	0	0	13
	Easy to use	Students	3	0	0	9	4	0
	For experienced users the height of the signals is confusing when compared with the height of signals in conventional keyboards	Students	0	1	2	10	3	0

Table 7 presents the total number of users that agreed, disagreed or remained neutral relatively to the questions raised during the meeting. The data show that the opinions of both groups of participants, teachers and students, were quite similar. On the other hand, the vast majority of participants (25, 24 and 21 for DOSVOX, JAWS and Braille keyboard, respectively) that did not emit an opinion belonged

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. Participants opinion regarding the system flaws identified by the focus group

Resource	Total number of opinions	Teachers			Students		
		Agree	Disagree	Neutral	Agree	Disagree	Neutral
DOSVOX	7	19	2	0	65	1	25
JAWS	5	12	0	3	33	8	24
Braille keyboard	6	13	1	4	41	16	21

to the students group. Regarding the resource DOSVOX, most students and teachers agreed with the questions that were arisen (65 and 19, respectively); the opposite opinions totalized 2 and 1 among the teachers and the students, respectively. The tendency observed for the resource JAWS is slightly different: 33 and 12 agreeing opinions among students and teachers, respectively, against 8 opposite opinions among the teachers (no student manifested disagreement relatively to the questions that were arisen).

The general opinions of the participants relatively to the usability of each of the tested resources are summarized in the following paragraphs.

DOSVOX:

5. **Teaching of accessibility resources in teaching institutions:** The users reported that the first contact they had with screen readers was DOSVOX and that their teaching institutions stimulate the use of DOSVOX.
6. **Can be adapted for web browsing.**
7. **Should guarantee access to text and spreadsheet editors, graphical objects and pdf documents.** The users revealed dissatisfaction relatively to the limitations of DOSVOX in the reading of images and graphical objects. The suggestion of upgrading VOSDOX to read also pdf documents was not consensual because some users believed that VOSDOX already reads this type of documents while the other users believed otherwise.
8. **Difficulties in browsing the internet.** The users suggested that DOSVOX should be used to access the web sites. However, in this case the design of the websites would have to follow the accessibility standards. This, together with the graphical contents of the websites and the help of screen readers, would solve the issues of reading web content.
9. **Browsing mechanisms need to be improved.**
10. **Good voice quality.** The users consider that DOSVOX is better than JAWS relatively to the audio quality.
11. **Missing accessibility tutorial.** The DOSVOX tutorial is available online, however the Braille or audio versions are missing.

JAWS:

12. **The use of screen readers is limited.**
13. **The quality of the robotized voice is low.**
14. **Spell checkers are missing.**
15. **The screen readers are flexible.**
16. **The use of screen readers has an impact in the learning process of formal written language.**

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Braille keyboard:

17. **The use of the Braille keyboard facilitates the learning process.**
18. **Issues with the signal standards.** The users reported that the Braille tags did not match the standard keys map.
19. **Applicability of the keyboard in home, teaching or work environments.** This was another controversial question. Some users affirm that the Braille keyboard is appropriate for home applications, while other users affirm the keyboard is more appropriate for commercial applications.
20. **Appropriate for users with low vision.** The tags are large and this facilitates the use of this resource by people with low vision.
21. **Easy to use.** This was another controversial item. Beginners approve the Braille keyboard, since it facilitates the finding of the keys. Experienced users affirm the Braille keyboard brings no added-value since they had already memorized the position of the keys in the conventional keyboards.
22. **Height of the Braille signals is confusing.** Experienced users affirm the height of the board signs in confusing in comparison with traditional keyboards.

The opinions of teachers and students regarding the discussed items differ in some aspects. However, the analysis of the objects of discrepancy points to four major disagreements relatively to the DOSVOX, JAWS and Braille keyboard resources:

- **Quality of voice:** teachers consider that the voice in DOSVOX and JAWS systems is hard to understand, while the students consider that the understanding comes after some training.
- **Access to contents and help systems:** the students consider the resources are robust, however they refer that some more experience is required before the potential of the applications can be fully exploited.
- **The use of screen readers as an alternative to Braille reading:** the teachers consider that the first may have a detrimental effect in the capacity of using the written language, however the students believe that the adaptation of spell checkers may provide the solution for this issue.
- **Use of Braille keyboard:** the students consider that the location of characters in the Braille keyboard is confusing, while the teachers consider that the Braille keyboard enriches the Braille method and can be a fundamental resource towards the inclusion of the inexperienced user in the learning and work environments.

DISCUSSION

Given the experimental protocol modularity and scope for usability evaluation, the necessary changes to adapt it to the accessibility evaluation consisted in minor adjustments in some steps, processes and activities; mainly in the planning steps of the experiment to adapt the testing environment for the specific needs of the group of participants.

The adapted protocol proved to be adequate for the purpose of supporting the assessment of the usability of accessibility features, promoting an ethical and adequate treatment to participants of the experiment.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

A multi-method data collection approach was used, implementing quantitative (performance evaluation and user satisfaction survey) and qualitative data collection methods (focus group). This ensured a more comprehensive and adequate usability evaluation (Martins et al., 2016).

The results obtained, from the usability point of view, indicate that there is no direct influence of previous experience with specific aid resources, on the user's performance, given the metrics: total task time; total number of errors; text interpretation errors due to the difficulty in understanding the audio produced by the synthesizer. According to the results, it was found that inexperienced users, in some tasks, displayed a better performance, which can be explained by an introductory training session, more numerous requests for help from the evaluation team, besides being less confident and therefore more careful than the experienced participants. This result is evidenced by the fact that only the experienced participants completed Tasks 1 and 2; with the latter being completed successfully only by this group. It is important to mention that despite the experience of the experienced participants with computer systems and accessibility aids, difficulties were observed in this group, which prevented them from performing the tasks more efficiently. On the other hand, inexperienced users were only able to use the accessibility aid products with the help of the team, without which would have been unviable the participation in experiment. Given the last step of the experiment, during which the participants were enticed to discuss their experience, it was highlighted the impact of the participant's educational background on the expectations and opinions about the evaluated accessibility aids.

The following steps in this research consist on refining the experiment materials and extending its application to an even bigger sample which allows for more inference between subgroups of participant's profiles. The availability of the protocol should facilitate the planning and performing of the usability tests, hopefully exposing the difficulties faced by the visually impaired community when using accessibility resources, as well as their acceptance levels regarding perception, comprehension and ease of interaction.

Even though the focus of this research was not to evaluate the voice synthesizers JAWS and DOSVOX, the results from the protocol application suggest that there are resources that users can benefit from the redesign of some features related to the usability problems found.

The results of the usability evaluation indicate that navigation failures have a relevant impact on the overall usability of the system. Experienced users generally tend to memorize commands to access the system, having a significant advantage over other user profiles. It is also worth mentioning that errors related to navigation and error prevention mechanisms, such as notification mechanisms and predictable navigation, would prevent experienced and inexperienced users from performing incorrect actions. This finding refers to the results presented in Table 1, in which only the group of experienced users completed tasks 1 and 2, and the latter was successfully completed only by part of this group. In the results presented in Table 2, the help request metric showed a difference between the means of the user groups, with inexperienced users presenting better performance. Although in the incorrect actions item the inexperienced users performed better, this result can be explained by the help that these users had during the accomplishment of the task, besides these users have been restricted to the execution of actions presented during the training.

In this study, the subjective satisfaction of users does not directly reflect the failures usability of the system. Actually, the literature reports that the opinion of the users, collected through the filling of generic self-reported subjective scales, does not fully reflect users' performance (Martins et al., 2016). In fact, the work developed by Bangor and colleagues examined 200 studies that evaluated the usability using the System Usability Scale and found that the results do not follow all performance spectrum (Bangor, Kortum & Miller, 2008).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The confrontation of the data obtained with the satisfaction survey with those obtained from the focus group may also differ due to the context in which the opinions were collected. The focus group is a less formal method and therefore was more favorable to the spontaneity of the users, when issuing their opinions. The focus group reflected both usability failures and suggestions for improvements.

In general, users were satisfied with the JAWS and DOSVOX system, however a difference was identified between inexperienced, intermediate and experienced users. It was noticed that the greater the time and the frequency of use, the more favorable the users' opinions tend to be.

According to the results of the evaluation trial, the reports of difficulties using the Braille keyboard, in performing Tasks 1, 2 and 3, was higher among users who did not know the Braille method.

It has been found that the *DOSVOX* system needs revisions in several aspects that are listed below:

- Provide a graphical interface associated with the audio description of all elements presented on the screen;
- Develop an electronic help system, which allows on-line access to system help information;
- Migrate to a platform that accepts graphic elements, in which it is possible to configure accessibility (Since DOSVOX was developed for the DOS environment);
- Develop of significant notification mechanisms to the user.

Regarding the JAWS system, it is suggested a re-planning of the navigation elements such as menus to access the systems and communication with other applications such as text and image editors.

It is also proposed to extend the evaluation to other accessibility features in order to classify them in terms of suitability to the context: domestic use, work environment and public environments.

Finally, it is proposed to extend the application of the methodology to evaluations of accessibility resources in general, including resources for other types of limitations: motor, cognitive, etc.

The data obtained from the experiment allowed the testing of the assumptions, leading to the conclusion that the adapted methodology and protocol are effective for the comprehensive usability evaluation, as it highlighted which methods are most effective in locating specific categories of usability problems.

CONCLUSION

It is considered that the main contribution of this paper is to provide a protocol with a set of methods and procedures, adapted for use in evaluations of accessibility products and devices, for the blind community.

The future steps of this research include refining the materials of the experiment and extend its application to an even larger sample that allows more inference between subgroups of participant profiles. The availability of the protocol should facilitate planning and usability testing, hopefully exposing the difficulties faced by the visually impaired community when using accessibility features, as well as their levels of acceptance regarding perception, understanding and ease of interaction. Although the focus of this research was not to evaluate the JAWS and DOSVOX speech synthesizers, the protocol application results suggest that resource users may benefit from the redesign of some features related to the usability problems that were found.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Afonso, A. P., Lima, J. R., & Cota, M. P. (2013, June). Usability assessment of web interfaces: User Testing. In Information Systems and Technologies (CISTI) (pp. 1-7). IEEE.

Aguiar, Y. P. C., & Vieira, M. F. Q. (2009). Proposal of a protocol to support product usability evaluation. *Fourth IASTED International Conference Human-Computer Interaction*, 282-289.

Bailey, J. E., & Pearson, S. W. (1983). Development of a tool for measuring and analyzing computer user satisfaction. *Management Science*, *29*(5), 530–545. doi:10.1287/mnsc.29.5.530

Bangor, A., Kortum, P. T., & Miller, J. T. (2008). An empirical evaluation of the system usability scale. Intl. *Journal of Human–Computer Interaction*, *24*(6), 574–594. doi:10.1080/10447310802205776

Bevan, N., & Bruval, P. (2003). *Usability net: Tools & methods*. Available: http://www.usabilitynet.org/tools/list.htm

Borges, J. A. S. (2009). Tecnopolicy and the regulation of competition between blind with computer and computer unassisted sighted people in taking exams to get into Brazilian universities. *Society for Social Studies of Leuthold Science Annual Meeting, 2009, Washington. 4S'2009 Annual Meeting, 2009*.

Box, G. E., Hunter, W. G., & Hunter, J. S. (1978). *Statistics for experimenters*. Academic Press.

Dias, A., Martins, A. I., Queirós, A., & da Rocha, N. P. (2018). Interoperability in Pervasive Health: Is It Tackled as a Priority? In HEALTHINF (pp. 57-65). Academic Press.

Ferreira, S. B. L., da Silveira, D. S., Capra, E. P., & Ferreira, A. O. (2012). Protocols for evaluation of site accessibility with the participation of blind users. *Procedia Computer Science*, *14*, 47–55. doi:10.1016/j.procs.2012.10.006

Findlater, L., & McGrenere, J. (2010). Beyond performance: Feature awareness in personalized interfaces. *International Journal of Human-Computer Studies*, *68*(3), 121–137. doi:10.1016/j.ijhcs.2009.10.002

Gahlawat, M., Malik, A., & Bansal, P. (2014). Natural speech synthesizer for blind persons using hybrid approach. *Procedia Computer Science*, *41*, 83–88. doi:10.1016/j.procs.2014.11.088

Hanington, B., & Martin, B. (2012). *Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions*. Rockport Publishers.

Hansen, E. G., Mislevy, R. J., Steinberg, L. S., Lee, M. J., & Forer, D. C. (2005). Accessibility of tests for individuals with disabilities within a validity framework. *System*, *33*(1), 107–133. doi:10.1016/j.system.2004.11.002

Hoaglin, D. C., Mosteller, F., & Tukey, J. W. (Eds.). (2009). *Fundamentals of exploratory analysis of variance* (Vol. 367). John Wiley & Sons.

Howarth, J., Smith-Jacksonb, T., & Hartsona, R. (2009). Supporting novice usability practitioners with usability engineering tools.Int. *J. Human-Computer Studies.*, *67*(6), 533–540. doi:10.1016/j.ijhcs.2009.02.003

ISO 9241-171 (2008). Ergonomics of human-system interaction: Guidance on software accessibility, London, UK. Part 171.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Jokinen, J. P. (2015). Emotional user experience: Traits, events, and states☆. *International Journal of Human-Computer Studies*, *76*, 67–77. doi:10.1016/j.ijhcs.2014.12.006

Lima, M., & Vieira, L. A. (2010). Experimental Protocol for Accessibility. In *IADIS 2010 IADIS International Conference Interfaces and Human Computer Interaction Experimental Protocol for Accessibility*. Freiburg, Germany: IADIS.

Lima, M., Vieira, R. S., Ferreira, Y. P., Aguiar, M. P., & Bastos, S.L. (2018). Evaluating System Accessibility Using An Experimental Protocol Based On Usability. *Computer Graphics, Visualization, Computer Vision And Image Processing 2018*.

Loiacono, E. T., Djamasbi, S., & Kiryazov, T. (2013). Factors that affect visually impaired users' acceptance of audio and music websites. *International Journal of Human-Computer Studies*, *71*(3), 321–334. doi:10.1016/j.ijhcs.2012.10.015

Martins, A. I., Queirós, A., Silva, A. G., & Rocha, N. P. (2015). Usability evaluation methods: a systematic review. In Human Factors in Software Development and Design (pp. 250-273). IGI Global. doi:10.4018/978-1-4666-6485-2.ch013

Martins, A. I., Queirós, A., Silva, A. G., & Rocha, N. P. (2016). Usability evaluation of ambient assisted living systems using a multi-method approach. *Proceedings of the 7th International Conference on Software Development and Technologies for Enhancing Accessibility and Fighting Info-exclusion*, 261-268. ACM. 10.1145/3019943.3019981

Martins, A. I., Queirós, A., Silva, A. G., & Rocha, N. P. (2016). ICF based Usability Scale: evaluating usability according to the evaluators' perspective about the users' performance. In *Proceedings of the 7th International Conference on Software Development and Technologies for Enhancing Accessibility and Fighting Info-exclusion* (pp. 378-383). ACM. 10.1145/3019943.3019997

Mesquita, L., Sánchez, J., & Andrade, R. M. (2018, July). Cognitive Impact Evaluation of Multimodal Interfaces for Blind People: Towards a Systematic Review. In *International Conference on Universal Access in Human-Computer Interaction* (pp. 365-384). Springer. 10.1007/978-3-319-92049-8_27

Miah, S. J. (2004). Accessibility improvement of multicultural educational web interface by using the User Centred Design (UCD) approach. In *Proceedings of the 2004 Informing Science and IT Education Joint Conference* (pp. 25-28). Informing Science Institute.

Mitchell, P. P. (2007). *A step-by-step guide to usability testing*. iUniverse, Inc.

Nielsen, J. (1993). *Usability Engeneering. Academic Press Inc*. Boston: Academic Press.

Pascual, A., Ribera, M., Granollers, T., & Coiduras, J. L. (2014). Impact of accessibility barriers on the mood of blind, low-vision and sighted users. *Procedia Computer Science*, *27*, 431–440. doi:10.1016/j.procs.2014.02.047

Queirós, A., Silva, A., Alvarelhão, J., Rocha, N. P., & Teixeira, A. (2015). Usability, accessibility and ambient-assisted living: A systematic literature review. *Universal Access in the Information Society*, *14*(1), 57–66. doi:10.100710209-013-0328-x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Queiroz, J. E. (2001). *Abordagem Híbrida para a Avaliação da Usabilidade de Interfaces com o Utilizador. Tese (Doutorado em Engenharia Elétrica)*. Campina Grande, Paraíba, Brasil: Universidade Federal da Paraíba.

Raman, V. (2003) Specialized browsers. In WebAccessibility: A Foundation for Research,1st Edition. Springer-Verlag.

Sánchez, J., & Hassler, T. (2007). AudioMUD: A multiuser virtual environment for blind people. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, *15*(1), 16–22. doi:10.1109/TNSRE.2007.891404 PMID:17436871

Sangiorgi, U. B. (2014). Electronic sketching on a multi-platform context: A pilot study with developers. *International Journal of Human-Computer Studies*, *72*(1), 45–52. doi:10.1016/j.ijhcs.2013.08.018

Simões-Marques, M., & Nunes, I. L. (2012). Usability of interfaces. In *Ergonomics-A Systems Approach*. InTech. doi:10.5772/37299

Sodnik, J., Dicke, C., Tomažič, S., & Billinghurst, M. (2008). A user study of auditory versus visual interfaces for use while driving. *International Journal of Human-Computer Studies*, *66*(5), 318–332. doi:10.1016/j.ijhcs.2007.11.001

Vatavu, R. D., Cramariuc, G., & Schipor, D. M. (2015). Touch interaction for children aged 3 to 6 years: Experimental findings and relationship to motor skills. *International Journal of Human-Computer Studies*, *74*, 54–76. doi:10.1016/j.ijhcs.2014.10.007

Wilkinson, S. (Ed.). (2015). *Qualitative psychology: A practical guide to research methods*. Sage.

This research was previously published in the Handbook of Research on Human-Computer Interfaces and New Modes of Interactivity; pages 275-296, copyright year 2019 by Engineering Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 27
Collaborative Systems for Design-Based Learning

Joycelyn Streator
Georgia Institute of Technology, USA

ABSTRACT

This chapter explores use of Design-based learning (DBL) and digital tools to facilitate collaborative learning through design-based projects. Design-based learning (DBL) is an educational approach that incorporates hands-own, authentic, multidisciplinary design tasks to identify problems and design solutions. With DBL, students typically work in teams and are tasked designing solutions to open-ended problems. Teams develop conceptual solutions to problems and then work through the design process to arrive at the creation of an actual artifact. This artifact may be fully functional or simply a model, prototype, or other representation of the complete system. STEM instructors and students should give careful attention to selecting the digital tools for collaboration. Some collaborative tools offer affordances and features that compliment the communication processes in one phase of the design process while another other tool may be better suited for the tasks specific to another phase.

INTRODUCTION

This chapter explores use of design-based learning (DBL) and digital tools to facilitate collaborative learning through design-based projects. Design-based learning is an educational approach that incorporates hands-on, authentic, multidisciplinary design tasks to identify problems and design solutions. As STEM educators seek new ways of incorporating inquiry-based methods, DBL provides a valuable method of bringing student-led learning to the forefront.

With DBL, students typically work in teams and are tasked with designing solutions to open-ended problems. Teams develop conceptual solutions to problems and then work through the design process to arrive at the creation of an actual artifact. There are five basic phases to the design process. In the first phase, students identify the key issue or problem to be addressed and then brainstorm potential solutions. In the early phases of the design process, students become proficient in identifying the criteria for selecting an optimal solution. This initial phase requires a high degree of collaboration and

DOI: 10.4018/978-1-7998-7297-9.ch027

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

one-to-many communication streams. Next, students gain experience in determining requirements for the chosen solution and documenting these requirements. These requirements serve as the blueprint for what will be accomplished during the project and what features are determined to be within its scope. In the final phases of the project, students will implement and evaluate the artifact created as a result of the process. This artifact may be fully functional or simply a model, prototype, or other representation of the complete system.

STEM instructors and students should give careful attention to selecting the digital tools for collaboration. Certain collaborative tools offer affordances and features that complement the communication processes in one phase of the design process while another other tool may be better suited for the tasks specific to another phase. The tools used during the first phase of the design process must be suitable not only for communicating, but also capturing and refining free-flowing ideas. As students endeavor to select a design project choice among competing ideas, students need collaboration tools that support a systematic and logical approach to selecting the optimal choice. The mix of collaboration tools used in the final phases should allow teams to communicate the status of the project to a larger audience and receive feedback on the resulting artifact.

Misappropriation of digital communication tools can undermine team efficiency and focus efforts on technical struggles with software applications rather the design project itself. However, when used effectively, the tools outlined in this chapter can support all phases of design-based learning in a manner that is effective yet unobtrusive to the learning process.

The design-based learning pedagogical approach has the potential to increase students' understanding of the design process through engaging in active and authentic learning projects. STEM students must have expertise in applying a systematic process to translating technological innovation to create value-added solutions.

This chapter explores electronic resources for use in design-based STEM education. Using design-based learning can improve knowledge of design processes and increase competence in problem-solving and student motivation. Specifically, this chapter discusses the use of collaborative tools for project creation, collaboration, peer assessment, and knowledge management. The discussion includes a number of technologies (e.g., email, text messaging, social media, wikis, project web sites, and blogging, among others). While specific applications may be referenced, this chapter emphasizes more salient features that are prevalent across a particular category of software applications. Given the rapid evolution of existing technologies and the disruptive nature of emerging technologies, instructors must continually reassess the value of new collaborative tools to support learning within the community of STEM students.

BACKGROUND

It has long been held that the most effective pedagogy incorporates deep (vs. surface) learning (Cope, Staehr, & Horan, 2002). With deep learning, students endeavor to understand the process by which effective solutions are identified and designed. This is in contrast to surface learning, in which students simply seek "the right answer" as expeditiously as possible. One of the biggest challenges facing STEM educators is incorporating learning experiences within an academic context that prepares students for complex, open-ended challenges found in professional work. For example, information technology (IT) education has been criticized for the disconnect between the IT curriculum and professional practice (Cohen, 2002a; Lee, Koh, Yen, & Tang, 2002; Trauth, Farwell, & Lee, 1993). Research indicates that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

IT practitioners place a greater emphasis on creative and critical thinking than educators (Lee et al., 2002), and that the ability to plan and design strategic IT solutions is a crucial skill for IT managers (Wu, Chen, & Chang, 2007).

STEM educators must seek news ways of facilitating inquiry-based methods and bring student-led learning to the forefront. In recent years, the importance of design thinking has been emphasized in both practitioner and scholarly circles. Design thinking is characterized as the cognitive strategies and frameworks used to solve what has been termed "wicked problems" (Buchanan, 1992). Buchanan conceptualized wicked problems as that are difficult to solve due to incomplete, dynamic, and often have unknown requirements. In a practitioner space, graduates of STEM programs encounter wicked problems as a matter of course. Developing cognitive frameworks to support design thinking during the formal educational process engenders greater confidence and an organized approach when encountering complex problems.

From a pedagogical perspective, design thinking is reflected in the tangible artifacts produced by student project teams. These artifacts address various levels of cognition and awareness of problem spaces and their complexities (Leinonen & Durall-Gazulla, 2014). For example, on the most basic level, a student may develop a deeper understanding of design based on physical attributes of an artifact. With a deeper initiation into design thinking the student would consider the behavior of the artifact in differing scenarios. Going further, the student would begin to understand design from a systems perspective. That is, how does the artifact and its behavior fit within a larger system of interconnected elements. In the higher levels of design thinking the student develops a greater awareness of the user and the social implications surrounding the design. For instance, the designer of app may consider requirements related to accessibility or cultural matters. Perhaps the designer of a new gadget may consider green manufacturing techniques and re-usability of materials.

In the practitioner realm, many corporations and research firms are positioning themselves to be design leaders and seek to develop an organizational culture centered on innovation (Dunne & Martin, 2006). Hiring managers recognize the value of recruiting individuals with a capacity for design thinking. The importance of developing a pipeline of talent with who can apply creative problem solving skills is highlighted increased level of corporate sponsorship of design activities and competitions in higher education (Collins & Han, 2004).

In the past, STEM faculty typically designed curricula around applying scientific principles to defined, technological problems. However, from an industry approach, the graduates are ill-prepared for unstructured real world problems. More recently faculty are seeking pedagogical approaches to foster design thinking. This shift is seen in both STEM (Razzouk & Shute, 2012) and non-STEM disciplines (Johansson-Sköldberg, Woodilla, & Çetinkaya, 2013). In academia, there is a growing recognition of the importance of developing a strong field of graduates prepared to face wicked, real world problems.

Among the many pedagogical approaches best suited to address this gap between the academic and practitioner worlds is design-based learning. This chapter explores electronic resources for use in design-based STEM education. Using design-based learning can improve knowledge of design processes, foster greater competence in problem-solving, and enhance student motivation. Specifically, this chapter discusses the use of collaborative tools for project creation, collaboration, peer assessment, and knowledge management. While the context of the discussion is in the discipline of information technology, the same approach and tools can be used across STEM fields.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

DESIGN-BASED LEARNING

Inquiry-based STEM pedagogy encourages students to pose questions and arrive at solutions, thus creating student-centric learning paths. Design-based learning is an educational approach that incorporates hands-on, authentic, multidisciplinary design tasks (Doppelt, Mehalik, Schunn, Silk, & Krysinski, 2008; Wijnen, 2000) to identify problems and design solutions. Design-based learning is rooted in a constructivist pedagogical approach in that it relies on learning that emerges through experimentation in authentic contexts (Duffy & Jonassen, 1992; Fosnot, 1996).

With the DBL approach, students play a larger role in defining the design problem. Therefore, the resulting projects remain topical and relevant to the current class of students. In addition, DBL has the common stages of the design process to serve as a guide for students through all stages, from conceptualization to development to evaluation.

While similar in origins to problem-based learning (PBL), DBL differs from PBL approaches. Problem-based learning centers on predetermined complex problems that students are challenged with solving ((Duch, Groh, & Allen, 2001; Savery & Duffy, 1995). By contrast, design-based learning places emphasis on the integration of scientific knowledge with emergent inquiries. Learning is facilitated as interdisciplinary teams endeavor to create authentic artifacts (Gómez Puente, Van Eijck, & Jochems, 2011). By contrast, PBL has received criticism as instructor-defined problem contexts tend to become outdated and less relevant to students (Wells, Warelow, & Jackson, 2009). In addition, research has shown that students often experience anxiety and confusion over the minimal guidance inherent in the PBL process (Kirschner, Sweller, & Clark, 2006). A design-based learning approach addresses these issues. Students play a larger role in defining the design problem and, therefore, the resulting projects remain topical and relevant to the current class of students. DBL also has the general tenets of the design process to serve as a guide for students through all stages, from conceptualization to development to evaluation.

Design-based learning engages students in design activities that reflect authentic contexts and guide students through generating specifications, outcome prediction, artifact creation, evaluation, and communication. As students step through iterations of each stage, they develop reasoning and critical thinking skills needed to address open-ended design challenges in the real world. DBL incorporates open-ended design assignments, hands-on experience, real-life scenarios, and multidisciplinary content (Puente, van Eijck, & Jochems, n.d.).

Importance of Design Process Knowledge

Graduates of STEM programs, especially IT, must have expertise in applying a systematic approach to translating technological innovation into valuable, real-world solutions. In order to meet this requirement, IT curriculum guidelines suggest that IT students must develop skills in the process of designing new solutions (Topi et al., 2010). These design skills include designing and implementing solutions that provide a high-quality user experience. Indeed, students who are competent in the design process should possess a greater ability to provide solutions for dynamic, nonlinear problems and anticipate unintended consequences from interrelated system components (Moazzen et al., 2013). While these guidelines are specific to IT, problem-solving and the ability to design effective solutions in complex environments is an important aspect of all STEM fields.

Key outcomes for design-based learning include increased student motivation, greater student emphasis on deep (versus surface) learning, and the implicit instruction provided by feedback on design solutions.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Design and Peer Assessment

Traditional methods for assessing a designed solution include observation of design activities, interviews, and analysis of design documents (Moazzen et al., 2013). However, the advent of the Internet and web-based tools for providing feedback has contributed to a rise in the use of peer assessment as a tool for evaluating student work. Recently, the role of peer assessment in the work of IT students has received considerable attention (Sitthiworachart & Joy, 2003; Tsai, Lin, & Yuan, 2002; Tseng & Tsai, 2007a). Peer assessment in IT projects not only benefits the recipient of the feedback, but also creates a learning mechanism for the student providing feedback. Students develop judgments about what constitutes effective, quality design through reviewing and providing feedback to peers (van Zundert, Sluijsmans, & van Merriënboer, 2010). In addition, research indicates that the quality of peer feedback is often highly correlated with critique provided by experts (Tseng & Tsai, 2007a).

Student Motivation and Deep Learning

When students are engaged in projects that involve real-world scenarios and authentic learning, research suggests that student motivation is greatly increased (Cohen, 2002a). In addition, actively involving students in peer project evaluation has also been recognized as a factor in increasing student motivation (Tseng & Tsai, 2007a). As the level of student motivation increases, students begin to take ownership of learning, develop an intrinsic interest, and shift from surface to deep learning. When STEM students adopt a deep-learning approach, they seek a deeper understanding by developing a holistic view of the relationship between the design tasks, technology skills, and content-related concepts (Cohen, 2002a).

SOLUTIONS AND RECOMMENDATIONS

With the rapid increase in web-based tools available to students and instructors, the challenge in applying technology to STEM learning is not in finding tools, but in identifying the best tools for the learning task. There are numerous solutions available to support the design-based approach to STEM learning. With technology constantly evolving, this discussion focuses on broad categories of collaborative tools, but also includes specific software examples. Most of the basic tools are available as a standard part of learning management software or as stand-alone options.

As students apply the design process to explore unstructured problems and complex outcomes, it's beneficial to have communication structures in place to organize and gather discussions, knowledge, solutions, and results. Below is an overview of each phase of the design process and examples of supporting technologies (see Figure 1).

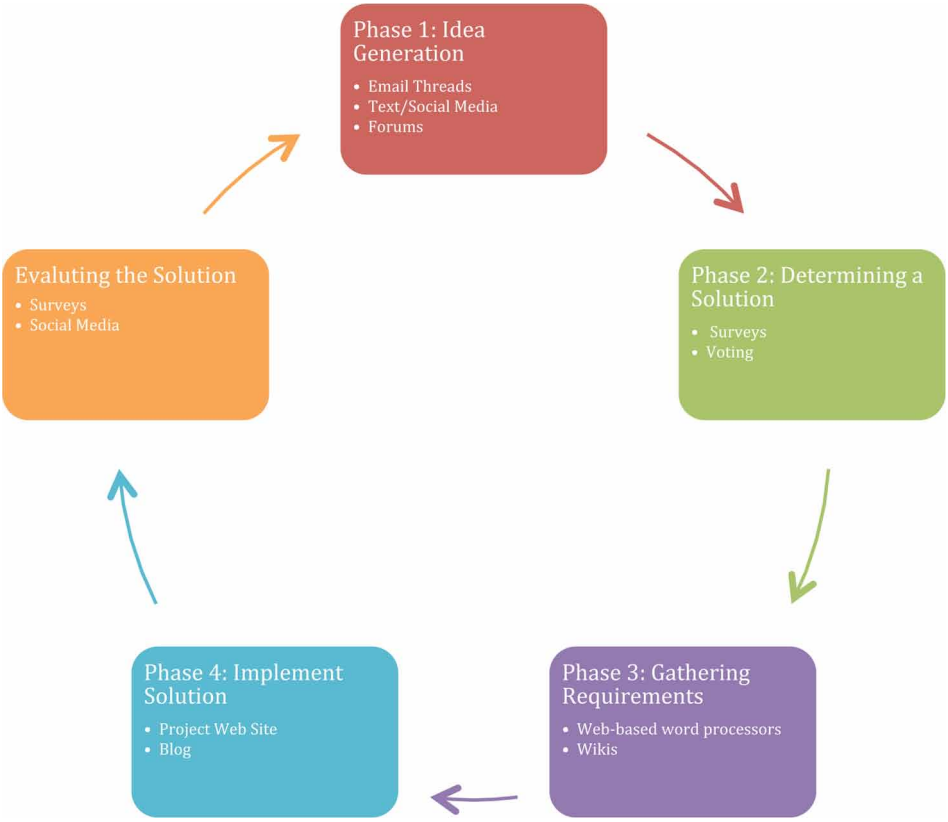
Phase 1 Collaborative Tools: Idea Generation

The first phase of the design process involves idea generation and brainstorming potential solutions or project topics. Brainstorming invites team members to pitch ideas loosely related to a given subject. The goals for brainstorming sessions include increasing the number ideas, building on existing ideas, and freeing participants to contribute with criticism from teammates and without regard to scope or feasibility. In this stage, students are engaging in highly unstructured communications.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The benefits of using collaborative tools to facilitate brainstorming has been well documented (Dennis, Wixom, & Vandenberg, 2001). However, initiating and organizing ideas is a challenge for many learners facing ambiguous and ill-defined inquiries. The most common collaborative tool used during this phase of the design process is email. However, email threads among project team members can be difficult to track and identify when competing for the user's attention in crowded inboxes. In addition, students must be diligent in their use of email features such as "reply all" to ensure that every group member remains included in the email discussion.

Figure 1. Phases of the design process and examples of collaborative tools



Beyond email, many students use texting and social media to communicate. While these platforms are rapidly emerging, there are key disadvantages to these communication tools, particularly texting. Though texting provides instant distribution and access to communication, there can be issues with group members being inadvertently omitted from communication. Moreover, there is no central repository for archiving of student ideas.

Unlike email and text messaging, use of discussion groups or forums provides a more structured means of facilitating collaboration during the idea generation phase. Students can join the forum or discussion group or be enrolled by the instructor. After initial member enrollment, there's no longer a need to manually check to ensure that all group members are included in all conversations. Since conversa-

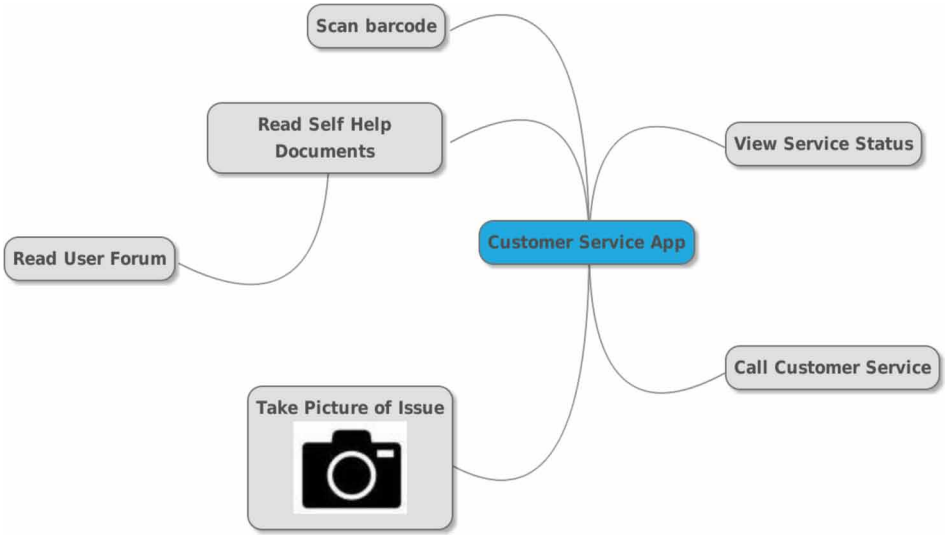
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tions are organized by topic or thread within most forum and discussion group tools, students have the ability to categorize ideas and contribute thoughts in a more efficient and intelligible manner. Forums and discussion groups can also serve as a repository for documenting ideas in the brainstorming stage.

Going a step further, mind mapping tools provide another means of capturing and conveying ideas during the idea generation phase. A mind map is a radial diagram consisting of a central node that represents an idea. Branches are drawn from the central note to show subtopics or concepts related to the central idea. The branches can contain words or pictures and utilize color for categorization.

Mapping cognitive processes creates knowledge structures in the early phases of many endeavors. As students seek to refine ideas, mind mapping tools provide a means of exploring relationships among ideas and identifying conceptual gaps. Just as maps are used in literature to aid in pre-writing, natural sciences maps can be used to group related biological processes or outcomes. In the brainstorming phase of design-based learning, mind maps can be used by teams to generate ideas and cluster related concepts. As an example, if IT students were challenged with designing an application, maps aid in capturing the genesis of a potential solution and possible features (see Figure 2).

Figure 2. Mind map used to design an IT application using Mindmup (mindmup.com)



Though mind mapping techniques existed prior to the onset of the digital age, collaborative tools allow easier creation and collaboration. Many mapping tools are available via the web and allow teams to develop and share maps in real time or asynchronously. Changes made by individuals can be viewed or revised by other team members. Thus, the map can be updated as learners refine ideas. The evolution of the project can be documented via updates to the map. In most cases, web-based mapping applications store results in the cloud or can be downloaded and embedded in common formats. With mind mapping tools, teams can explore and collaborate on the potential features of several competing solutions.

The list of features and affordances associated with mind mapping software is constantly evolving. For example, some mind mapping tools allow for a richer object set. Beyond text, some systems support images, external data sources, links, and other forms of media. A valuable feature for team-based col-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

laborative projects is real-time collaboration, which allows users to modify and respond to the document from their own devices in real time. Other features that are of interest for team-based mind mapping include the ability to share documents, cloud storage, and the ability to track document history. In addition, tools that have a free version available provide a practical option for students. Table 1 contains a sampling of mind mapping tools and a summary of features.

Table 1. Examples of mind mapping tools

Tools	Features					
	Web-based	**Real-time Collaboration**	**Online Storage**	**Document History**	**Free Version**	**Additional Features**
Mindmup	X		X	X	X	• Project planning • Post to social media
Coggle	X	X		X	X	• Email change notifications • Presentation mode
Sketchboard	X	X	X		X	• Freehand drawing • Unified Modeling Language
VUE			X		X	• Import academic citations • Merge multiple maps • Supports external data sources • Presentation support
xMind	X		X	X	X	• Gantt view • Presentation mode • Create PowerPoint slides

Phase 2 Collaborative Tools: Determining the Optimal Solution

In the next stage of design-based learning, teams will need to identify the optimal solution. The method by which students assess what defines an optimal solution is specific to the discipline and topic. However, the method with which students arrive at their decision may ultimately consist of the judgment of individual group members. Some potential criteria for consideration are:

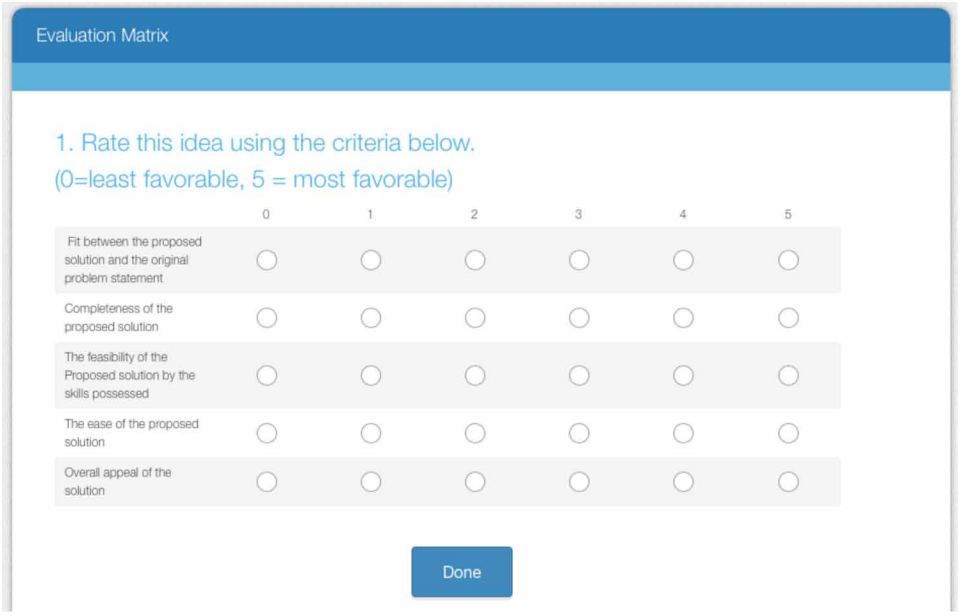
- Fit between the proposed solution and the original problem statement
- Completeness of the proposed solution
- The feasibility of the proposed solution by the skills possessed
- The ease of the proposed solution
- The overall appeal of the proposed to the design team and/or potential users.

In order to obtain the most favorable solution, students can create criteria for assessing their project. Each group member then rates potential project ideas, or the team can conduct a simple vote. Either way, surveys and questionnaires provide an ideal vehicle for rating, ranking, and voting. While there are a number of free web-based survey tools available, survey and assessment features are often built into learning management systems and web-based office productivity applications.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Approaches to evaluating potential solutions via web-based survey may include open-ended questions, closed-format questions, or a combination of both. If students poll team members or potential users with open-ended questions, the data obtained will be every rich, but highly unstructured and will take additional time to parse. Another means of evaluating ideas via web-based survey would be structuring the survey as an evaluation matrix. (See Figure 3) The survey questions would consist of an array of criteria for assessing the merits of an idea. The evaluator rates each idea (e.g., on a scale of 0-5) based on how well it meets each criterion. The results of the survey provide a criterion-by-criterion score as well as an overall score for each idea. The scores can be compared and the highest scoring idea selected.

Figure 3. Evaluation matrix created using SurveyMonkey (surveymonkey.com)



Phase 3 Collaborative Tools: Requirements Gathering

In the third phase of design-based learning, students gather requirements for implementing the chosen solution. Successful requirements gathering requires the collaborative development of a document that specifies the resources needed to complete the project. Students may work individually or in teams at this stage. Regardless, a central place where students can share and access requirements gathered by other group members is highly beneficial. Web-based word processors (e.g., Google Docs or Microsoft Office 360) are some of the simplest and most accessible tools for document collaboration. Project teams can create and simultaneously build requirements documentation with the most up-to-date version available to all team members. The main drawback to this approach is that the document is initially unstructured. Thus, team members must agree on a format and abide by that format as they make individual contributions. Since there is no embedded mechanism for capturing feedback or comments from team members, other communication tools would have to be used in parallel.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

For more complex design problems with elaborate requirements, wikis can provide a better collaborative solution. Wikis are specifically designed to allow collaborative editing and structuring of information. Wikis are particularly well suited for when a design document evolves and must be edited by multiple team members. In addition, team members can continuously review and give feedback on captured requirements.

Wiki pages can be created based on templates that reflect the nature of the project. For example, in IT projects, a wiki's pages can be pre-structured to accommodate documentation of functional requirements or use cases. Wikis also provide quick, web-based access to the latest team member contributions. As the project evolves, team members will have access to the history of not only the requirements, but also the discussion surrounding each requirement.

Beyond wikis, more advanced tools designed specifically for requirements gathering exist in the marketplace. Many of these solutions are costly and designed for corporate environments. However, a few providers offer solutions that include a free basic account suitable for student projects. Table 2 provides a sampling of requirements gathering systems.

Table 2. Examples of requirements gathering tools

Tools	Features
Wikis	Free Familiar interface, shallow learning curve
ReqView	Free version available Import documents from diverse file types Work online or offline
Gatherspace	Develop models and diagrams Report generation
iRise	Validate requirements Develop diagrams Integrate with other development environments

Phase 4 Collaborative Tools: Implementation of the Solution

In the implementation phase, students build the solution based on the requirements gathered in the previous stage. The collaborative tools used during this phase may vary greatly by discipline. However, a project web site provides an excellent means of communicating project progress during implementation. Project web sites serve as a repository for archiving and linking all aspects from each phase of the entire design project. As students review deliverables from previous phases, they reinforce their understanding of the project topic and develop a structured approach to problem-solving. The project web site provides easy access to the learning path by which they arrived at the current phase.

Within the IT discipline, the project web site can serve as point of distribution for beta versions of the artifact under design and successive releases. The website is a place for the project team to communicate the status, features, and notes regarding each new development. For users (or the instructor), the web site provides a means of gauging the project's progress and feature complexity prior to completion.

Project web sites also give instructors a view into the level of contribution from each team member. With access to a living history of the project, the instructor can assess the scope and impact of each team

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

member's contribution on an ongoing basis. In the absence of this dynamic system, it can be difficult to ascertain the amount of effort and significance of various tasks related to the final output. Also, with visibility into the project's progress, the instructor can better ascertain when to guide project teams if intervention is necessary.

For project team members, the website serves as a hub for convenient access to all phases of the project. There are a number of free web services that provide for rapid development of visually appealing and highly functional web sites. These web services provide drag-and-drop design capabilities that make creating a web site as simple as using a word processor. Thus, students no longer need to be versed in the technical details of creating web sites to harness the collaborative power of the web to support their project. STEM students can remain focused on the project domain without having to master web site development techniques, if this is outside the scope of the assignment.

For more complex projects with a greater lifespan, can place designated project resources behind password-protected web pages, effectively creating an intranet for team members. For example, access to the discussion groups/forums and survey data could be located within members-only pages. Housing project documents and communication in a project web site provides an efficient means of accessing and storing project information beyond email attachments or texting updates to team members.

Blogs are a special feature of web sites (and many learning management systems) that merit a separate discussion. Project teams can utilize blogs as part of the web site to document the stages of implementation. Blogs can also serve as electronic journals where students post pictures, links to resources, and status updates for peers and instructors.

From the instructor's standpoint, student blogs give insight into team progress and individual intellectual growth. Blogging bestows upon each student his or her own voice and opportunity to express a unique perspective on the learning challenges and accomplishments within the project space. In addition, blogs support commenting features that can be used by the instructor to provide feedback, pose additional inquiries, or give encouragement.

From the student's standpoint, blogging provides a tool for reflection and critical thinking. In writing a blog post, students apply analytical thought, reason through hypotheses, and communicate their rationale for results. When blog posts are made viewable to peers as well as the instructor, research has shown that students are more inclined to take ownership of their own ideas and the manner in which they communicate them. As students perceive that their ideas are being evaluated by their peers their level of motivation has been shown to increase (Tseng & Tsai, 2007b). As the level of student motivation increases, students began to take ownership of learning, develop an intrinsic interest, and shift from surface to deep learning. When STEM students adopt a deep-learning approach they seek a deeper understanding by developing a holistic view of the relationship between the design tasks, technology skills, and content-related concepts (Cohen, 2002b).

In addition to the deep learning that arises from blogging and peer critique, blogging also encourages communities of inquiry and knowledge sharing. As students share ideas, challenges, and successes, mutual learning occurs. Blogging can provide more personal expression and response than traditional journaling methods. As students seek sources to support their point of view, they are more inclined to find and evaluate the merits of data sources and identify scholarly work. As students focus and strengthen their discourse, their peers benefit from a plurality of well-supported, well-reasoned perspectives. Thus, students have a richer understanding of multifaceted problems and approaches as opposed to the more myopic vantage point of a single source.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Phase 5 Collaborative Tools: Feedback and Evaluation of Solution

Once the solution has been implemented, students can receive peer or expert feedback via responses posted to project blogs or surveys in which peers or experts external to the project provide both structured and unstructured comments. When utilized among peers, making feedback anonymous encourages the most constructive and honest responses.

As discussed previously, surveys can be designed to capture highly structured or unstructured feedback. The intended goal for resulting data should drive the format for the data collection. Once the project has been implemented, there are many channels for soliciting response via survey. Surveys can be emailed or embedded in a project website or the actual project deliverable if the project involved the creation of a digital artifact. Regardless, the goal is to capture the experience of the user or client and gain insight into potential opportunities for improvement. This data can then be used to refine the project via repetition of the design cycle if time or the scope of the assignment permits.

Both the student receiving feedback and the student providing feedback benefit from participating in peer assessment as part of the final phase of design-based learning projects. When considering the merits of feedback received as well formulating well-reasoned comments, students strengthen their understanding of how to arrive at a sound solution and what comprises design excellence. The prospect of receiving feedback from peers can be just as valuable in motivating self-critique and refinement of thought.

In addition to surveys, social media can be used in the evaluation phase of DBL. Social media applications vary greatly in their interface and functionality. However, there are several common features typically found in social media that are supportive of evaluating DBL projects. First, social media provides an instant form of collective communication. Apps like Twitter allow users to create uniquely identifiable channels of communication relating to a single topic. As an example, a team might use Twitter to generate discussions around a particular feature of the project. The team can then analyze the social media stream with the goal of evaluating the user response or reception to that feature.

Using social media, project teams can have many-to-many conversations and generate "buzz" or interest in their projects. Receiving live feedback and gauging the level of interest in a proposed solution provides an authentic learning experience in discovering the practical aspects of a topic and proposed solution. A team can design the most scientifically elegant solution, but if the feedback indicates that a community of potential users/clients don't perceive this solution as needed or useful then the design may require adjustment. Even in the absence of altering the solution, students still benefit from analyzing social media content as a response to team communication about the solution. In other words, students learn not only how to refine a technical solution, but also how their communication of technical or scientific information might be improved.

There are a number of collaborative tools available to support pedagogical approaches that incorporate design-based learning. Thoughtful application of these tools can foster greater collaboration, knowledge acquisition, and critical thinking. Table 3 provides an overview of the more basic tools discussed in this chapter. The table provides a starting point for applying free and commonly available tools with a relatively shallow learning curve. As instructors and teams become more acclimated to design-based learning, experimentation with some of the newer and more advanced tools discussed in this chapter may provide additional benefits.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Overview of basic collaborative tools

Digital Tool	Pros/Cons	Design Phase
Email	Pros: easily accessible and available to all Cons: email threads can be difficult to follow; individuals may be unintentionally dropped from group conversations	Idea generation – early brainstorming and idea introduction
Text Messaging	Pros: conversational quick communication Cons: Not well suited for group conversations or documenting	Idea generation – clarifying or refining ideas among dyads
Forums/Discussion Groups	Pros: easy to organize and structure communication around topics Cons: not as quickly assessable as email and text	Idea generation – refining and documenting ideas
Web-Based Word Processors/Office Productivity	Pros: easily accessible, simple to use Cons: unstructured, once document is formatted all users must maintain format; commenting is not built in(?)	Requirements gathering and documentation
Wikis	Pros: structure is predefined; commenting is built in Cons: more setup time required	Requirements gathering and documentation
Web-Based Surveys	Pros: easily distributed Cons: value of data and effort of analysis depends on how well questions are planned	Solution determination, feedback and evaluation of the solution
Project Web Site	Pros: can serve as a hub for all project documents and communication; can set up separate team member-only spaces Cons: can become outdated without ongoing effort to maintain	Implementation – documenting and communicating project milestones. Release new versions of the project artifact.
Blogging	Pros: easily accessible self-reflective tool for providing project updates and journaling Cons: students may require additional instruction on electronic communication etiquette and providing constructive feedback	Implementation
Social Media	Pros: can be used to generate buzz or interest in project; also provides project-related conversation streams for content analysis Cons: can be difficult to garner attention and attack focused conversations in noisy medium	Feedback and evaluation of the solution

FUTURE RESEARCH DIRECTIONS

The pace of change in educational technologies challenges researches to create persistent methodologies for assessing the impact of emerging technologies. To build a stronger theoretical framework and more robust empirical studies of technology application, it would be worthwhile to explore the development of salient features related to these collaborative systems. The structure for investigating new technologies could for example include affordances offered by the technology without overly focusing on the features, interface, or technical configuration.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

When students are engaged in projects that involve real-world scenarios and authentic learning, students become more motivated to engage in deep learning. Design-based learning pedagogy provides an effective way to engage STEM students in authentic learning activities that prepare them for real-world design problems. In addition, because DBL allows students to apply creativity to generate their own design plans and specifications, students have a vested interest in project outcomes and can explore complex solution spaces. At the same time, the design process provides guidance to students on how to successfully apply their technical skills to solve problems and produce functional artifacts. These artifacts can then be evaluated and refined by students to further understand the design process cycle.

A design-based learning pedagogical approach has the potential to increase students' understanding of the design process through engaging in active and authentic learning projects. In addition, student motivation, individually and collectively in teams, is a strong determinant for deep learning and perhaps the desire to engage more fully in developing knowledge of the design process. Increased knowledge and deep learning yield more favorable design outcomes.

Design-based learning places students at the center of defining design problems and taking ownership of the process. Projects reflect issues that are uniquely relevant and topical for each team. In addition, the phases of the design process guide students through an authentic means of arriving a solution. Students progress from conceptualization to development to evaluation just as they would with design solutions to problems in the "real world."

As students move through each stage of the design process and confront unstructured inquiry and uncertain outcomes, collaborative tools can be used to add structure to communication. These tools can facilitate idea sharing, serve as knowledge repositories, and communicate solutions. Given the vast and rapidly evolving digital communication and collaboration tools available, STEM instructors and students should give careful attention to deploying the tools best suited for the tasks specific to each design phase. If applied effectively, the tools outlined in this chapter can support all phases of design-based learning in a manner that is effective yet unobtrusive to the learning process. As STEM educators find novel ways of introducing inquiry-based approaches to student-led learning, technology will remain a valuable resource. As technologies evolve, instructors must continually reassess the value of existing and emerging collaborative tools to support learning within the community of STEM students.

REFERENCES

Buchanan, R. (1992). Wicked problems in design thinking. *Design Issues*, *8*(2), 5–21. doi:10.2307/1511637

Cohen, E. (2002a). *Challenges of information technology education in the 21st century*. IGI Global. Retrieved from http://books.google.com/books?hl=en&lr=&id=Tbt3OE0UT0IC&oi=fnd&pg=PR7&dq=+%22challenges+of+information+technology+education%22&ots=g__Lx9NkCA&sig=SpuoZkU6t-sWbi5q67iYEAIJ1fQ

Cohen, E. (2002b). *Challenges of information technology education in the 21st century*. IGI Global. Retrieved from http://books.google.com/books?hl=en&lr=&id=Tbt3OE0UT0IC&oi=fnd&pg=PR7&dq=+%22challenges+of+information+technology+education%22&ots=g__Lx9NkCA&sig=SpuoZkU6t-sWbi5q67iYEAIJ1fQ

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Collins, C. J., & Han, J. (2004). Exploring applicant pool quantity and quality: The effects of early recruitment practice strategies, corporate advertising, and firm reputation. *Personnel Psychology*, *57*(3), 685–717. doi:10.1111/j.1744-6570.2004.00004.x

Cope, C., Staehr, L., & Horan, P. (2002). Towards establishing the best ways to teach and learn about IT. *Challenges of Information Technology Education in the 21st Century*, 57.

Dennis, A. R., Wixom, B. H., & Vandenberg, R. J. (2001). Understanding Fit and Appropriation Effects in Group Support Systems via Meta-Analysis. *Management Information Systems Quarterly*, *25*(2), 167–192. doi:10.2307/3250928

Doppelt, Y., Mehalik, M. M., Schunn, C. D., Silk, E., & Krysinski, D. (2008). *Engagement and achievements: A case study of design-based learning in a science context*. Retrieved from http://scholar.lib.vt.edu/ejournals/JTE/v19n2/doppelt.html

Duch, B. J., Groh, S. E., & Allen, D. E. (2001). *The power of problem-based learning: a practical" how to" for teaching undergraduate courses in any discipline*. Stylus Publishing, LLC. Retrieved from http://books.google.com/books?hl=en&lr=&id=-78ZnGLRacAC&oi=fnd&pg=PR8&dq=%22Problem-based+Learning%22&ots=xnWlgDw3ka&sig=vBRvU2gMlhr8M4enSgcEfbRi51Y

Duffy, T. M., & Jonassen, D. H. (1992). *Constructivism and the technology of instruction: A conversation*. Psychology Press. Retrieved from http://books.google.com/books?hl=en&lr=&id=yS310A35FC0C&oi=fnd&pg=PR1&dq=constructivism&ots=1v4VqyqzSh&sig=dwffGNrNiTZc-3VF5omxI7ANk-Q

Dunne, D., & Martin, R. (2006). Design thinking and how it will change management education: An interview and discussion. *Academy of Management Learning & Education*, *5*(4), 512–523. doi:10.5465/AMLE.2006.23473212

Fosnot, C. T. (1996). *Constructivism. Theory, Perspectives, and Practice.* ERIC. Retrieved from http://www.eric.ed.gov/ERICWebPortal/recordDetail?accno=ED396998

Gómez Puente, S. M., Van Eijck, M., & Jochems, W. (2011). Towards characterising design-based learning in engineering education: A review of the literature. *European Journal of Engineering Education*, *36*(2), 137–149. doi:10.1080/03043797.2011.565116

Johansson-Sköldberg, U., Woodilla, J., & Çetinkaya, M. (2013). Design thinking: Past, present and possible futures. *Creativity and Innovation Management*, *22*(2), 121–146. doi:10.1111/caim.12023

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, *41*(2), 75–86. doi:10.120715326985ep4102_1

Lee, S., Koh, S., Yen, D., & Tang, H.-L. (2002). Perception gaps between IS academics and IS practitioners: An exploratory study. *Information & Management*, *40*(1), 51–61. doi:10.1016/S0378-7206(01)00132-X

Leinonen, T., & Durall-Gazulla, E. (2014). Design thinking and collaborative learning. *Comunicar, 21*(42). Retrieved from http://eprints.rclis.org/20862/

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Moazzen, I., Hansen, T., Miller, M., Wild, P., Hadwin, A., & Jackson, L. (2013). Literature Review on Engineering Design Assessment Tools. *Proceedings of the Canadian Engineering Education Association*. Retrieved from http://library.queensu.ca/ojs/index.php/PCEEA/article/view/4864

Puente, S. M. G., van Eijck, M., & Jochems, W. (n.d.). A sampled literature review of design-based learning approaches: a search for key characteristics. *International Journal of Technology and Design Education*, 1–16.

Razzouk, R., & Shute, V. (2012). What is design thinking and why is it important? *Review of Educational Research*, *82*(3), 330–348. doi:10.3102/0034654312457429

Savery, J. R., & Duffy, T. M. (1995). Problem based learning: An instructional model and its constructivist framework. *Educational Technology*, *35*(5), 31–38.

Sitthiworachart, J., & Joy, M. (2003). Web-based peer assessment in learning computer programming. In *Advanced Learning Technologies, 2003. Proceedings. The 3rd IEEE International Conference on* (pp. 180–184). Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1215052

Topi, H., Valacich, J. S., Wright, R. T., Kaiser, K., Nunamaker, J. F. Jr, Sipior, J. C., & De Vreeda, G.-J. (2010). IS 2010: Curriculum Guidelines for Undergraduate Degree Programs in Information Systems. *Communications of the Association for Information Systems*, *26*, 359–428.

Trauth, E. M., Farwell, D. W., & Lee, D. (1993). The IS expectation gap: Industry expectations versus academic preparation. *Management Information Systems Quarterly*, *17*(3), 293–307. doi:10.2307/249773

Tsai, C.-C., Lin, S. S., & Yuan, S.-M. (2002). Developing science activities through a networked peer assessment system. *Computers & Education*, *38*(1), 241–252. doi:10.1016/S0360-1315(01)00069-0

Tseng, S.-C., & Tsai, C.-C. (2007a). On-line peer assessment and the role of the peer feedback: A study of high school computer course. *Computers & Education*, *49*(4), 1161–1174. doi:10.1016/j.compedu.2006.01.007

Tseng, S.-C., & Tsai, C.-C. (2007b). On-line peer assessment and the role of the peer feedback: A study of high school computer course. *Computers & Education*, *49*(4), 1161–1174. doi:10.1016/j.compedu.2006.01.007

van Zundert, M., Sluijsmans, D., & van Merriënboer, J. (2010). Effective peer assessment processes: Research findings and future directions. *Learning and Instruction*, *20*(4), 270–279. doi:10.1016/j.learninstruc.2009.08.004

Wells, S. H., Warelow, P. J., & Jackson, K. L. (2009). Problem based learning (PBL): A conundrum. *Contemporary Nurse*, *33*(2), 191–201. doi:10.5172/conu.2009.33.2.191 PMID:19929163

Wijnen, W. (2000). *Towards design-based learning*. Eindhoven: Eindhoven University of Technology. Retrieved from http://w3.tue.nl/fileadmin/osc/OSC_oo/doc/OGO_brochure_1_EN.pdf

Wu, J.-H., Chen, Y.-C., & Chang, J. (2007). Critical IS professional activities and skills/knowledge: A perspective of IS managers. *Computers in Human Behavior*, *23*(6), 2945–2965. doi:10.1016/j.chb.2006.08.008

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

KEY TERMS AND DEFINITIONS

Authentic Learning: A pedagogical approach that encourages students to create tangible outcomes that can be examined and critiqued using the real world as a context.

Deep Learning: An approach to learning in which learner seeks to understand the theory and broader interconnectivity between concepts.

Intrinsic Interest: A desire to engage or learn based on an internal reward system.

Many-to-Many Conversations: A feature of internet-driven communication that allows participants to converse (both transmitting and receive responses) with multiple individuals simultaneously.

Peer Assessment: A process by which students evaluate and provide feedback on each other's work using criteria provided by an instructor.

Surface Learning: An approach to learning that involves simple memorization of facts with no concern for drawing larger connections.

Unstructured Problems: A problem space in which the number of potential solutions is unknown and the connection between the solution and the outcome to be produced is nonlinear and complex.

This research was previously published in Digital Tools and Solutions for Inquiry-Based STEM Learning; pages 61-81, copyright year 2017 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 28
Developing and Validating Measurement Instrument for Various Aspects of Digital economy:
e-Commerce, e-Banking, e-Work and e-Employment

Nikolina Žajdela Hrustek
University of Zagreb, Zagreb, Croatia

Renata Mekovec
University of Zagreb, Zagreb, Croatia

Igor Pihir
University of Zagreb, Zagreb, Croatia

ABSTRACT

ICT-driven innovations affect all sectors of economy and society where trends like adaptability, remote workforce, augmented reality/virtual reality, internet of things, smart machines and artificial intelligence run the core of digital transformation of every aspect of a business. This article introduces the measurement instrument that was created and validated with intention of questioning certain aspects of digital economy from the user point of view. The validation of the proposed measurement instrument was conducted by applying factor analysis (Principal component analysis - PCA) which revealed critical factors affecting certain aspects of digital economy: e-commerce, e-banking, e-work (telework) and e-employment. Measurement instruments were tested on 197 respondents from two Croatian counties. To maximise the benefits that can be derived from digital transformation it is essential to overcome all barriers and force employment of opened opportunities. Business alignment with IT remains a challenge; therefore, presented results are valuable input in the discussed domain.

DOI: 10.4018/978-1-7998-7297-9.ch028

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1. INTRODUCTION

Digital economy refers to economy based on digital technology usage and can be described as the ability of conducting business thought market ground on Internet and World Wide Web. It encompasses every aspect of modern life, such as entertainment, health, education, business, banking as well as citizens' engagement in government work (BCS, 2015). Various components of digital economy include "government, policy and regulation, internet, world wide web, telecommunication and electronic industry, e-business and e-commerce industry, digital service providers, information and knowledge management systems, intellectual property rights, human capital and knowledge workers, research and emerging technologies" (Mutula, 2010). EU and other countries around the world research and promote digital economy (EUROSTAT, 2018a) and try to measure its impact on national and global level (IMF, 2018).

The movement of traded goods, services, and finance defined image of globalization, but today's version of globalization is being characterized by flows of data that embody ideas, information, and innovation with no borders and hard to measure (Barefoot et. al., 2018), (IMF, 2018). According to McKinsey&Company (2016) 50% of the world's traded services are already digitized, 12% of the global goods trade is conducted via international e-commerce, cross-border Skype calls equal 46% of the volume of traditional international calls, from 88 to 100% of the SMEs that use eBay's platform are exporters. Globalization and rapid advancements in information technology offer unprecedented opportunities to improve lives.

ICT and the Internet allow significant consumption benefits, such as finding information, ordering and payment for services and goods and that all customers can perform in the privacy from their home. "An e-commerce transaction is the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or services do not have to be conducted online. One commerce transaction can be between enterprises, households, individuals, governments, and other public or private organizations" (OECD, 2011, p. 72). E-banking refers to the process or service that allows a bank customer to perform financial transactions via electronic media and is one of the most successful services in e-commerce with an increasing number of users every year.

The *e-work* indicate usage of ICT and the Internet in different aspects of employment activities like finding information about employment, sending job applications, logging on for employment mediation portals. The relevant papers that present opportunities of ICT and the Internet to support the employment policy in EU countries are: "Job opportunities in the Information Society" (1998) and "Strategies for jobs in the Information Society" (2000), i2010 - European Information Society 2010 and The Europe 2020 Strategy – "A strategy for smart, sustainable and inclusive growth" (2010). The share of respondents, which use ICT and the Internet as a tool for job seeking, indicates extent to which ICT and the Internet are exploited in job matching of the labour market.

This research aims to validate this new instrument that covers following aspects of digital economy: (i) usage of e-commerce, (ii) scope of e-commerce, (iii) usage of e-banking, (iv) usage of e-work (telework) and (v) e-employment. For this purpose, the new instrument, based on identified 5 factors or components, researched through 25 items (research questions) for monitoring certain aspects of digital economy was defined. Instrument items were defined and adjusted according to EUROSTAT (2014) and SIBIS (2003).

The rest of the paper is organized as follows: the second section of the literature review of digital economy and its current state. The third section provides the research methodology of research measure-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ment instrument, data collection, characteristics of respondents and used statistical methods. Section four represents the results of data analysis by construct validity, reliability of the measurement instrument and research findings: (1) intensity of using e-commerce, (2) scope of e commerce transaction: domestic, international, (3) intensity of using and banking, (4) perception of using e-work - telework, (5) and employment. Paper ends with conclusion and discussion as section five.

2. LITERATURE REVIEW ON DIGITAL ECONOMY

To maintain and take advantage of growing consumer interest in Internet-enabled services, online service providers are investing more in the adoption of e-commerce and are searching for new ways to attract customers to their websites, to encourage them to buy their products/services, and to enhance their loyalty (Ingham et al., 2014). On the other hand, consumers (current and potential) are leveraging and researching (with the use of Internet) prices, quality, services and delivery options, and sharing ideas and opinions to the end point of transaction/end of online shopping (Accenture 2012).

According to Commission expert group (European Commission, 2014a) it is better to characterise digital economy through key features like mobility, network effects and use of data. The US leads the world, with digital activity accounting for 33 per cent of its GDP, and in the second most advanced digital nation UK digital economy accounts for about 31 per cent of the UK's GDP (Racounter, 2016). An increasing number of customers are accepting e-commerce as an alternative to traditional shopping (Ingham et al., 2014).

When it comes to products or services purchased online, according to eMarketer (2014), e-commerce will account $1.316 trillion in 2014, or 5.9% of the retail market worldwide. By 2018, retail e-commerce reaches $2.5 trillion and share 8.8% of worldwide total retail market. Revenue driven by digital is estimated to 11.4% on global scale (research done on 2000 global companies) by Cognizant (Roehrig & Pring, 2018).

Although online sales continue to grow, the influence of web on total retail is much wider, owing this to proliferation of mobile devices, like smartphones or tablets. Forrester research estimates that web will influence 50% of total retail sales and will represent a compound annual growth rate of 7% (Sehgal, V., 2014). Western Europe UK, Germany, and France have the largest online share of retail sales, and forecast is that online retail sales will grow to compound annual growth rate of 11.5% over the next five years (O'Grady, 2014). In year, 2017 EU 28 countries had an average purchase online (in the last 3 months) by 48% of citizens (EUROSTAT, 2018b).

In 2013, eGovernment services have been used by 41% of the EU28 Population, where only 9 out of 28 countries have reached the target of half of the population by using eGovernment services (European Commission, 2014). In 2017, eGovernment services are used in average on EU 28 countries at 49% of individuals (EUROSTAT, 2018b). There are now between three and seven students per computer on average in the EU schools, interactive whiteboards are present in schools (over 100 students per interactive whiteboard), as well as data projectors. Around 50% of students attending grades 8 and 11 in general education use a desktop or a laptop during lessons at school at least weekly, 30% of students in grades 8 and 20% in grade 11 in general education use an interactive whiteboard at least weekly (European Commission, 2013).

The data on Internet banking use show dispersion amongst European countries, with over 80% of bank customers using Internet banking service in Nordic countries, while less than a third of the bank

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

customer population does so in Italy and Spain. In France, Germany, Belgium as well as the UK, adoption rates sit around 50%, while the average for the EU is 43% (Troiano, Sondergaard & Theodore, 2014). Forbes.com (Newman, 2016) predicted that in 2017 successful digital transformation that drives modern business would be encouraged with technology like augmented and virtual reality, application program interfaces, big data analytics, Internet of things, smart machines and artificial intelligence according to Forbes now in 2018 really become reality in every aspects of business (Columbus, 2018).

Adoption, use and perception of various e-services is in literature connected with different factors and possible moderators that (1) can influence overall customers' online behaviour, (2) can increase/ decrease the e-service usage, and (3) can have influence on their further global development.

Most of the literature assumes that young people are the major market for ICT, and therefore studies on online behaviours of older adults are rare. Lian and Yen (2014) presented the performance expectation and social influence as the major factors driving older adults toward online shopping, which is the same as with younger users. On the other hand, the major barriers include value, risk, and tradition, which is different from the younger. Chen et al (2015) presented results that show that gender and trust propensity influence consumers' decisions to continue using the Internet for purchases. Furthermore, the most benefit-oriented customers are men with high trust belief. Results presented by Yousafzai and Yani-de-Soriano (2012) indicate that (1) relationship between usefulness and behaviour is stronger for younger males with high levels of optimism and innovativeness and the (2) relationship between ease of use and behaviour is stronger for older females with high level of discomfort.

Ingham et al. (2014) stress that the extended version of TAM which includes trust, perceived risk and enjoyment can be used as "intermediate dispositional model" between (1) the properties of online shopping web platform, (2) the customer, (3) the e-merchant and (4) customer online purchase behaviour. Alsajjan and Dennis (2010) introduced the Internet banking acceptance model [IBAM] which includes (1) trust, (2) subjective norms, (3) perceived manageability, (4) perceived usefulness and (5) attitudinal intentions. IBAM can be used in order to predict and explain Internet banking behaviour. Loureiro (2013) reports that perceived quality and brand loyalty are more important when explaining the Internet brand equity than brand awareness and trust.

As part of digital economy measurement instrument, developed in this paper, perception of using e-work telework and e-employment were considered and authors such Laar et.al. (2017) made a systematic literature review on new digital skills at labour in digital economy that helps unemployed/employed to better perception of this "new" ways of doing business in digital economy. According to Eurostat indicator of looking for a job or sending job applications online EU 28 countries has an average of 17% of individuals seeking a job in this way (EUROSTAT, 2018b).

Challenges and opportunities of digital economy in developing countries were explored by Lazovic and Durickovic (2014), which presents an opportunity for developing countries and its classic economies to transform to digital economy, "skip" a few steps, and effectively respond to the demands of the global market. Using ICT and the Internet for conducting business activities today links two terms: telework and e-work, where e-work is the general component. "Telework occurs when paid workers carry out all, or part, of their work away from their normal places of activity, usually from home, using information and communication technologies" (Johnston, Nolan, 2001, p. 12).

The previous studies conducted differ several types of e-work. Gareis (2002) distinguishes the following types of e-work: employees working in remote back-offices, multi-locational teleworking employees, home-based teleworking employees, remote call centre in company-owned back office (outside own

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

region), employees working in telecentres, telecottages or other office premises owned by third parties, call centre employees in telecottages or telecentres.

Types of outsourced e-work include: e-lancers, e-outsourcing within own region, e-outsourcing to other region in own country, e-outsourcing to companies in other countries, outsourced call-centre, and outsourced call-centre with telecoms link. The request for labour and work is becoming more frequent due to less stability in employment relationships, dynamic changes in traditional and new sectors, diversification of career development and labour mobility. In this sense, ICT and the Internet can serve different purposes, for example offering websites for sophisticated job and candidate search engines, facilitating job-matching and job mobility for job seekers and employers, improving the functioning of labour markets, coordination and exchange of information, monitoring of local market trends, and online marketing employers and employees etc. Active labour market policies for digital economy were investigated by Bianco (2018).

The item related to e-commerce measured frequency of purchase various products and services and is of high relevance for digital economy adoption. The indicator of Internet users conducting on-line banking is also of great relevance for digital economy adoption. When the user is confident in security features that supports online banking, this most often ultimately results in a much more frequent use also other types of transactions.

The items measuring a frequency of usage ICT and Internet for communication is important because ability to communicate with others via the Internet is one of the skills of digital literacy and digital literacy is a central objective in the e-learning Action Plan in eEurope 2005 and one of priority of Digital Agenda for Europe and The Europe 2020 Strategy.

A high level of skills in communicating by using e-mail and social networks indicates a high potential for exploiting communicative potential of the Internet. An increase in the share of respondents who frequently ore very frequently use ICT and Internet for communicating with others should be interpreted as an increase in the general level of digital literacy.

3. RESEARCH METHODOLOGY

3.1. Research Measurement Instrument

With an aim to create a measurement instrument (a questionnaire) for monitoring certain aspects of digital economy: usage and scope of e-commerce, usage of e-banking, usage of e-employment and user perception regarding e-work (telework), the approach proposed by Straub et al. (2004) is adopted (Figure 1).

At the beginning of the creation of measurement instrument (questionnaire), an initial pool of 25 items presented in Table 1 was drafted based on a comprehensive overview of recent available research, outlined in previous section, adjusted according to EUROSTAT (2014) and SIBIS (2003). These 25 items were supplemented with demographic, economic and social status questions regarding participants' gender and age, household structure, place of residence, marital status, employment, family assets situation, level of income of the household in the last three years, level of education, along with questions regarding the time when respondents first started using the computer and the Internet.

Items were coded on a 5-point semantic ordinal scale. Response labels for items measuring user perception ranged from "1-strongly disagree" to "5-strongly agree", and those for measuring usage ranged from "1-not at all" to "5-very frequently".

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Research framework



Source: Authors' work

3.2. Data Collection and Characteristics of Respondents

The research targets were people who daily use ICT and the Internet. For the purpose of this study an online questionnaire was designed. Various demographic, economic, social and cultural characteristics of the respondents are presented in Table 2.

The research was conducted in two counties in the north-western part of Croatia (Varaždin and Međimurje County) on a convenience sample using a non-parametric snowball sampling method. For more detail about this method, see Babbie (2010). For contacting potential subjects/respondents electronic mail and social network (Facebook) and an e-learning system of Faculty of organization and informatics were used. Link on online questionnaire on the social network Facebook has been sent to respondents (friends, relatives ..., 18+) with a request for filling out the questionnaire and to forward the questionnaire to other respondents (18+) with which they are connected on this or other social networks. System for e-Learning at Faculty of Organization and Informatics Varaždin, for the purpose of the pilot survey was used in a way that the link to the questionnaire was placed on forum of courses Operations Research 1 and Operations Research 2 with the request that all students who want to, voluntarily fill out a questionnaire. The data collection period via online survey lasted three months, i.e. from June to September 2014. A total of 331 respondents participated in the study, aged 18 to 74. The number of valid questionnaires was 197, remaining 134 questionnaires were incomplete and thus discarded from further analysis.

3.3. Statistical Methods

The online questionnaire was evaluated in terms of construct validity and reliability. In this research, construct validity was established through convergent and discriminating validity. For the assessment, authors used convergent and discriminating validity factor analysis as a multivariate statistical approach.

Factor analysis is a technique particularly suitable for analysing the patterns of complex, multidimensional relationships and usually is used by researchers to examine the underlying patterns or relationships for a large number of variables and to determine whether the information can be condensed or summarized in a smaller set of factors or components (Rencher, 2002). Factor analysis identified the separate dimensions of the structure first and then determined the extent to which each variable is explained by each dimension. The applied factor analysis method is ‘‘principle component analysis (PCA)’’ with orthogonal Varimax rotation method and Keiser normalization. As a criterion to determine the number of factors, Eigenvalue larger than 1 was used. Only items with factor loadings above 0.40 and cross-loadings below 0.40 were retained (Hair et al., 2009). The Kaiser-Meyer-Olkin (KMO) test of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Research measurement instrument description

Component	Code	Item
Intensity of usage e-commerce (1)	Q99	In the last three months, I have used ICT and Internet to buy food, supplies.
	Q107	In the last three months, I have used ICT and Internet to buy movies, music.
	Q101	In the last three months, I have used ICT and Internet to buy household supplies (furniture, toys, etc.).
	Q108	In the last three months, I have used ICT and Internet to buy books, magazines, newspapers.
	Q102	In the last three months, I have used ICT and Internet to buy items for sport and recreation.
	Q106	In the last three months, I have used ICT and Internet to buy telecommunications services.
	Q100	In the last three months, I have used ICT and Internet to buy shoes and clothes.
	Q103	In the last three months, I have used ICT and Internet to buy / book tickets (concerts, theatre, exhibitions).
	Q104	In the last three months, I have used ICT and Internet to buy electronic equipment.
	Q105	In the last three months, I have used ICT and Internet to buy computer software/video games or computer equipment.
	Q115	In the last three months, I have used ICT and Internet for investing in investment funds.
Intensity of usage of e-banking (2)	Q113	In the last three months, I have used ICT and Internet to pay the bills, the products and services via e-banking.
	Q114	In the last three months, I have used ICT and Internet for money transfer.
	Q112	In the last three months, I have used ICT and the Internet to find information about banking products and services.
	Q98	In the last three months, I have used ICT and Internet to find information about specific / desired products and services.
Perception of e-work and telework (3)	Q121	I believe that the implementation of working at distance (telework) increases labour productivity.
	Q122	I believe that the implementation of working at distance (telework) increases a sense of autonomy in the workplace.
	Q120	I believe that, by using ICT and the Internet, one may easily synchronize one's private and business life.
	Q119	I believe that, by using ICT and Internet, one can do more business activities in one day.
Scope of e-commerce transaction: domestic, international (4)	Q109	I buy products and services via ICT and Internet from local companies.
	Q110	I buy products and services via ICT and Internet from companies across the European Union.
	Q111	I buy products and services via ICT and Internet from companies all over the world.
Intensity of using e-employment (5)	Q116	In the last three months, I have used ICT and the Internet to find information about employment.
	Q117	In the last three months, I have used ICT and the Internet to send job applications.
	Q118	By using ICT and the Internet, I can, in a simpler manner, make contact with potential employer.

Source: Authors' work

sampling adequacy and Bartlett's test of sphericity were examined to check if the requirements for factor extraction were met. Kaiser-Meyer-Olkin test of sampling adequacy represents the ratio of the squared correlation between variables to the squared partial correlation between variables. Kaiser (1974) recommends accepting values greater than 0.5 as barely acceptable. Value between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are the most acceptable. For more, see Hutcheson and Sofroniou (1999).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Demographic, economic, social and cultural characteristics of respondents

Gender	Percentage	Marital Status	Percentage
Male	48%	Single	61.0%
Female	52%	Married	30.0%
Place of residence	Percentage	Partnered	6.0%
Urban	59%	Divorced	1.0%
Rural	41%	Widowed	2.0%
The level of income of the household in the last three years	Percentage	Family assets situation	Percentage
Increased	4.0%	Much worse than the majority	4.0%
Decreased	9.0%	Somewhat worse than the majority	9.0%
Stayed the same	67.5%	Neither better nor worse than the majority	67.5%
Do not know	18.0%	Somewhat better than the majority	18.0%
Decline to answer	1.5%	Much better than the majority	1.5%
Household structure	Percentage	When did you first start using the computer and the Internet?	Percentage
One-person household	6.0%	6 months ago, or more	2.0%
Adults without dependent children	23.0%	6-12 months ago	0.0%
Single parent with one or more dependent children	7.0%	1-2 years ago	0.5%
Two adults with one or more dependent children	58.0%	2 years ago, or more	86.3%
Other households with dependent children	6.0%	I do not know.	11.2%
Level of education	Percentage	Employment	Percentage
Primary school	1.0%	Full-time employment	43.0%
Three-year vocational secondary school	4.0%	Part-time employment	3.0%
Four-year secondary school	46.0%	Part-time employment as the only source of income	0.5%
College	8.0%	Independent economic activity (craftsman. freelancer)	1.0%
Faculty	35.0%	Unemployed	7.0%
Specialization, Master's, Doctorate	6.0%	Student	44.0%
		Retired	1.5%

Source: Authors' work

It is also necessary to measure the reliability of the measurement instrument in order to prove that its use in repeated measuring would show equal measurement indicators. To approximate the reliability of an instrument, its degree of internal consistency should be determined. This study employed Cronbach's Alpha reliability coefficient for measuring internal consistency of extracted factors. It is considered, for the instrument to have a satisfying reliability, if Cronbach's Alpha reliability coefficient is 0.70 or higher (Mejovšek, 2008).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

4. RESULTS

Table 3 presents the final version of the research instrument for measuring certain aspects of digital economy: usage and scope of e-commerce, usage of e-banking, usage of e-employment and user perception regarding e-work (telework).

Table 3. Validated research instrument and descriptive statistics

Code	Item	N	Min	Max	Mean	St.Dev.
Intensity of usage e-commerce (1)						
Q99	In the last three months, I have used ICT and Internet to buy food, supplies.	197	1	5	1.518	0.961
Q107	In the last three months, I have used ICT and Internet to buy movies, music.	197	1	5	1.503	0.924
Q101	In the last three months, I have used ICT and Internet to buy household supplies (furniture, toys…).	197	1	5	1.624	0.990
Q108	In the last three months, I have used ICT and Internet to buy books, magazines, newspapers.	197	1	5	1.579	0.958
Q102	In the last three months, I have used ICT and Internet to buy items for sport and recreation.	197	1	5	1.827	1.134
Q106	In the last three months, I have used ICT and Internet to buy telecommunications services.	197	1	5	1.711	1.011
Q100	In the last three months, I have used ICT and Internet to buy shoes and clothes.	197	1	5	1.995	1.172
Q103	In the last three months, I have used ICT and Internet to buy / book tickets (concerts, theatre, exhibitions).	197	1	5	1.954	1.117
Q105	In the last three months, I have used ICT and Internet to buy computer software/video games or computer equipment.	197	1	5	1.827	1.148
Q115	In the last three months, I have used ICT and Internet for investing in investment funds.	197	1	5	1.330	0.874
Intensity of usage of e-banking (2)						
Q113	In the last three months, I have used ICT and Internet to pay the bills, the products and services via e-banking.	197	1	5	2.837	1.537
Q114	In the last three months, I have used ICT and Internet for money transfer.	197	1	5	2.635	1.548
Q112	In the last three months, I have used ICT and the Internet to find information about banking products and services.	197	1	5	2.371	1.225
Q98	In the last three months, I have used ICT and Internet to find information about specific / desired products and services.	197	1	5	3.822	0.976
Perception of e-work and telework (3)						
Q121	I believe that the implementation of working at distance (telework) increases labour productivity.	197	1	5	3.508	0.951
Q122	I believe that the implementation of working at distance (telework) increases a sense of autonomy in the workplace.	197	1	5	3.407	0.941

continues on following page

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Continued

Code	Item	N	Min	Max	Mean	St.Dev.
Q120	I believe that, by using ICT and the Internet, one may easily synchronize one's private and business life.	197	1	5	3.416	0.969
Q119	I believe that, by using ICT and Internet, one can do more business activities in one day.	197	1	5	3.832	0.962
Scope of e-commerce transaction: domestic, international (4)						
Q109	I buy products and services via ICT and Internet from local companies.	197	1	5	2.269	1.104
Q110	I buy products and services via ICT and Internet from companies across the European Union.	197	1	5	2.421	1.097
Q111	I buy products and services via ICT and Internet from companies all over the world.	197	1	5	2.888	1.358
Intensity of using e-employment (5)						
Q116	In the last three months, I have used ICT and the Internet to find information about employment.	197	1	5	2.589	1.324
Q117	In the last three months, I have used ICT and the Internet to send job applications.	197	1	5	2.061	1.276
Q118	By using ICT and the Internet, I can, in a simpler manner, make contact with potential employer.	197	1	5	3.492	1.172

Source: Authors' work

The goal of the research was to develop the research measurement instrument for monitoring certain aspects of digital economy: usage and scope of e-commerce, usage of e-banking, usage of e-employment and user perception regarding e-work (telework). In the first step an initial pool of 25 items was created. For the purpose of validation of the measuring instrument online questionnaire was designed and a pilot study has been conducted on people who daily use ICT and the Internet in the north-western part of Croatia (Varaždin and Međimurje County). Construct validity of measuring instrument has been tested with factor analysis method ''maximum likelihood'' with orthogonal Varimax rotation and Keiser normalization. In order to check that the requirements for factor extraction were met the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and Bartlett's test of sphericity was examined. For measuring internal consistency of extracted factors this study employed Cronbach's Alpha reliability coefficient.

In continuation the results of construct validity, the reliability and research findings are presented.

4.1. Construct Validity

In order to determine whether the partial correlation of the variables was small, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Chi-square test of sphericity before conducting the factor analysis was used. As depicted in Table 4, the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = 0.832) and Bartlett's test of sphericity ($\chi 2 = 2437.108$, df = 276, p = .000) both confirmed that the data satisfied the requirements for carrying out the principal component analysis (PCA).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Kaiser–Meyer–Olkin and Bartlett's test of sphericity

Kaiser–Meyer–Olkin and Bartlett's test of Sampling Adequacy.		0.832
Bartlett's test of sphericity	Approx. Chi-Square	2437.108
	df	276
	Sig	0.000

Source: Authors' work

After the first "principle component analysis (PCA)'' with orthogonal Varimax rotation and Keiser normalization iteration, only one item did not meet the loading cut-off, thus this item was dropped. The remaining items were then subjected to another iteration and with this iteration, the meaningful factor structure was reached. The final PCA with orthogonal Varimax rotation and Keiser normalization iteration uncovered 5 distinct factors (Table 5). They accounted for 62.981% of the sample variance.

As findings show in Table 5, five factors relevant to certain aspects of digital economy were defined. The first one appeared to be the most important one because it explained the largest portion (31.631%) of the total variance after the varimax rotation. It consisted of 10 items meant for measuring Frequency of using e-commerce. The second factor explained 11.080% of the variance. It had 4 items that measure Frequency of using e-banking. The third factor accounted for 7.799% of the variance. It employed 4 items for determination of Perception of e-work - telework. The fourth factor represented 7.087% of the variance and consisted of 3 items measuring Scope of e-commerce transaction (domestic/international). The fifth factor explained 5.384% of the total variance. It was assessed with 3 items aimed for measuring the Frequency of using e-employment.

4.2. The Reliability of the Measurement Instrument

The final measurement instrument (questionnaire) consisted of 24 items distributed over 5 assessment scales that were intended to measure the following constructs: (1) Intensity of using e-commerce, (2) Intensity of using e banking, (3) Perception of e work - telework, (4) Scope of e commerce transaction: domestic, international, and (5) Intensity of using e-employment.

In order to prove that the use of an assessment scale in repeated measurements would show equal measurement indicators it is necessary to measure the reliability of such a measurement instrument. One way to approximate the reliability of an instrument is to calculate the degree of internal consistency or Cronbach's alpha coefficient for each scale or category of questions.

An instrument is considered to have satisfying reliability if Cronbach's alpha reliability coefficient is 0.70 or higher (Mejovšek, 2008). Cronbach's alpha coefficients for each part of the measurement instrument or assessment scale were found to be satisfactory for convenience sample (N=197). As can be observed from the data presented in Table 6 for the category of questions on "Intensity of usage e commerce" Cronbach's alpha coefficient was 0.905.

From the data presented in Table 7 for the category of questions on "Intensity of using e-banking", one can see that Cronbach's alpha coefficient was 0.823, which is acceptable.

For the category of questions on "Perception of e-work - telework" Cronbach's alpha coefficient was 0.798 according to the data presented in Table 8, which is also acceptable.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Rotated component matrix

	Component				
	1	2	3	4	5
Q99	0.817				
Q107	0.794				
Q101	0.771				
Q108	0.747				
Q102	0.729				
Q106	0.709				
Q100	0.703				
Q103	0.660				
Q105	0.649				
Q115	0.456				
Q113		0.865			
Q114		0.845			
Q112		0.781			
Q98		0.477			
Q121			0.842		
Q122			0.826		
Q120			0.789		
Q119			0.615		
Q110				0.857	
Q109				0.702	
Q111				0.682	
Q117					0.855
Q116					0.849
Q118					0.502

* Extraction Method: principal Component Analysis, Rotaton Method: Varimax with Kaiser Normalization
Source: Authors' work

For the part of measurement instrument which presented category of questions "Scope of e-commerce transaction: domestic, international" Cronbach's alpha coefficient was 0.774 (Table 9).

And finally, according to the results presented in Table 10 the category of questions on "Intensity of using e-employment" Cronbach's alpha coefficient was 0.687.

As all Cronbach coefficients α are higher than 0.7, except for factor Frequency of the use e-employment, the alpha value of which is 0.687, which is considered acceptable by certain authors (that is according to Hair et al., 2014 and Kehoe, 1995 acceptable for exploratory studies and for small component which have less than 10 - 15 items), one can rely on the measurement instrument and its measurement results.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 6. Internal consistency - Intensity of usage e-commerce

Case Processing Summary			
		N	**%**
Cases Valid		197	100.0
Excluded		0	0.0
Total		197	100.0
Reliability Statistics			
Cronbachs Alpha		Cronbachs Alpha Based on Standardized Items	N of Items
0.905		0.906	10
Item Statistics			
	Mean	Std. Deviation	N
Q99	1.518	0.9615	197
Q107	1.503	0.9237	197
Q101	1.625	0.9903	197
Q108	1.579	0.9584	197
Q102	1.827	1.1342	197
Q106	1.711	1.0114	197
Q100	1.995	1.1715	197
Q103	1.954	1.1171	197
Q105	1.827	1.1476	197
Q115	1.330	0.8735	197

Source: Authors' work

Table 7. Internal consistency - Intensity of using e-banking

Case Processing Summary			
		N	**%**
Cases Valid		197	100.0
Excluded		0	0.0
Total		197	100.0
Reliability Statistics			
Cronbachs Alpha		Cronbachs Alpha Based on Standardized Items	N of Items
0.823		0.814	4
Item Statistics			
	Mean	Std. Deviation	N
Q113	2.838	1.5333	197
Q114	2.635	1.5480	197
Q112	2.371	1.2246	197
Q98	3.822	0.9762	197

Source: Authors' work

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 8. Internal consistency - The perception of the use of e-work – telework

Case Processing Summary			
		N	**%**
Cases Valid		197	100.0
Excluded		0	0.0
Total		197	100.0
Reliability Statistics			
Cronbachs Alpha		Cronbachs Alpha Based on Standardized Items	N of Items
0.798		0.799	4
Item Statistics			
	Mean	Std. Deviation	N
Q119	3.832	0.9622	197
Q120	3.416	0.9686	197
Q121	3.508	0.9509	197
Q122	3.406	0.9409	197

Source: Authors' work

Table 9. Internal consistency - Scope of the e-commerce transaction: domestic, international

Case Processing Summary			
		N	**%**
Cases Valid		197	100.0
Excluded		0	0.0
Total		197	100.0
Reliability Statistics			
Cronbachs Alpha		Cronbachs Alpha Based on Standardized Items	N of Items
0.774		0.785	3
Item Statistics			
	Mean	Std. Deviation	N
Q109	2.269	1.1037	197
Q110	2.421	1.0974	197
Q111	2.888	1.3582	197

Source: Authors' work

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 10. Internal consistency - Intensity of using e-employment

Case Processing Summary			
		N	**%**
Cases Valid		197	100.0
Excluded		0	0.0
Total		197	100.0
Reliability Statistics			
Cronbachs Alpha		Cronbachs Alpha Based on Standardized Items	N of Items
0.687		0.680	3
Item Statistics			
	Mean	Std. Deviation	N
Q116	2.589	1.3242	197
Q117	2.061	1.2763	197
Q118	3.492	1.1720	197

Source: Authors' work

4.3. Research Findings

Results of descriptive statistical analysis presented in Table 3 indicate that respondents who participated in the pilot study unexpectedly rarely used e-commerce services. For example, more than 65% of the respondents rarely or never used e-commerce services for purchasing shoes and clothes or to buy/book tickets for concerts, theatre, exhibitions. Likewise, more than 70% of the respondents rarely or never used e-commerce services to buy computer software/video games or computer equipment, telecommunications services and sport and recreation items. More than 80% of the survey participants are not interested in investing in investment funds or electronical purchase, household supplies, movies, music, books, magazines, newspapers or food.

With regard to the factor "Scope of the e-commerce transaction: domestic/international, respondents' purchase of products and services do not refer from the companies in their country or from the EU member states, but from companies around the world.

Results related to factor "Intensity of using e-banking" show respondents' frequency of using e-banking services and reveal that more than one third of participants frequently or very frequently use e-banking for money transfer and payment and 20.30% of them use it to find information about banking products and services, while more than 70.00% of respondents use it to find information about specific / desired products, ICT services and Internet use.

Results which presented factor (3) "The perception of the use of e-work – telework" demonstrated a positive attitude regarding the questionnaire items which were related to the use of ICT and Internet for business activities and e-work (telework). More than 40.00% of respondents believe that telework increases a sense of autonomy and labour productivity, 75.00% of them believe that, by using ICT and Internet, one can do more business activities in one day and 50.76% of them state that using ICT and Internet can easily synchronize one's private and business life.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

According to data associated with the factor "Frequency of the use of e –employment", as well as with previously analysed e-commerce, an unexpectedly small number of respondents in the pilot study use ICT and the Internet for the purpose of employment, 63.45% of respondents do not use or very rarely use ICT and Internet to send job application, while 47.72% stated that they do not use or very rarely use ICT and Internet to find information about employment. Although respondents usually do not use ICT and the Internet for the purpose of employment, it is interesting that respondents in the pilot study perceived the use of ICT and the Internet for the purpose of employment as useful because 62.44% of them agree or strongly agree with the statement "By using ICT and the Internet, I can, in a simpler manner, make contact with potential employer."

Usage of measurement instrument for research in its on the whole or by component and its results can be of great help to the creators of the national strategy in public sectors as well as researchers in the country and abroad concerning digital economy and information society, because it displays results in relation to important spectre of component as well as critical factors which have a huge influence on active participation of individuals/groups/communities in certain segments of information society. The measuring instrument is also suitable for use in large-scale research of several relevant and topical aspects of digital economy in general population of citizens according to socioeconomic characteristics and can be useful and valuable for small and large businesses in Croatia and other countries of the world for market research and ultimately for defining long-term as well as short-term decisions and strategic plans.

5. CONCLUSION AND DISCUSSION

In this paper digital economy critical factors were researched starting with extensive literature review and finishing with the empirical research of certain aspects digital economy measurement instrument validity that was finally confirmed through this research. Digital economy measurement instrument was based on five major critical factors gathered around 25 instrument items or research questions that define state of certain aspects digital economy in general population of citizens.

In section, three and four empirical research was conducted and results was discussed. Firstly, the research items were defined, then factor analysis was applied through principal component analysis – PCA, which resulted with critical factors affecting digital economy. Then, a new instrument for measuring certain aspects digital economy was tested and validated with reliability analysis on sample of 197 respondents from two of Croatia counties. Final results, were discussed through section 4.3. and findings in general population of citizens were presented and discussed. From point of view of empirical data gathered in this research, it can be concluded that citizens in Croatia (presented sample) are still mainly sceptics in major use and benefits of digital economy. Respondents are generally conservative about new possibilities of ICT and Internet in area of e-commerce, e-banking, e–employment and e-work – telework in regular manner. The results of empirical research indicate that more than 2/3 of respondents use Internet for gathering information about product and services but they buy them normally in regular manner and avoiding the use of e-commerce services for these purposes.

In comparison with the EU28 countries for 2014, on average the level of usage of e-commerce services was 41% in 2017 EU28 was 48% (EUROSTAT, 2017). Results for Croatia was 21%. Purchase in European Union is mostly used by the UK citizens 72.00% 2014 and for UK in 2017 78%. and the minimum of users 6.00% - 2014 and 11% 2017 was in Romania (calculations made by the author, based on EUROSTAT data (EUROSTAT, 2018b). Use of e-banking for money transfer and payments of bills is

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

present at 1/3 of respondents in Croatia which is same as in EUROSTAT 2017 report 33% (EUROSTAT, 2018b), unlike continuing growth in number of Internet banking users in 28 EU countries which on average in 2014 reached the level of 44.00%; in 2017 it was 56%. From the survey results, it is evident that respondents also have a positive attitude towards e-work or telework and believe that it brings more freedom and gains increase in labour productivity. Respondents, which participated in the study, also see great benefits in contacting potential employer through the use of ICT and Internet, even if a small number of them use it to find job or apply for it via the Internet in Croatia according to EUROSTAT (2018b) only 13% which is in line with empirical results and littlebit below the EU 28 average of 17% in 2017 (EUROSTAT, 2018b).

There are several limitations of the conducted and described research, which should be taken into consideration. First limitation is connected to the sample of the respondents of pilot study as well as the method used (snowball sampling method) which consists exclusively to the respondents from two very similar districts in the northwest area of Croatia (Međimurje and Varaždin district) and that in that sample, hardly accessible areas which do not have the same level of infrastructure which allows access to the Internet, were not included. Therefore, in the further researches with the existing validated measurement instrument, the intention is to conduct a research on a greater number of respondents, in such a way to encompass larger and more diverse number of areas in Croatia as well as some other countries members of the European Union, if possible. The age group of the respondents were adult citizens, which includes respondents of the younger generation of so called "digital natives". The most important reason for not including people younger than 18 years of age into the research were certain claims in which respondents were asked their opinion on activities juveniles are forbid to conduct by the law, such as claims concerning e-banking, e- employment and e-work. Generally for future research, this research results are a good starting point for large-scale research of digital economy in general population of citizens and can be of great help to both the private and public sectors in defining strategic plans and decisions. On the other hand, new measurement instrument validated through this pilot study, which comprises only certain aspects of the digital economy should be of great value for further research in this complex and current relevant but still insufficiently explored area.

REFERENCES

Accenture. (2012). *European Cross-border e-commerce the challenge of achieving profitable growth*. Retrieved March 31, 2016, from https://www.accenture.com/us-en//~/media/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Industries_2 /Accenture-ERRT-Brochure.pdf

Alsajjan, B., & Dennis, C. (2010). Internet banking acceptance model: Cross-market examination. *Journal of Business Research*, *63*(9-10), 957–963. doi:10.1016/j.jbusres.2008.12.014

Babbie, E. (2010). The Practice of Social Research (13th ed.). Wadsworth, Cengage Learning.

Barefoot, K., Curtis, D., Jolliff, W., Nicholson, J. R., & Omohundro, R. (2018). Defining and Measuring the Digital Economy. Bureau of Economic Analysis U.S. Department of Commerce. Retrieved April 20, 2018. https://www.bea.gov/digital-economy/_pdf/defining-and-measuring-the-digital-economy.pdf

BCS. (2015). The digital economy, Enabling the information society. Retrieved March 31, 2016, from http://policy.bcs.org/sites/policy.bcs.org/files/digital%20economy%20Final%20 version_0.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bianco, A. (2018). Active Labour Market Policies for Digital Economy: Skills Development and Workforce Preparation. ASTRIL (Associazione Studi e Ricerche Interdisciplinari sul Lavoro). Retrieved July 1, 2018, from http://host.uniroma3.it/associazioni/astril/db/434116a6-9952-477f-9fff-98da58bb36a7.pdf

Chen, Y., Yan, X., Fan, W., & Gordon, M. (2015). The joint moderating role of trust propensity and gender on customers' online shopping behaviour. *Computers in Human Behavior*, *43*, 272–283. doi:10.1016/j.chb.2014.10.020

Columbus, L. (2018). The State Of Digital Business Transformation. Forbes. Retrieved April 20, 2018. from https://www.forbes.com/sites/louiscolumbus/2018/04/22/the-state-of-digital-business-transformation-2018/#7902aad85883

eMarketer. (2014). Retail sales worldwide will top $22trillion this year. Retrieved March 31, 2016, from http://www.emarketer.com/Article/Retail-Sales-Worldwide-Will-Top-22-Trillion-This-Year/1011765

European Commission. (2013). Survey of schools: ICT in Education, Benchmarking Access, use and attitudes to technology in Europe's schools. European Schoolnet and University of Liege Psychology and Education. (SMART No. 2010/0039). Retrieved March 31, 2016, from https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/KK-31-13-401-EN-N.pdf

European Commission. (2014). eGovernment, Digital Agenda Scoreboard 2014. Retrieved March 31, 2016, from http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=5814

European Commission. (2014a). Commission Expert Group on Taxation of the Digital Economy - Report. Retrieved April 20, 2017, from http://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/gen_info/good_governance_matters/digital/report_digital_economy.pdf

EUROSTAT. (2014) European Union survey on ICT usage in households and by individuals. Eurostat Model Questionnaire (version 3.4). Retrieved April 11, 2014. from https://circabc.europa.eu/sd/a/9d890128-8925-4b8a-9dba3e9281de3759/Questionnaire%20HH%202014_v3.4.pdf

EUROSTAT. (2018a). Digital economy & society in the EU - A browse through our online world in figures. 2018 edition. Eurostat. Retrieved July 7, 2018, from http://ec.europa.eu/eurostat/cache/infographs/ict/2018/index.html

EUROSTAT. (2018b). Science, technology, digital society. Eurostat. Retrieved July 1, 2018, from http://ec.europa.eu/eurostat/data/database

Gareis, K. (2002) SIBIS – Workpackage 2: Topic research and indicator development, Work, employment & skills. Retrieved March 10, 2016, from http://www.sibis-eu.org/files/D2-2/SIBIS_WP2_work_employment_skills.pdf

Hair, J. F. Jr, Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate Data Analysis* (7th ed.). Englewood Cliffs: Prentice Hall.

Hair, J. F. Jr, Hult, G. T. M., Ringle, C., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM)*. London, UK: Sage Publications.

Hutcheson, G., & Sofroniou, N. (1999). *The multivariate social scientist*. London: Sage. doi:10.4135/9780857028075

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

International Monetary Fund (IMF). (2018). Measuring The Digital Economy. Retrieved July 7, 2018, from https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/04/03/022818-measuring-the-digital-economy

Ingham, J., Cadieux, J., & Mekki Berrada, A. (2014). e-Shopping acceptance: A qualitative and meta-analytic review. *Information & Management*, *52*(1), 44–60. doi:10.1016/j.im.2014.10.002

Johnston, P., & Nolan, J. (2001). Status Report on New Ways to Work in the Knowledge Economy. Information society technologies. Retrieved March 16, 2016, from ftp://ftp.cordis.europa.eu/pub/ist/docs/ka2/ework2001.pdf

Kehoe, J. (1995). *Basic Item Analysis for Multiple-Choice Tests*. ERIC/AE Digest.

Laar, E., & Deursen, A. J. A. M. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, *72*, 577–588. doi:10.1016/j.chb.2017.03.010

Lazovic, V., & Durickovic, T. (2014). The digital economy in developing countries - challenges and opportunities. In *37th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)*, Opatija, Croatia (pp. 1580-1585). 10.1109/MIPRO.2014.6859817

Lian, J.-W., & Yen, D. C. (2014). Online shopping drivers and barriers for older adults: Age and gender differences. *Computers in Human Behavior*, *37*, 133–143. doi:10.1016/j.chb.2014.04.028

Loureiro, S. M. C. (2013). The effect of perceived benefits, trust, quality, brand awareness/associations and brand loyalty on Internet banking brand equity. *International Journal of Electronic Commerce Studies.*, *4*(2), 139–158. doi:10.7903/ijecs.1000

McKinsey & Company. (2016). Digital Globalization: The New Era of Global Flows. McKinsey Global Institute. Retrieved April, 20, 2017, from http://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Digital%20globalization%20The%20new%20era%20of%20global%20flows/MGI-Digital-globalization-Full-report.ashx

Mejovšek, M. (2008). *Metode znanstvenog istraživanja u društvenim i humanističkim znanostima*. Zagreb: Naklada Slap.

Mohit, M. A. (2014). Present trends and future directions of quality-of-life. *Procedia: Social and Behavioral Sciences*, *153*, 655–665. doi:10.1016/j.sbspro.2014.10.097

Mutula, S. M. (2010). Digital Economy Components - Digital Economies: SMEs and E-Readiness. doi: Retrieved from http://www.igi-global.com/chapter/digital-economy-components/36102 doi:10.4018/978-1-60566-420-0.ch003

Newman, D. (2016). Top 10 Trends For Digital Transformation In 2017. *Forbes*. Retrieved April, 20, 2017, from https://www.forbes.com/sites/danielnewman/2016/08/30/top-10-trends-for-digital-transformation-in-2017/#7aa2928347a5

O'Grady, M. (2014). Forrester research online retail forecast, 2013 to 2018 (Western Europe). *Forrester Research*. Retrieved March 31, 2016, from https://www.forrester.com/Forrester+Research+Online+Retail+Forecast+2013+To+2018+Western+Europe/fulltext/-/E-RES116259

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Reconteur. (2016). The Digital Economy. Retrieved April, 20, 2017, from https://raconteur.uberflip.com/i/774645-the-digital-economy-special-report-2017

Rencher, A. C. (2002). *Methods of Multivariate Analysis*. Hoboken, NJ: John Wiley & Sons. doi:10.1002/0471271357

Roehring, P. & Pring, Benjamin. (2018). The World Ahead – Mastering the Digital Economy. Cognizant. Retrieved from https://www.cognizant.com/whitepapers/the-work-ahead-mastering-the-digital-economy-codex2115.pdf

Sehgal, V. (2014). Forrester Research Web-Influenced Retail Sales Forecast, 2013 To 2018 (US). *Forrester Research*. Retrieved March 31, 2016, from https://www.forrester.com/Forrester+Research+Web Influenced+Retail+Sales+Forecast+2013+To+2018+US/fulltext/-/E-RES117465

SIBIS. (2003). Benchmarking Social Inclusion in the Information Society in Europe and the US. Retrieved from http://www.eurosfaire.prd.fr/ist/documents/pdf/6-Benchmarking_Social_Inclusion_in_the_Information_Society.pdf

Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information Systems*, *13*(1), 63. Retrieved from http://aisel.aisnet.org/cais/vol13/iss1/24

Troiano, M., Sondergaard, T., & Theodore, S. (2014). Multichannel banking and overcapacity: cost saving opportunity or competitive threat? ScopeRatings. Retrieved from https://www.scoperatings.com/study/download?id=81053d19-74f0-4804-ba89-2ece61a5eb74&q=1

Yousfzai, S., & Yani-de-Soriano, M. (2012). Understanding customer-specific factors underpinning internet banking adoption. *International Journal of Bank Marketing*, *30*(1), 60–81. doi:10.1108/02652321211195703

This research was previously published in the International Journal of E-Services and Mobile Applications (IJESMA), 11(1); pages 50-67, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 29
Emergence of Industry 4.0 Technologies:
Leapfrogging Opportunity for the Russian Federation

Leyla A. Gamidullaeva
Penza State University, Russia

Sergey M. Vasin
Penza State University, Russia

Elena V. Shkarupeta
Voronezh State Technical University, Russia

Tatyana O. Tolstykh
https://orcid.org/0000-0002-4386-9684
NUST MISIS, Russia

Alexey G. Finogeev
https://orcid.org/0000-0002-4777-3364
Penza State University, Russia

Galina V. Surovitskaya
K. G. Razumovsky Moscow State University of Technologies and Management, Russia

Sergey Kanarev
Penza State University, Russia

ABSTRACT

Innovations in the modern world are not simply connected with the opportunities of digital technologies but also largely based on them. This is exactly why the full-fledged successive industrial sector's digitization will become a platform for qualitative changes of the economy and long-term opportunities. Thus, the transition to digital technologies is inevitable, but from another perspective, this very transition cannot be the absolute goal. In this chapter, the authors aimed at providing a better understanding for Industry 4.0 concept and its application benefits for Russia. The main problem is how the Russian Federation acts against the economically developed countries, which are the creators of Industry 4.0. This chapter mainly focuses on presenting the authors' views on how to sustain and increase competitive advantage of the Russian Federation by catching and implementing Industry 4.0. With Industry 4.0, Russian Federation gets a bigger share of the world manufacturing value chain.

DOI: 10.4018/978-1-7998-7297-9.ch029

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Recent trends of globalization are faced with the need to meet the constant global demand for new production technologies. To overcome this problem, the industry must ensure sustainable production. It is expected that, within the framework of the fourth stage of industrialization, a new approach in the industry 4.0 will ensure a greater integration of information and communication technologies (ICT) with industry. It leads to the intelligent and self-organized industry as well as, more flexible and efficient industrial goods.

During the first industrial revolution with the help of water and steam, the production was mechanized. The main driver of the second industrial revolution was electricity, which helped create mass production. At the center of the third revolution was electronics and information technologies that automated production. Due to the third industrial revolution there began a wide use of information technologies in the industry. The industry 4.0 is related with the development of Cyber Physical Systems.

The fourth industrial revolution is the blending of technologies of the physical, digital and biological world, which creates new opportunities and affects political, social and economic systems.

The fourth industrial revolution fundamentally transforms modern production, thanks to new technological achievements, including digitalization and robotization, artificial intelligence and the Internet of things (IoT), new materials and biotechnology. Due to these changes, production in developed countries again becomes the main source of prosperity and creation of new jobs.

In this chapter, the authors aimed at providing a better understanding for Industry 4.0 concept and its application benefits for Russia. The main problem is how the Russian Federation acts against the economically developed countries, which are the creators of Industry 4.0. This chapter mainly focuses on presenting the authors views on how to sustain and increase competitive advantage of the Russian Federation by catching and implementing Industry 4.0. With Industry 4.0, Russian Federation get a bigger share of the world manufacturing value chain.

BACKGROUND

By rapid implementation of information and communication technologies in manufacturing, the industrial processes becomes smart and enables mass customization. Many researches today are devoted to the investigation of the technologies and processes concerned with Industry 4.0 and its impact on economic development.

Industry 4.0 supposes the use of network approach that is based on the ability of creating smart products and components *(Kohlberg & Zühlke, 2015).* According to the authors *(Kohlberg & Zühlke, 2015)* Industry 4.0 enables new implementation areas through the potential of Industry 4.0 technologies such as powerful, flexible and affordable Cyber Physical Systems applications or extended applicability of Lean Production with various production types.

Bughin and Manyika *(2015)* assumed that the crucial impact factor in competition is related with the Internet of Things (IoT) which means that senior managers and company's members must act at the system level in order to be able to solve the challenges coming from the technological disruption.

Industry 4.0 technologies' application has proved their effectiveness in terms of increasing European firm's competitive advantage not only in manufacturing sectors, but also in service fields such as retail, healthcare, travel and financial services *(Piercy & Rich, 2009).*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Further, we should consider the main approaches to the identification of milestones in the development of industrial systems.

INDUSTRIAL REVOLUTIONS: FROM INDUSTRY 1.0 TO INDUSTRY 4.0.

During the first industrial revolution with the help of water and steam, the production was mechanized. The main driver of the second industrial revolution was electricity, which helped create mass production. At the center of the third revolution was electronics and information technologies that automated production. Due to the third industrial revolution there began a wide use of information technologies in the industry.

We are at the beginning of a new era, the era of artificial intelligence. But this is not only new technologies, but also cardinal changes in the very foundations of our civilization, the way of thinking of all the inhabitants of the Earth. The founder of the World Economic Forum Klaus Schwab (called it the "Fourth Industrial Revolution" *(Schwab, 2017).* Determination is inevitable and society is involved in changes regardless of the individual's desire: the decision to grant a loan in a bank or to invite to a new job takes artificial intelligence. The media was overwhelmed with a wave of reports about new successes of neural networks or investments in their creation, in amounts comparable to the budget of cities with million inhabitants.

Artificial intelligence technologies are actively being introduced in the retail and banking sectors, but the introduction of technologies into the real economy is still at an initial level. Most large enterprises still can not decide on the transition from traditional methods of managing customer or production management to technologies based on data analysis and fully automatic decision making. However, those few who have already made up their mind declare real effectiveness from the introduction.

The fourth industrial revolution seems to come out of the third, which is also called "digital" and which began in the middle of the last century. It was characterized by the merging of technologies and the blurring of the facets between the physical, digital and biological spheres.

The fourth industrial revolution is the blending of technologies of the physical, digital and biological world, which creates new opportunities and affects political, social and economic systems *(Schwab, 2017*). The fourth industrial revolution fundamentally transforms modern production, thanks to new technological achievements, including digitalization and robotization, artificial intelligence and the Internet of things, new materials and biotechnology. Due to these changes, production in developed countries again becomes the main source of prosperity and creation of new jobs. The leading developed and developing countries are now implementing their own initiatives aimed at developing the future production, and the leading foreign regions play an active role.

The features of the fourth technological revolution include the following:

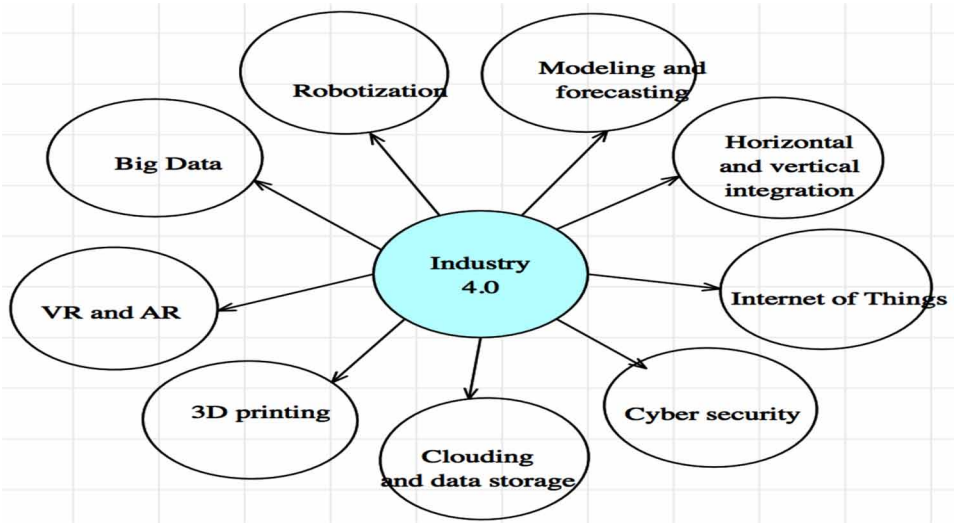
- Rates of development. Development is not linear, but rather exponential. The new technology itself synthesizes more and more advanced and efficient technologies;
- Breadth and depth. It changes not only what and how we do, but also who we are;
- Systemic exposure. Integral external and internal transformations of all systems are envisaged in all countries, companies, industries and society as a whole;
- Methodological changes. The harmonization and integration of a large number of different scientific disciplines and discoveries is growing.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

With the term fourth technological revolution, the term Industry 4.0 (Industry 4.0) is associated (Figure 1).

The digital economy in industry is realized within the framework of the concept Industry 4.0, which is an element of the fourth industrial revolution. The concept Industry 4.0 was first presented at the Hanover Fair in 2011 by German scientists and politicians H. Kagerman, V.-D. Lucas, W. Valster (Kagermann, et al., 2011). In 2012, the Government of the Federal Republic of Germany within the framework of the "Strategy for High Technologies 2020" adopted an innovative development program - Industrie 4.0.

Figure 1. Large-scale trends in Industry 4.0



The basis of the program Industry 4.0 is the creation of "smart" enterprises (factories). These enterprises / factories have three types:

- Digital enterprises;
- Smart enterprises;
- Virtual enterprises.

The scale, depth and speed of the transformations that are occurring allow us to speak about the humanitarian and technological revolution (Ivanov, 2017). In this situation, technology comes to the forefront. The possession of high technologies and, especially, leadership in them means a strategic advantage in the modern world. It is technologies that become the leading variables, order parameters that determine the place of the state in the world and attract capital from countries in which there are none or insufficient (Ivanov and Malinetsky, 2017).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

TECHNOLOGICAL WAYS OF LIFE

Determining the genesis of the development of the PC is impossible without the hypothesis put forward a quarter of a century ago, according to which the long-term technical and economic development in its content represents a change in the technological structures (Lvov, 1986; Glaziev, 1993). This structuring of the process of global technical and economic development has shown its effectiveness in a number of works on measuring technological changes in the modern economy.

According to the most common point of view, the technological way is "a combination of technologies characteristic of a certain level of production development; in connection with scientific and technical and technological progress, there is a transition from lower orders to higher, progressive ones" (Glaziev, 1990).

To date, economists have identified five existing ways and talk about the onset of the sixth. In the Russian economy, there are several technological structures (Ermakova, 2013). It is conventionally assumed that the duration of the technological order is 50-60 years.

If we follow the theory of Kondratiev cycles and technological structures, then computer technologies are not related to tomorrow, but, rather, to today's and even to yesterday's day. The core of the sixth technological order, according to some scientists, may be NBIC-convergence, based on the union and synergistic enhancement nano achievements, bio-, information and cognitive technologies. The result of SCBIC-convergence will be a complete merger of these technologies into a single scientific and technological area of knowledge (Schummer 2009).

EVOLUTION OF MODELS AND CONCEPTS OF THE INNOVATION PROCESS

Modern concepts of innovation development include:

- "Open" innovations, which in 2003 proposed G. Chesbrough (2003). The model assumes that the company, when developing new technologies and products, not only relies on its own internal corporate R & D, but also actively draws innovations and competences from the outside;
- "Disruptive" innovations - K. Christensen theory (2016), which he introduced for the first time in 1997. This model can be used to describe the impact of new technologies on the functioning of a company: everything changes at a time when subversive technologies find their buyer who is ready to put up with the shortcomings of a new product and who need new properties of this product;
- Model "TAMO" and "arena of innovations" (Jansen, 2002). Model "TAMO" (T-technology, A - applied, M - marketing and logistics, O - organizational and managerial). The four components of the model - T, A, M, O - create an arena of innovation;

Theory of Constraints (Theory of Constraints, TOC) by E. Goldratt (2009). Each system has very few restrictions, and they are the key to its management.

IV. Post-industrial transition.

The transition from economy to post economy (post-industrial transition) is due to the expansion of commodification - goods become knowledge, events, impressions, attitudes, and reputation. People share knowledge and experience in networks; represent the products of their creativity in public use; participate in volunteer activities; participate in evaluation and examination. Products of intellectual

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

activity - complex, high-tech, requiring high costs (software with open source, databases, communication channels, technological solutions) are produced and provided for free on a significant scale.

MAIN FOCUS OF THE CHAPTER

Issues, Controversies, Problems

The "old economy" relied on the industrial revolution and the management of industrial branches. In an effort to reduce costs, manufacturers standardized products and aimed to continuously increase their market shares and increase efficiency from the growth of production scale. Thinking about efficiency, they copied successful processes and policies in each geographic market and managed operations, according to the hierarchy, when the chief executive instructed middle managers who in turn gave orders to employees. Standard organizational structures were developed that corresponded to the types of production, the planning system and the commercial activities associated with it. Unified methods of motivation were used, depending on the output and quality of products.

The new economy, called digital, in the already saturated consumer market is based on digital technologies and other approaches to managing information about customers, products, prices, competitors and all other aspects of the marketing environment. Information can be infinitely changed, analyzed, personalized and sent electronically to a large number of addressees in a short period of time. Having public information, for example, such as a message about the proposed price, and a feedback system with the seller, consumers and corporate customers can make more informed decisions about the purchase. Thus, the information age offers more precise levels of production, targeted communication and a balanced pricing policy.

Evolution of Types of the Economy

A.V. Babkin *(2017)* outlines the following concepts for the formation of a modern economy:

- Post-industrial,
- new,
- innovative,
- Information,
- knowledge economy,
- Competencies,
- network interaction,
- digital.

Over the past half century in Russia, several types of economies have changed from the industrial economy to the information economy, the digital economy and the knowledge economy.

The main feature of the information economy is the ratio of the rate of development of individual subsystems of the economic system. Denoting S, T, P, I, F - respectively, the rate of development of science, technology, production (product), information sector and finance, we can write the ratio in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the rate of dynamics of different subsystems (elements) of the economy for different historical periods *(Sukharev, 2015):*

$$\frac{\partial P}{\partial t} > \frac{\partial T}{\partial t} > \frac{\partial S}{\partial t} \tag{1.1}$$

$$\frac{\partial I}{\partial t} \geq \frac{\partial F}{\partial t} > \frac{\partial S}{\partial t} > \frac{\partial T}{\partial t} > \frac{\partial P}{\partial t} \tag{1.2}$$

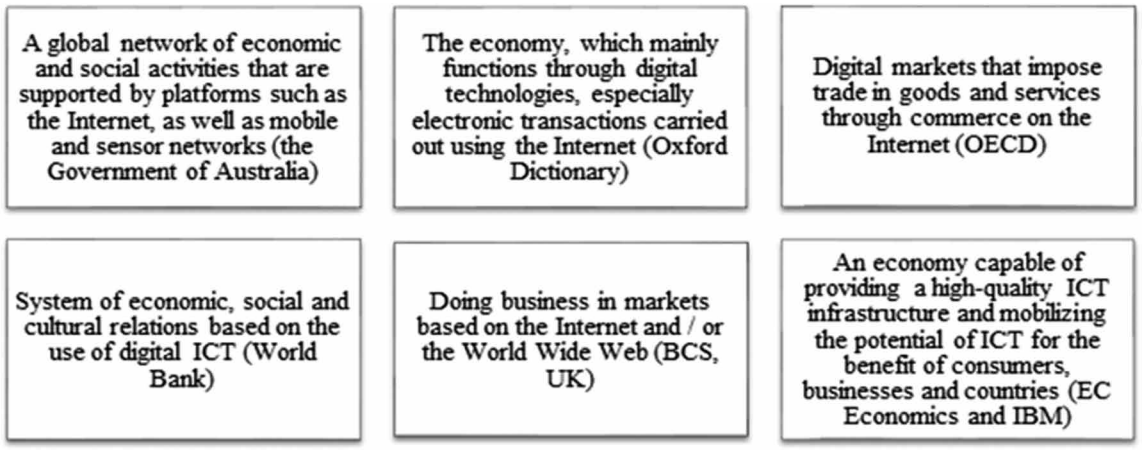
The information economy can also develop without the influence of digital technologies, which has been observed so far. However, the use of digital technologies clearly expands its capabilities, as it improves the processing, storage of information, facilitates the information choice, by reducing the transaction capacity of decisions made.

Analysis of Different Views on the Concept of "Digital Economy"

The term "digital economy" was introduced by D. Tapscott *(1996).* In 2009, co-authored with E. Williams, he introduced the term "Wikinomics", implying a massive collaboration under it, which is based on such competitive principles as openness, sharing and actions at the global level *(Tapscott and Williams, 2009).*

The system of views on the concept of "digital economy" is presented in Figure 2.

Figure 2. System of views on the concept of "digital economy"



In fact, in the modern concept of "digital economy" it is a matter of changing the technological base of the economy, which will automate routine operations. G.G. Malinetsky believes that it is worth talking about the digital economy, referring to the computer economy *(Ivanov and Malinetsky, 2017).*

The Government of the Russian Federation has developed and in July 2017 approved a program for the development of the digital economy until 2024, which defines five basic areas: regulation, personnel and education, the formation of research competencies and technical facilities, information infrastructure

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and information security. This is not about a separate autonomous project, but about creating a fundamentally new way of life, a new basis for the development of the system of public administration, economy, business, the social sphere, the whole society. Obviously, these tasks can not be solved from above, it is necessary to interact with all participants in this process. In accordance with the program "Digital Economy of the Russian Federation", the digital economy is "economic activity, the key factor in the production of which is data in digital form, and contributes to the formation of an information space, taking into account the needs of citizens and society in obtaining quality and reliable information, the development of information infrastructure Russia, the creation and application of Russian ICT, as well as the formation of a new technological basis for social and economic spheres *(State program "Digital Economy in the Russian Federation", 2017).*

The digital model will increase the competitiveness of the Russian economy in global markets, provide the conditions for a gradual transition to the level of the innovation economy and knowledge economy, and improve the quality and standard of living of the population (for example, by reducing harmful emissions and improving the environmental performance of industrial production).

The digital economy has great potential to promote economic development. The Internet "explodes" the established markets for goods, services and labor, as well as the principles of the functioning of the public sector. Russia needs to take advantage of the current scientific and technological situation in the world economy in order to ensure globally competitive positions in the market *(Babkin, 2017).* Thus, the problem of managing the development of industrial companies in the context of reindustrialization and digitalization comes to the fore and becomes archival.

According to S.P. Kurdyumov (2018) under the term "digital transformation" the authors understand:

- A change of the model of economic management from program-target to program-prognostic;
- A change in the economic structure, the change in traditional markets, social relations, public administration associated with the penetration of digital technologies into them;
- A fundamental change in the main source of value added and the structure of the economy through the formation of more efficient economic processes provided by digital infrastructures;
- A transition of the function of the leading mechanism of economic development to institutions based on digital models and processes.

The notion of "digitalization" is closely related to the concept of digital economy.

In the broad sense, the process of "digitalization" is usually understood as a socio-economic transformation initiated by the massive introduction and assimilation of digital technologies, i.e. technologies of creation, processing, exchange and transfer of information.

Digitalization is also understood as the introduction of technologies needed to create new business models, processes, systems and software that will increase profits, increase competitiveness and business efficiency. Digitalization is the use of the possibilities of online and innovative digital technologies by all participants in the economic system from individuals to large companies and states. Digitalization is the most complete disclosure of the potential of digital technologies through their use in all aspects of business - processes, products and services, approaches to decision-making. It is important to emphasize that in order for the digitalization process to be complete, clearly defined business tasks and data.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Current Problems of Digitalization in Russia: Building Knowledge Economy

The movement along the way of managing the development of industrial companies requires the joint efforts of all participants. It is necessary to overcome a significant number of barriers. Only in this way the industrial complexes and the national economy of Russia as a whole will be able to move to a new stage in the development of the digital economy, to ensure the competitiveness of products of national production, both on the domestic and global markets.

Thus, the development environment under digital transformation changes its state to the "digital environment for the development of industrial companies" due to infrastructure and institutional changes.

Under the digital environment, the authors propose to understand a set of interrelated subjects of the production process and a digital infrastructure characterized by the use of information technology, high innovative activity and receptivity, operating in a favorable climate, which allows implementing scientific, technological, innovative and digital potential through proactive behavior. The digital environment for development is the most important prerequisite for scientific, technical and humanitarian progress.

The development of ICT infrastructure was noted by the Government of Russia as one of the priority directions in the construction of the digital economy. Access to high-quality ICT infrastructure positively affects GDP growth and the possibility of developing digital services. Providing broadband Internet access for small settlements, medical and educational institutions, the creation of domestic digital platforms, the deployment of 5G networks is an incomplete list of tasks planned by the Digital Economy of the Russian Federation program.

Thus, the knowledge economy is the goal of the development of the digital economy in Russia. The urgency of the formation of the knowledge economy is confirmed by the state and business. The knowledge economy is an economy in which knowledge is a market product. It is characterized by a high share of services, a high share of investment in innovation, developed information and communication sphere, building partnerships, cooperation of various companies. The economy of knowledge becomes a factor of innovative development, without which it is impossible to imagine modern society. The key characteristics of the knowledge economy are shown in Figure 3.

In Figure 4, the presence or absence of a digital economy is determined through E-Intensity, the index developed by The Boston Consulting Group, which tracks the development of the digital component of the global economy in 85 countries.

The index of the economy's digitization is calculated as the weighted average of three subindexes: infrastructure development, online costs, user activity.

The subindex "Infrastructure Development" reflects the degree of infrastructure development and the availability and quality of Internet access (fixed and mobile). The subindex "Online costs" includes the costs of online retail and online advertising. The subindex "User activity" is calculated as a weighted average of subindexes of a lower level: the activity of companies, the activity of consumers and the activity of state institutions. All subindexes are formed from the weighted averages of several parameters underlying them.

Figure 5 shows that Russia's position in the rating of BCG for the past five years has not actually changed, and the country ranks 39th out of 85 in the development of the digital economy. In 2011, it was on the 43rd place, in 2012 - on the 39th, in 2013 - on the 40th line. At the same time, the RF index (e-Intensity) grew at an average annual rate of 24% and in 2015 was 113. The leader of the rating Denmark is characterized by the value of the index of 213. The top 3 also includes Luxembourg and Sweden (212 and 208 respectively). Singapore ranks first in digital competition. However, China's indicators

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

are growing very fast, on average by 33% per year - and by 2025 it can take the first place in the ranking (URL: https://www.rbc.ru/economics/10/06/2016/5759aed19a79470d3392e05d). Technologically, China stands at the forefront of development in the most key industries, especially in the development of the Internet, applied developments, and is ahead of the US. Many institutions in Beijing do not accept cash or credit cards, they only accept aliexpress checks. It is already clear that the way Asian countries respond to global challenges, at what pace they will be set, will largely affect the further development of the world economy. However, the USA is the only digitally developed country in the world where there is no regulatory framework for digital politics.

Figure 3. Key characteristics of the knowledge economy (Adapted from: Russia 2025: from talent to cadres, 2017)

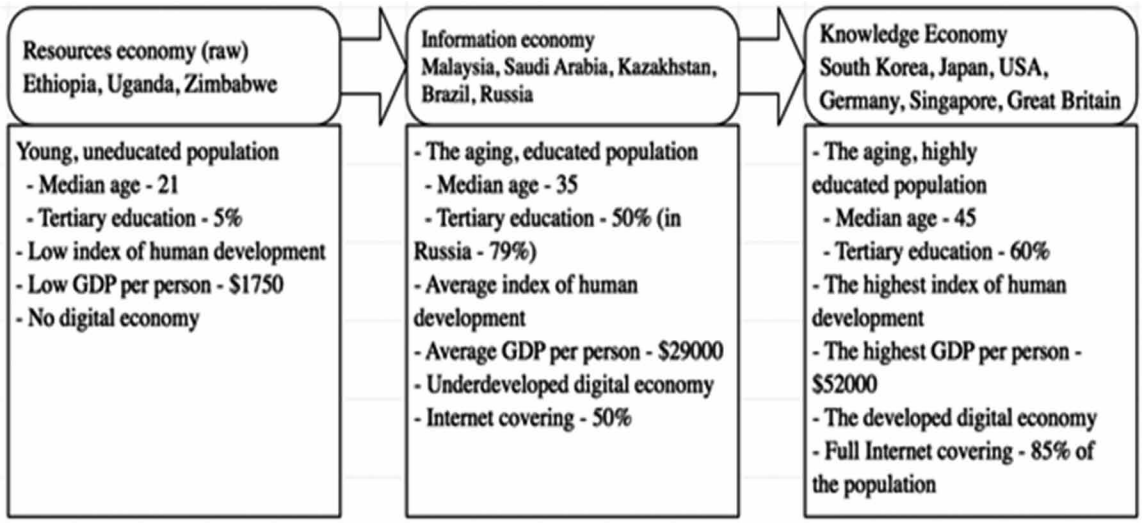
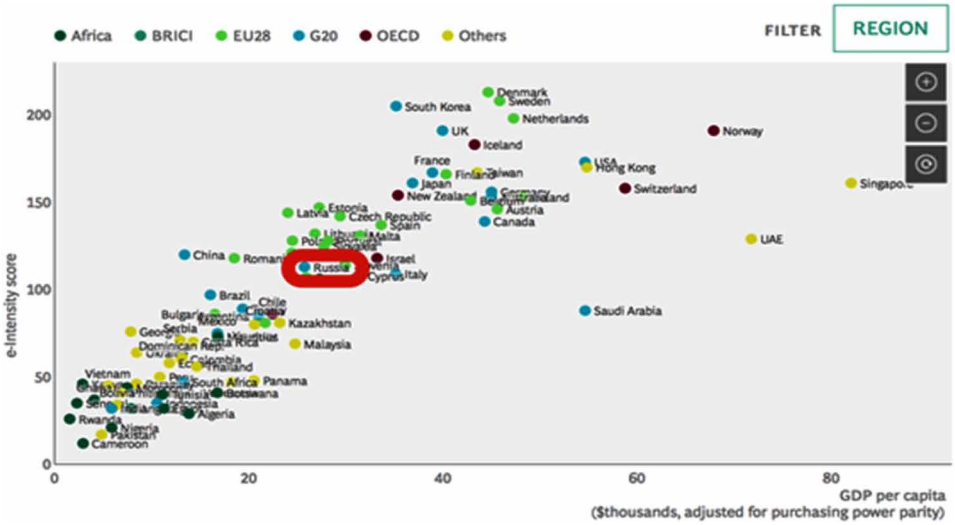
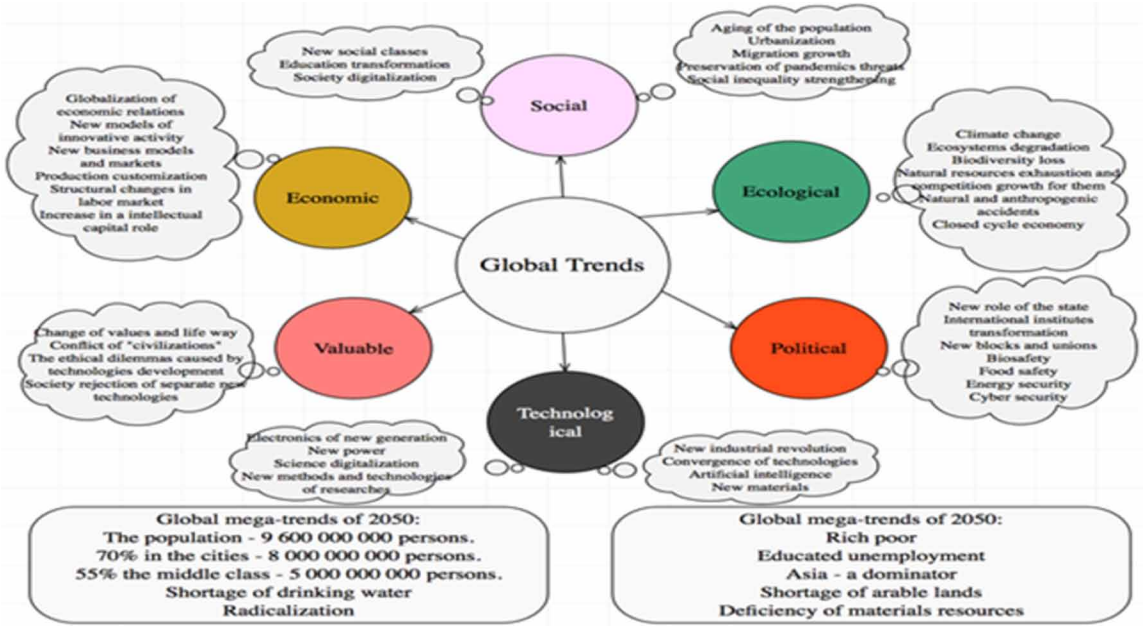


Figure 4. The index of the development of the digital economy of the countries of the world in 2015 (Boston Consulting Group, 2018)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Global development trends (adapted from Chulok, 2017)



The advantages that developing countries have so far demonstrated: high growth rates, cheap labor, are no longer a systemic factor that provides economic growth. Russia will need the industrial policy that will promote inclusive and smart economic growth.

Challenges and Opportunities in Leap-Frogging Strategies in Russia

According to the IMF, the growth rate of world GDP in 2017 accelerated to 3.7% against 3.1% a year earlier. Economic acceleration was global in nature and was observed in about 120 countries, both developed and developing. Support for the growth of developed countries had a soft monetary policy, the growth of developing countries - rising prices for hydrocarbons. The Russian economy emerged from the recession, but growth remains "modest". Inflation slowed sharply, the ruble strengthened, the Bank of Russia softens monetary policy. At the end of 2017, GDP growth was 1.5%, compared to a decrease of 0.2% a year earlier. The GDP grew mainly due to services, trade, mining and agriculture. The driver of growth was domestic private demand, while the growth rates of investment and consumption were at the same level. Net exports made a negative contribution due to outstripping growth in imports (*Sberbank Annual Report 2017).*

One of the central tasks of macroeconomic policy in Russia today is to reach a sustainable pace of economic growth. A steady growth rate is the dynamics of the system near a certain magnitude of its tempo. The figures of the dynamics to 2% do not satisfy many agents of the economy, because this is a rather low economic growth, and such figures can be provided by the opportunistic factors set by the dynamics of prices in foreign markets (Sukharev, 2018). G.G. Malinetsky (2015) believes that "to seriously talk about modernization and, even more so, to implement it, Russia needs to have its own big project, to master the possibilities of a new technological order and to ensure rapid economic growth (by more than 10% a year)".

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In the conditions of rapid changes in society, everything is transformed - the structure of the workforce, business processes, management technologies and forms of organizations, the nature of creativity and the structure of assets, property rights. Global trends (Figure 1.6) generate big challenges for the economy, politics and society. Among the trends of technological development in the 21st century, the following (Andreeva, 2017):

- The transition from "manufacturing" as production through human physical forces to "brainfacturing" - intellectual production, or production through the human intellect;
- Transition from the concepts of "high-tech" and "low-tech" of the twentieth century to the concept of advanced and subversive (disruptive) industries in the 21st century;
- Transition from B2B, B2C to M2M - the concept of IoT ("Internet of things").

Management of industrial companies can not keep up with all global trends. In these conditions, the issue of prioritization comes first. The organization that can prioritize and concentrate efforts wins, which understands that no company can cope with all trends, it is necessary to be open to the world. The key quality of PC management in the modern world is collaboration, cooperation.

The concept and characteristics of Russia's major challenges are presented in the Strategy for Scientific and Technological Development of the Russian Federation until 2025 (Decree of the President of the Russian Federation dated 1 December 2016, No 642). In recent decades, Russia has entered a wave of deep technological and social changes, characterized by the emergence of new ones and the strengthening of the following aspects:

- The origin of the digital revolution - the massive use of digital technology, personal computers, laptops, tablets, smartphones, cameras, digital video and sound;
- Explosion of the communicative revolution - cellular communications, broadband Internet, social networks, GPS navigation;
- Manifestation of the consumption revolution - retail chains, supermarkets and shopping and entertainment centers, fitness centers, symbolic and glamorous consumption.

Further we will analyze the changes in the structure of the "old / new" technologies of Russian industry. By new technologies we mean technological innovations, under old technologies we mean the available traditional technologies. If a new production is mentioned, then it means production on new technologies, that is, when implementing technological innovations (Tatarkin, et al., 2017).

We consider the value of the costs of technological innovation as the cost of new technologies *In(t)*, and the total amount of expenditures in fixed capital - as all investments *I(t)*. Then, the difference between the value of all investments in fixed assets and the costs of technological innovation in the form of costs for old technologies, labeled *Is (t)*, is calculated in Figure 6.

As we can see, the total amount of investments in the Russian industry is growing: increase as the cost of technological innovation (investment in "new technology" (*In(t)*) in absolute terms, and their share in the structure of investments. For the period 2010-2015. the amount of investment in "new" technology has increased 2.1 times, and in "old" - 1.8 times without inflation, which is explained by the policy of stimulating innovation activities of enterprises.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 6. Dynamics of investments in "old / new" technologies of industrial complexes of the Russian Federation for 2010-2015
(Calculated by the authors on the basis of: Industrial production in Russia, 2016)

Indicator	2010	2011	2012	2013	2014	2015
Total amount of investments in industry, I(t), mln. rub.	3 290 400,0	3 969 500,0	4 713 100,0	5 136 900,0	5 415 600,0	5 970 100,0
Investments in "old technologies", Is(t), mln. rub.	2 940 636,7	3 500 057,8	4 129 439,4	4 390 121,7	4 652 825,9	5 234 342,3
Investments in "new technologies", In(t), mln. rub.	349 7 63,3	469 4 42,2	583 6 60,6	746 7 78,3	762 7 74,1	735 7 57,7
including for product innovations, mln. rub.	138 3 33,0	203 0 67,0	263 9 75,6	260 6 93,6	291 8 04,5	264 1 80,8
including for process innovations, mln. rub.	211 4 30,3	266 3 75,4	319 6 85,1	486 0 84,6	470 9 79,5	471 5 76,8
The share of investments in "new technologies" in the total amount of investment in industry, %	10,6%	11,8%	12,4%	14,5%	14,1%	12,3 %

Next, we will analyze the changes in the structure of "old / new" technologies by the number of employees in production on new and old technologies (Figure 7). The number of employed in the development will be taken as the number of employees in the "new" technologies *Ln(t)*. The difference between the number of all employed and employed in development is the number of people working on "old" technologies *Ls(t)*.

Figure 7. Number of employees in the "new / old" production in the RF and in the Central Federal District for the period from 2010 to 2016 (Calculated by the authors on the basis: Regions of Russia. Socio-economic indicators. 2017).

Indicator	2010	2011	2012	2013	2014	2015	2016
The number of employed in the industry of the Russian Federation, people.	13 25 5 200	13 23 8 500	13 19 6 800	13 07 5 400	12 84 8 800	13 38 0 100	13 35 7 500
The number of employed in the industry of the Central Federal District, people.	3 428 600	3 419 100	3 384 500	3 343 300	3 305 400	3 578 000	3 613 800
Number of employees in the "new" production of the Russian Federation, people.	736 5 40	735 2 73	726 3 18	727 0 29	732 2 74	738 8 57	722 2 91
Number of employees in the "new" production of the Central Federal District, people.	381 7 95	380 3 63	373 4 61	375 0 87	381 0 47	380 1 40	372 2 93
Number of employees in the "old" production of Russia, people.	12 51 8 660 ,0	12 50 3 227 ,0	12 47 0 482 ,0	12 34 8 371 ,0	12 11 6 526 ,0	12 64 1 243 ,0	12 63 5 209 ,0
Number of employees in the "old" production of the Central Federal District, people.	3 046 805, 0	3 038 737, 0	3 011 039, 0	2 968 213, 0	2 924 353, 0	3 197 860, 0	3 241 507, 0
The share of employed in the "new" production of the Russian Federation,%	5,56 %	5,55 %	5,50 %	5,56 %	5,70 %	5,52 %	5,41 %
The share of employed in the "new" production of the Central Federal District,%	11,14 %	11,12 %	11,03 %	11,22 %	11,53 %	10,62 %	10,30 %

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In 2015, we managed to overcome this negative trend a little: there was an increase in employed in industry, both throughout the Russian Federation and in the Central Federal District. This trend in 2016 remained only in the Central Federal District, where the increase in employed in industry amounted to a negligible amount of 35,700 people. In the Russian Federation in 2016, there was again a reduction in employed in industry. The number of employees in new and old production is also declining over the past seven years both for Russia and the Central Federal District. At the same time, the share of research and development personnel is also decreasing with a general reduction in labor productivity (as shown before).

Consequently, the key competencies for innovation development in Russia are as follows: new materials, devices, the human factor, information technologies, biotechnology.

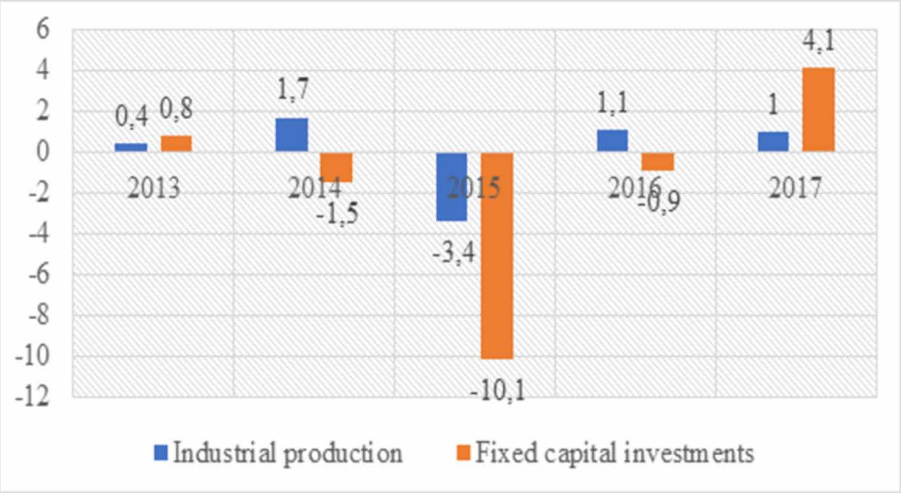
SOLUTIONS AND RECOMMENDATIONS

Lessons From De-Industrialization and Re-Industrialization

The modern condition of the Russian industry provided there was a drop of production volumes in 2015 and a slight growth in 2016 and 2017 with the cumulative deficit of fixed capital expenditures (Figure 8), is characterized by a set of attributes *(Sukharev, 2014):*

- High level of de-industrialization and technological lagging of Russian productions;
- Fragmentation of the industrial system: sectoral (branch) breaks, including vertical and horizontal links;
- Localization (spatial) of productions by regions with the emerging effect of monopolization and spatial segmentation of industrial markets;
- The effect of scouring for orders, technical solutions, sometimes personnel, as information systems of management fail to find necessary solutions and auxiliary processes (therefore sometimes import is inevitable);

Figure 8. Annual increase rates of industrial production and fixed capital investments



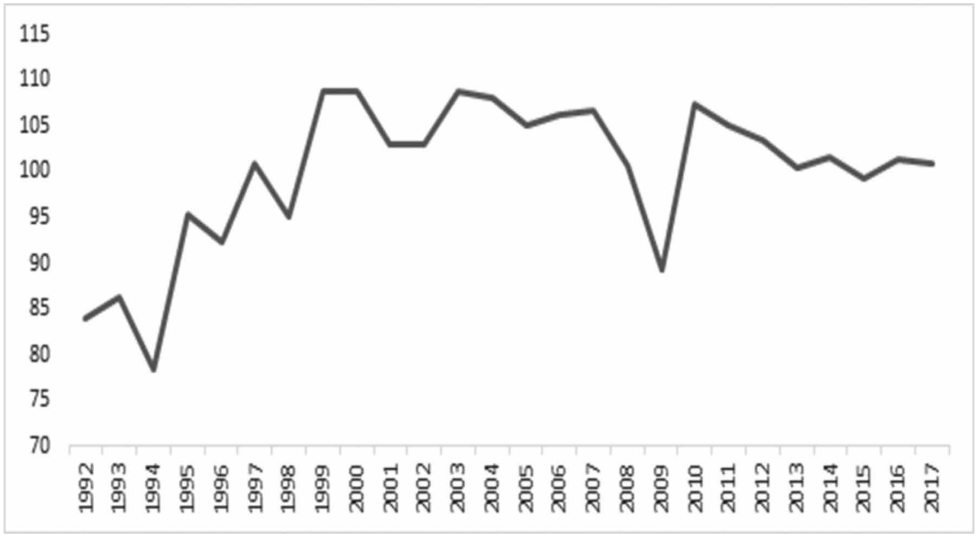
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Problems with product competitiveness due to a low technological level of production;
- Underdeveloped institutions of industrial development promotion, lack of favorable development environment and organizational forms.

Let us briefly analyze the dynamics of the most significant parameters determining the Russian industrial development.

The index of industrial production (Figure 9) shows a drop in the dynamics in 2010-2014, a negative value of the rate in 2015 and a weak growth in 2016-2017.

Figure 9. The index of industrial production from 1992 till 2017, in % with resect to the previous year. The general dynamics for the last 7 years may be evaluated as descending (from 107,3% in 2010 to 101% in 2017). Changes of the financial results display extremely unstable functioning of the industry as a system due to major fluctuation from year to year. The number of employees in the industrial field (figure 1.3) was constantly decreasing from 21,3 mill. of people in 1992 to 12,8 mill. in 2015.



The yield on capital investments for the last 5 years decreased from 0,125 in 2011 to 0,117 in 2014, in 2015 there was a slight increase to 0,12 (Figure 11).

The labor and industrial productivity (Figure 12) was falling from 2009 till 2013, and in 2015 reduced critically.

These alerting figures are the evidence of the necessity to change approaches in the industrial policy.

The experience of economic reforms in Russia from 2000s shows that the measures focused on Russian industry development promotion have included the following initiatives:

- Establishment of special economic zones since 2005;
- In the period of economic growth in 2005 Russia realized top priority national projects;
- Establishment of development institutions in 2006;
- Introduction of technological platforms in Russia from 2010;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 10. The average annual number of employees in the industry from 1992 till 2015, mill. of people

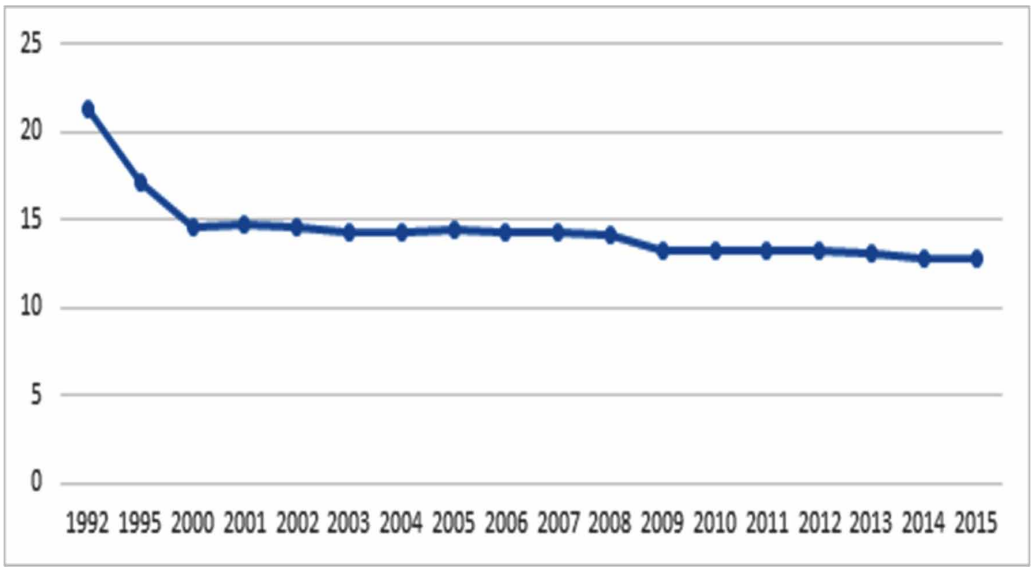
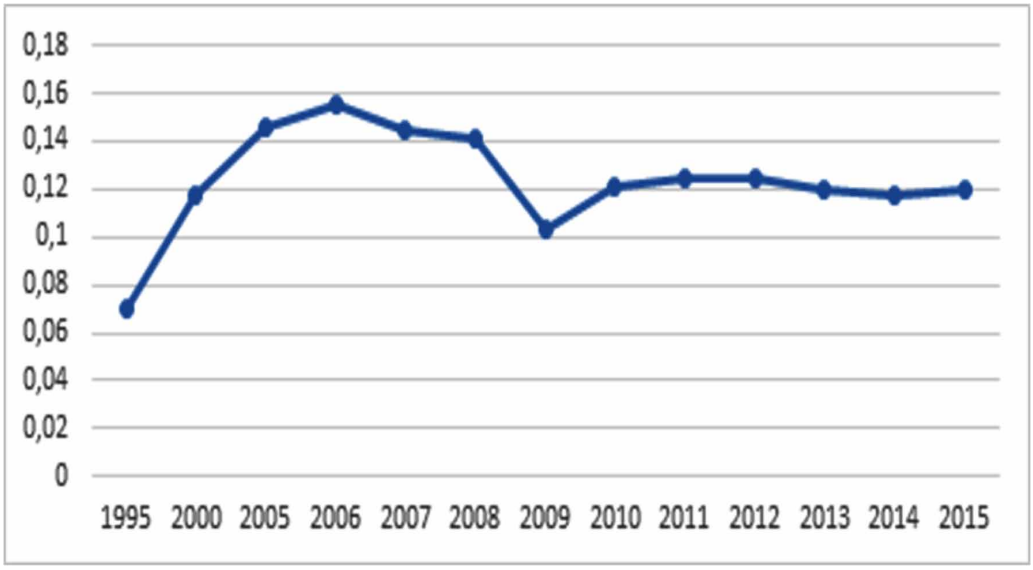


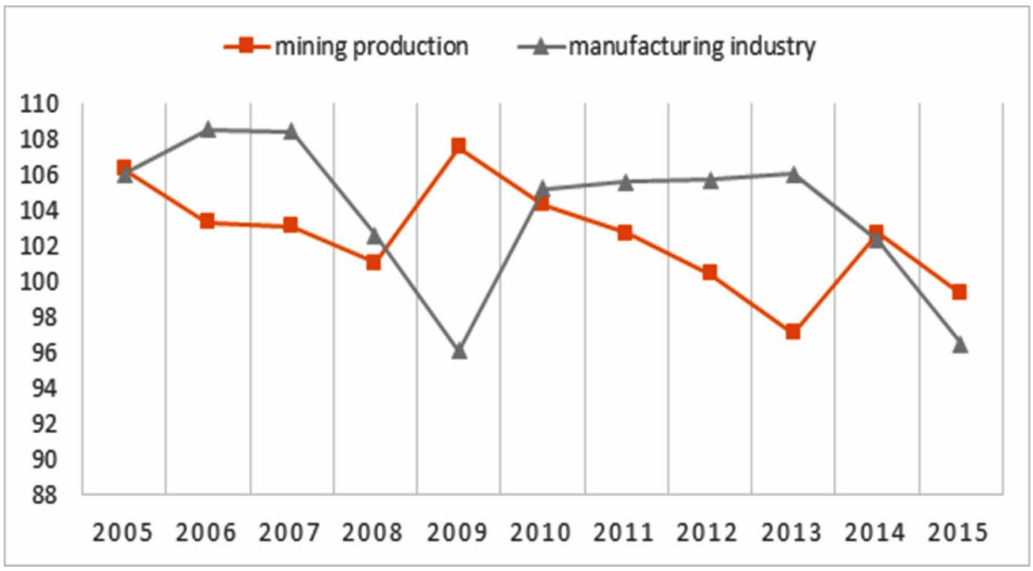
Figure 11. The yield on capital investments in the industrial production from 1995 till 2015



- From early 2012 innovation territorial clusters have been organized;
- In late 2014 the legislation fixed special forms of socioeconomic development specifically for Dalnevostochniy region (Far East region) – "territories of priority development" (TPD);
- In December 2014 in his message to the Federal Assembly the President of Russia set an objective to implement National Technological Initiatives (NTI);
- Following the changes of the geopolitical situation and some restraints on the import of certain technologies in 2014 the attention was drawn to elaboration of the Russian industrial policy;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 12. The labor productivity in the industry from 2005 till 2015, in % with respect to the previous year



- In December 2015 the objective was set to create a national project office to support priority socioeconomic development projects;
- In 2016 there was launched the development program of the economy of new generation – digital economy;
- In 2018 12 national priority projects have been launched (demography; healthcare; education; accommodation and municipal environment; ecology; safe and high-quality highways; labor productivity and employment support; science; digital economy; culture; small and medium entrepreneurship and individual entrepreneurial initiative support; international cooperation and export).
- Some principal problems of the inefficiency of implementation of some initiatives include the following:
- Lack of feedback in the system of initiators and conductors of the said initiatives. The key condition of success in the innovation economy is the development of positive feedback. The presence of idea exchange, an innovation-receptive environment, many ambitious people coming from all over the world provides positive feedback between economic agents engaged in the knowledge-intensive field;
- Lack of coordination between initiators and conductors of the said initiatives. Cooperation and symbiosis should become more important than traditional logic of economic competition;
- Inactivity, lack of motivation and low innovation activity. It is favorable to increase the innovation activity till the level of the Soviet times (approximately 20 times). It is necessary to have a flow of ideas, projects, inventions, proposals, initiative; it is important to value the new, the original, the unusual.

Let us highlight the main problem to be resolved by the present study. To be considered the main, a problem should be of system nature for all industrial systems and have such a difficulty that it would be impossible to solve it within the existing managerial models.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

We believe that this sort of problems includes deep de- industrialization of the Russia industrial system, which has led to systemic negative socioeconomic consequences. The external factors of the socioeconomic stagnation (sanction in particular) in this case served only as a catalyst of problem aggravation. In this situation the negative effect of de-industrialization is not reduced only to absolute and relative (industrial share in GDP) reduction of industrial production volumes. According to O.S. Sukharev *(2014),* at de-industrialization the share of industrial production doesn't just reduce, it becomes more primitive; the technological level drops down, the production infrastructure collapses/curtails.

De-industrialization is a process of socioeconomic changes caused by decreased or absolutely ceased industrial activities in a region or a country, especially in heavy industry and industrial production *(The program of economic re-industrialization of Novosibirsk region).*

To describe the above-mentioned negative consequences there was defined the "two Ds effect" (de-industrialization and de-qualification), which has been later transformed into the "three Ds effect" (de-industrialization, de-qualification, dysfunction of management), as well as into the "four Ds effect"1 (from some analogy with the "four Is effect" *(Bodrunov, 2016):*

- *Disorganization* of production (decreasing organization and management of production);
- *Degradation* of technologies applied (falling technological level of production);
- *De-Qualification* of labor in production (includes not just a loss of skills and competences, but also simplification of the labor content, destruction of labor motivation etc.);
- *De-Complication* (simplification) of products.
- To our point of view this effect can be supplemented with such components as:
- *Disintegration* of production, education and science;
- *Deficiency* of investments and sanctions in the economy;
- *De-Structuring* of sectors.

At the present time the Russian economy is at the crossroads: to develop following the innovation path and to try and keep pace with the developing economies, or to lose the ability to compete with highly-developed countries forever. Thus, lagging is the main threat for Russia. It is crucial to reverse such situation and to ensure the development dynamics.

The experience of post-soviet development shows that the main problem lies not in ideas, but in their implementation. For the last quarter of the century the country has undergone a series of innovatory and bold initiatives (from creation of Special economic zones to RAS transformation), which, according to the authors' concept, are intended to provide the transition to the innovation path of development, as well as the economic development and life-quality improvement. However, in practice, such solutions haven't always led to the predicted effects. According to some scholars *(Ivanov and Malinetsky, 2017)*, such situation is to a great extent caused by application of the approach known as "innovation without science", as the bulk of such decisions have been made on the basis of common views without sufficient expert examination.

V.V. Ivanov and G.G. Malinetsky *(2017)* notice in arguments on development ways the dividing line in the following question: "Human for economy or economy for human?" If "human is for economy", than the greatest achievements are the growth of high-tech export, the number of employees in non-resource-based sectors of industry, the growth labor productivity etc. If "economy is for human", than it is natural to evaluate the quality of life in real indicators important for people: health, education quality, social protection, prosperity, food, energy etc. The authors proceed from the requirements to follow the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

"economy for human" paradigm. It is necessary to speak about the quality of people's lives, because obviously every next phase of economic development or changes of socioeconomic setups increases the role of the person. Therefore, the creation of high living standards is the key factor for the economy to change and to grow; for the best talents to remain in Russia.

Besides the person's role in the innovation economy, the preservation and restoration of the environment are the objectives of the modern world that require close attention and timely and efficient decisions both in the applied context and in the legal field. The commercial or paid approach to nature management seems to be just, and socially responsible and far-sighted industrial companies are ready to invest considerable funds into environmental events. At the present time the legislation provides for several types of compensation of negative impacts on the environment: payment for negative impacts, as well as indemnification for infliction of damage to environmental components, introduction or improvement of new technologies and holding of nature-conserving events. It is obvious that modernization of production, construction and reconstruction of treatment facilities has a great positive effect in comparison with payment of fees, and the state goal is to stimulate these and similar events. Companies holding nature-preserving events have the right to decrease fees, but the mechanism of funds offsetting has not been properly defined by laws, and in practice the balance is achieved through courts.

J. Stiglitz *(1997*), famous American economist and Nobel Prize winner, has come up with the theory of "The Great Divide". He convincingly demonstrated that the American economy had been developing for quite some time in favor of 1% of the richest US citizens, which could lead to a social catastrophe: «The top 1 percent have the best houses, the best educations, the best doctors, and the best lifestyles, but there is one thing that money doesn't seem to have bought: an understanding that their fate is bound up with how the other 99 percent live. Throughout history, this is something that the top 1 percent eventually do learn. Too late» (Stiglitz, 1997). At the present time the separation between countries and inside them is continuing to grow. Although the inequality has been acknowledged as a great threat to the world stability, nowadays the 1% of the richest control 50% of the world wealth against 43% in 2010 *(BCG).*

We believe that programs and strategies of scientific and technological development, re-industrialization of the Russian industry, the program of digital economy, as well as other state programs of modern Russia must be carried out in the interests of 99% of its population.

De-Industrialization, Re-Industrialization, and Neo-Industrialization

At the present time all developed countries are reconsidering post-industrial conceptions. Such terms as "modernization", "new industrialization" (neoindustrialization), "re-industrialization" have become permanent on the agenda. The views of researchers on the said terms are introduced below.

According to Feldman *(2001)* modernization is creation of an industrial base with structure, branches and technical equipment of the international level; establishment of mutual autonomy of social spheres (including creation of advanced systems of social protection); development of human rights protection.

In general understanding, re-industrialization is a new economic policy devoted to modernization and innovative development of the Russian economy. Economic re-industrialization presupposes establishment of new and development of existing high-tech enterprises, production of new goods and services, creation of new work places, growth of labor productivity and industrial and economic competitiveness in whole. It is reflected in accelerated technological development of the economy, in modernization of existing productions on the basis of absolutely new technologies and in establishment of new high-tech sectors and productions *(The program of economic re-industrialization of Novosibirsk region).*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 13. Views on the term "industrialization"

Source	Definition
Sukharev, 2014	Industrialization is the process of switching primitive labor scarcely equipped with technology to the machine based one
Sanzharevsky, 2010	Industrialization is a process of establishment of large-scale machine production and the transition on the basis thereof from the agrarian society to the industrial one
Epishkin, 2010	Industrialization is country's industrial development; introduction of large machinery into country's national economy
Financial dictionary, Finam.	Industrialization is a period of priority development of production characterized by the establishment of large-scale machine production standard goods on the basis of the following: - complex division of labor and specialization; - utilization of various types of energy; - application of science and technology in production organization.
Black, 2000	Industrialization is a process of transferring the resources into the industrial sector.
Dictionary of business terms. Academic.ru.	Industrialization is committed development of industry, establishment of large-scale machine production in the economy or in a certain economic branch, considerable growth of the share of industrial production in the economy.
Usoltseva, 2017	Under industrialization one understands the process of transition to the industrial stage of development associated with considerable growth of the share of industry in the economy, with development of new technologies

Figure 14. Definition of "new industrialization" (neoindustrialization)

Source	Definition
Primakov, 2012	«New industrialization» (or neoindustrialization) is a policy characterized by the following features: - economic structure diversification to achieve a growing share of industrial production, - providing the said process with personnel possessing the corresponding skills; - modernization of country's financial system for the needs of re-industrialization; - establishment of "channels", "lifts" linking scientific development with industrial production; - systemic import of high technology: through acquisition of technological assets abroad; - by attracting direct investments into the Russian industry provided technology transfer

Figure 15. Views on the term "re-industrialization"

Source	Definition
Sukharev O. S. Re-industrialization of the Russian economy and technological development //National interests: priorities and security. – 2014. – №. 10.	Re-industrialization is restoration of production and technological systems, individual sectors and types of production taking place along with settlement of principal objectives concerning stock, technological and staff foundations of the industry with the general focus on creation of national qualitative values in use
	Re-industrialization is an economic policy representing a set of measures broader than in standard variants of the industrial policy. It is devoted to planned restoration (creation, change) of the industrial and technological base of the economic system by applying macroeconomic, institutional and organizational, legal, structural and investment measures effecting not just industrial organization, but the auxiliary infrastructure, financial and banking systems etc.
Re-industrialization: How can we organize industrial development? A verbatim of a direct conversation with the Chairman of the Development Party Yuri Krupnov, 3rd November, 19:10, "Govorit Moskva" radio 92FM	Re-industrialization is designing, creation of an absolutely new industrial system that would be competitive in the world and, most importantly, that would give people, the country's population (in this case, Russia's population) a sufficient number of high skill-demanding jobs
Putin V.V. On our economic problems //Bulletin. – 2012. – Vol. 30. – №. 15. – P. 5.	Re-industrialization is considered as intensive development of the Russian industry by means of large investments into development (including acquisition abroad) of new technologies and equipment for the account of reorganization of recipients of such investments — the industry in whole, its base elements and subjects
The decision of the Scientific Expert Council under the Chairman of the Council of the Federation of the Federal Assembly of Russia on the issue "Re-industrialization of Russia: opportunities and constraints" [Online resource] – URL: http://www.council.gov.ru/media/files/41d477365af565138 6f7.pdf (address date: 11.10.2016)	Re-industrialization should be interpreted as a process coordinated by authorized bodies and devoted to creation and development of the model of Russian industry, which should be implemented in the following areas: organization and development of target sectors of the country's innovation complex, in particular, bioeconomics, nano-industry, cognitive technologies; modernization of the manufacturing industry using enhanced innovation technologies; introduction of cutting-edge technologies into the development of mineral and raw-material sectors
Bodrunov S.D. Economic re-industrialization: shall we begin with import substitution? //Economic revival of Russia. – 2014. – №. 3. – P. 5-7.	Re-industrialization is a process of intensive economic growth by means of increasing the efficiency of resource utilization for the purpose of production and realization of competitive goods. These products should be developed on the basis of Russian knowledge-intensive technologies. To achieve these goals it is necessary to modernize the production and technological base of the national industry
Romanova O.A., Bukhvalov N.Y. Re-industrialization as a determinative trend of economic development of industrial areas //Fundamental research. – 2014. – №. 6-1.	Re-industrialization is a simultaneous process of creation of not just new high-tech sectors of the economy, but also efficient innovative renewal of its traditional sectors together with coordinated qualitative changes between economic, technical, social and institutional spheres, carried out by means of interactive technological, social, political and managerial alterations. As for this definition it is reasonable to highlight not just the interconnection of all sphere of public life in the country for the purpose of implementing the program of re-industrialization, but also "the functional-catalytic industrialization" as a special type of re-industrialization

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

From the point of view of O.S. Sukharev *(2014),* industrialization is a substitution of manual labor with the machine one, which leads to staff disengagement. Nowadays industrialization is reduced to *a sharp increase of production manufacturability* (the share of industrial production is subject to change, drop or even grow like in China). The comparison of the processes of industrialization and de-industrialization is shown in Figure 16.

Figure 16. Comparison of the processes of industrialization and de-industrialization

Parameters/ Process	Industrialization	de-industrialization
The share of industry in FGP (number of factories, sectors) Assets	Grows Quite rapid renewal, wear reduction, introduction of new technologies	Drops Massive wear and aging, low pace of renewal, immanent barriers to introduction of new technologies
Staff skills	Grow	Drop
Technological level (mechanization, automation, raw material processing extent)	Grows	Drops
The share of imported components, nodes, spare parts	Drops	Grows
Effective life span of developments (products)	Drops	Initially gradually rises, then sharply drops due to product wear
Technological operation complexity Development costs and time	Grows Grow (according to plan) on a short period of time and drop on a long one	Drops Considerably and quite rapidly grow blocking the appearance of new products and technologies
Development institutions (institutional conditions)	Efficient as they ensure financing (crediting) of production and emerging of new technologies	Low efficiency, short resources and reduction of the resource base for the development of new technologies and industry

D.E. Sorokin and S.A. Tolkachyov *(2015)* propose to characterize the upcoming changes of industrial foundation as neoindustrialization. From their point of view, neoindustrialization is large-scale introduction of a complex of breakthrough of NBICs (Nano-Bio-Info-Cogno-technologies) into the production process, cardinal alteration of the essence of the industrial way of production enabling as follows:

- To sharply increase labor productivity in manufacturing sectors;
- To create new markets (at the same time some traditional activities will vanish);
- To form global centers of rapid industrial growth;
- To reduce the need for low-skilled labor, thus exacerbating the global unemployment problem;
- To amplify the technological leadership of the developed countries over the rest of the world.
- D.P. Frolov and M.M. Babkin *(2016)* study the term "NBIC-convergence" as integration of nano-, bio-, information technologies and their combinations. According to these scholars, convergence of nano-, bio-, information technologies and their combinations as an objective process of development of a complex of new widely used technologies originates and develops locally within individual research centers and innovation clusters, and then spreads over the territories of other regions: from more innovatively developed to less ones. Centralized management of individual branches of NBIC-convergence creates incentives and impulses for the authorities, scientific and business communities that lead to industrial complex modernization.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To our mind, rapid development of NBICs obliges to correct priorities. At the present time it is more appropriate to discuss another abbreviation - SCBIN (Socio-Cognito-Bio-Info-Nano) and the decisive role of social technologies, without which prominent inventions and scientific achievements won't be apprehended and implemented by the modern society.

A number of researchers and practitioners speak about the presence of digital disruption (Schmidt and Cohen, 2010) in the modern Russian economy, about so-called "digital vortex", when digital technologies destroy the existing ways of production and consumption of goods and create new ones, and digitization in various fields in inhomogeneous and resembles a vortex. Traditional companies have advantages in capital, renowned brands and accumulated client bases. New companies-destabilizers have advantages in innovations (actively utilize new technologies), maneuverable response and organizational readiness for experiments and risks.

O.V. Krivosheev *(2017)* attributes the following principles to digital disruption:

1. Everything that can be digitized should be digitized.
2. Value chains mean nothing for consumers; what matters is value consumed.

Opportunities and Threats From Digitalization of the Russian Economy

Intensive development of the society of digital economy inevitably implies solution of problems in the field of knowledge management. Information and knowledge obtained through experience are becoming the priority resources. And such competences as innovation, competence, creativity and cognitive endeavor are becoming competitive advantages in the market. Therefore, the transition from physical to digital economy requires absolutely new approaches not just in industrial sectors and productions, but in formation of the personnel potential for the digital economy: education, personnel training, development and management of innovative human resources, management of talents.

We shall characterize the depth of digital economy penetration in Russia using the statistics. In 2017 over 62% of business were registered online, 92% of patients were registered before the ambulance arrived to the E.R. due to the access to their personal data, 92% of prescriptions were issued in electronic form, the cost of tutors' services dropped by 30%: 80% of students relied on personal educational paths created on the basis of artificial intelligence. As for the financial sector, over 50% of customers do not attend offices and receive services remotely. It is the average figure in the world. Public satisfaction with the quality of state services today has exceeded 86% *(Statistical data of the Gaydar Forum)*.

Business transformation on the basis of digital models will make it possible to reach an absolutely different level of product and services creation and promotion, to provide the optimal quality of services to clients and the efficiency to companies and enterprises (Kupriyanovsky, et al., 2017). However, such transformation necessitates substitution of traditional managerial approaches, principles and values to the models with priority goals and economic system's success criteria being not the profit or short-term efficiency, but client focus, innovation, new project realization rate, cooperation with suppliers and partners.

All the above-mentioned phenomena fundamentally change the structure of the global economic system – opportunities for consumers, the structure of sectors, the role of the state (Figure 17).

Besides the benefits from digitization described in figure 1.9 transformation processes in the course of re-industrialization constitute some threats to economic and social development (Figure 18).

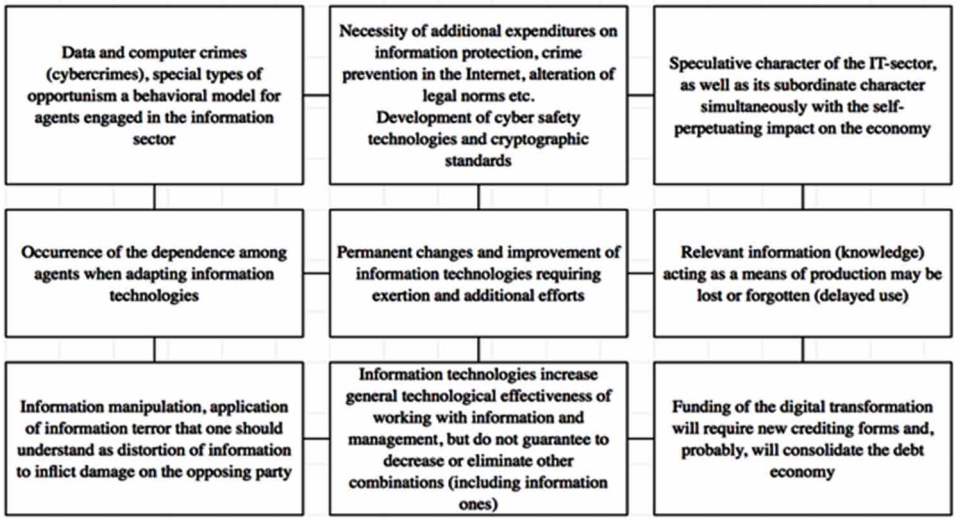
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 17. Sources of benefit from digitization at different levels

Benefits from digitization at macro- and meso – levels	
Effect for the country in whole	**Benefits for the public sector**
New GDP growth source	Process efficiency growth (for example, tax collection and data management)
Creation of new work places and employees' productivity growth	Reduced chance for fraud and misuse of state services
Expansion of trade, more effective use of capital and intensified competition	Identification and analysis of social trends using Big Data
Accumulation of the potential of governments and their ability to react in current situation	More effective interaction with citizens and the private sector

Benefits from digitization at the microlevel	
Benefits for economic subjects	**Benefits for consumers**
Simplified expansion to other markets – revenue growth	Opportunity to purchase better goods and services at favorable prices
Enhanced efficiency of internal prices (for example, supply chain management)	Opportunity to use products unavailable earlier (for example, through joint consumption)
Access to the best labor resources through digital communication channels	Obtainment of information on the most interesting opportunities for employment
Increased transparency and simplicity of interaction with the public sector	Simplified access to state services through digital portals

Figure 18. Threats from digitization



Thus, describing the digital economy O.S. Sukharev *(2017)* uses the term "irrational optimism". "Irrational optimism" occurs among agents not only from financial markets, but also from markets on high-tech products. They encounter a similar, but more reserved speculative effect. Such effect may provide high pace of the economic growth, however the quality can be disappointing for most agents. In the course of time it will lead to the occurrence of interconnected bubbles (technological, financial and/or mortgage) provoking an economic crisis. New technologies reproduce irrational optimism regarding

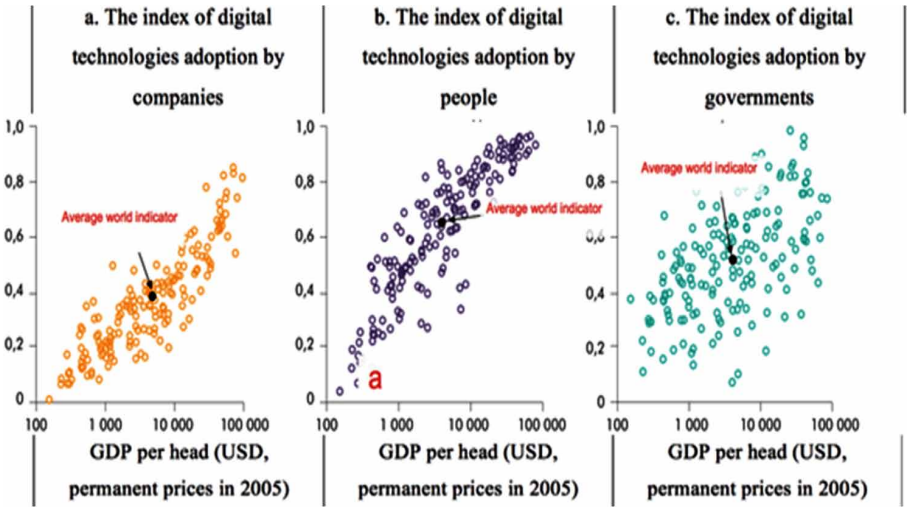
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the granting of resources for their development and dissemination, including the very resource that is allocated by state funding programs.

The drop of efficiency is becoming inherent into the very plot of speculative human reaction (including the state level of administration as well). Standardization and unification in IT, on the one hand, will decrease development rates, and on the other - they will eliminate the impact of the speculative element in these sectors demonstrating a growing output. Probably, in this case the output growing effect may be ceased or reduced.

Thus, the progress (modernization), transformation processes in the course of re-industrialization entail not only positive effects. Despite a great number of successful examples, the impact of new technologies on the productivity across the globe and on the Russia's scale, on the broadening of opportunities for the poor and the middle class, as well as on the dissemination of the principles of administrative accountability have yet failed to meet expectations (Figure 19).

Figure 19. Pessimism caused by adoption of digital technologies in the world (The visuals display distribution of digital technologies determined by the Index of digital technologies adoption)



The forced introduction of computers into various spheres of life has given no considerable effect *(Ivanov and Malinetsky, 2017)*. The data on multifactor productivity (labor and capital) in the USA demonstrate that this crucial indicator was been growing for the last quarter of the century 2,5% per year only from 1958 to 1968. Such growth rate gave three explosive innovations – universal adoption of production lines, new materials (chemistry), mass use of combustion engines (and total motorization of the country). In the period from 2010 to 2015 the growth rate of multifactor productivity dropped 10 times to 0,25% per year *(Gurov and Poluni, 2017).*

In Russia the markets associated with the digital economy have grown 5,5 times from 2011 from 5 to 27,7 trillion of rubles, the volume of digital economy and online commerce market is increasing (simultaneously with digital economy share stagnation starting from 2014) (Figure 21), although the level of labor productivity is significantly lower (more than two times) than the foreign countries under consideration, especially the countries with developed economies (Figure 22).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 20. Pessimism caused by adoption of digital technologies in the world

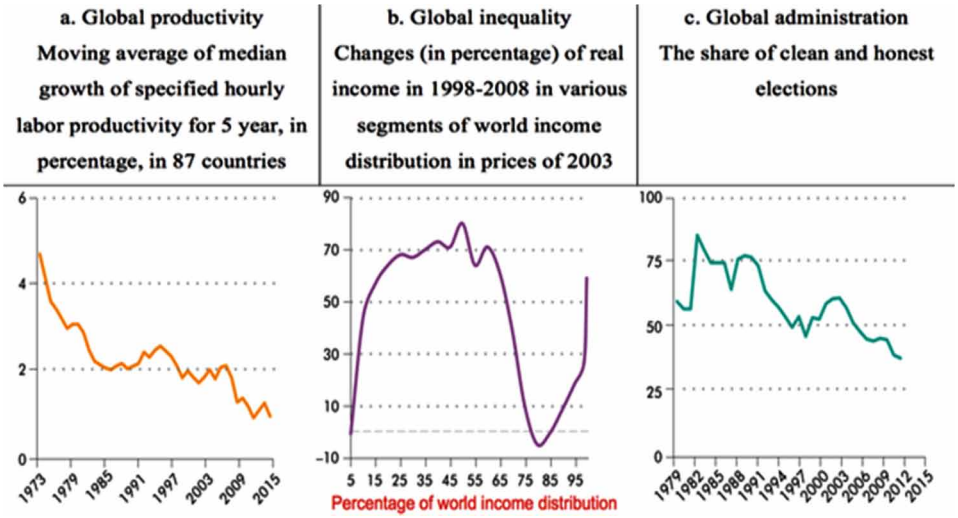
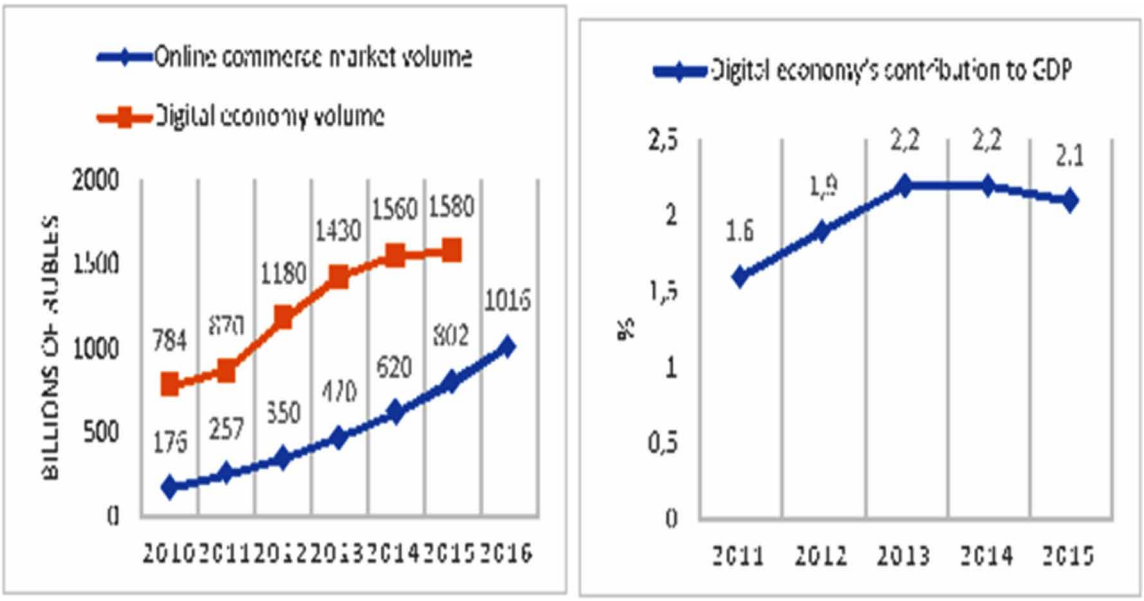


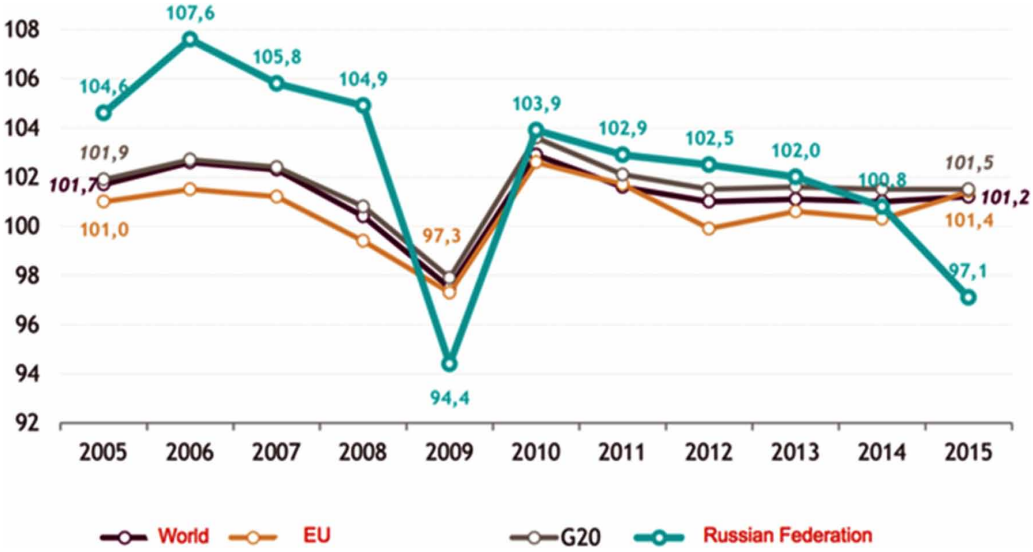
Figure 21. The volume of digital economy and online commerce market in Russia, billions of rubles; digital economy's contribution to GDP, % (BCG; https://www.insales.ru/blog/2015/09/30/ecommerce_services_report_2015/)



The observed dynamics of the labor productivity index in Russia in 2010-2015 (according to OECD) in combination with the remaining low level of labor productivity appears to be quite a dangerous phenomenon in terms of stable economic growth and digital economy formation, and from the point of view of country's social development provision, including people's life quality improvement (*Labor productivity in Russia).*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 22. The labor productivity index in Russia, EU countries, G7 and OECD in 2005–2015, % (ILO)



FUTURE RESEARCH DIRECTIONS

Together with the improvement of concrete systems and technologies' technical level, it is required to expand people's involvement in this infrastructure and to teach them how to use it properly. Besides, given the significance of information processing, the creation of the information is of primary importance. In other words, the digital technology itself is incapable of providing inventions in physics, chemistry or engineering sciences *(Sukharev, 2017)*.

Innovations in the modern world are not simply connected with the opportunities of digital technologies, but largely based on them. This is exactly why the full-fledged successive industrial sector's digitization will become a platform for qualitative changes of the economy and long-term opportunities. Thus, the transition to digital technologies is inevitable, but from another perspective, this very transition cannot be the absolute goal. The financing of such transition will require new crediting forms and may consolidate positions of the debt economy.

CONCLUSION

In this chapter, the authors aimed at providing a better understanding for Industry 4.0 concept and its application benefits for Russia. The main problem is how the Russian Federation acts against the economically developed countries, which are the creators of Industry 4.0. This chapter mainly focuses on presenting the authors views on how to sustain and increase competitive advantage of the Russian Federation by catching and implementing Industry 4.0. With Industry 4.0, Russian Federation get a bigger share of the world manufacturing value chain.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ACKNOWLEDGMENT

The reported study was funded by RFBR according to the research project No. 18-010-00204.

REFERENCES

Andreeva, E. L. (2017). *Non-industrialization and change of the world industrial landscape: vectors of industrial development. INDUSTRY-2017*. Retrieved from http://inecprom.spbstu.ru/conference/industry/archive / industry-2017 /

Babkin, A. V. (2017). Digital Economy and Industrial Policy: A Systems Approach or Backlog. Conference "Industrial Policy in the Digital Economy: Problems and Perspectives", St. Petersburg, Russia.

Bauernhansl, T., Hompel, M., & Vogel-Heuser, B. (2014). *Industrie 4.0 in Produktion, Automatisierung und Logistik — Anwendung, Technologien, Migration*. Wiesbaden: Springer Vierweg; doi:10.1007/978-3-658-04682-8

Black, D. (2000). *Economics: an explanatory dictionary*. Ves Mir.

Bodrunov, S.D. (2014). Economic re-industrialization: shall we begin with import substitution? *Economic Revival of Russia, 3*, 5-7.

Bodrunov, S.D. (n.d.). Re-industrialization: socioeconomic parameters of reintegration of production, science and education. *Sociological Research, 2*, 20-28.

Boston Consulting Group (BCG). (n.d.). Retrieved from https://www.bcgperspectives.com

Bughin, J., & Chui, M. (n.d.). The Internet of Things. *Advances in E-Business Research*, 111–125. doi:10.4018/978-1-5225-2104-4.ch006

Chesbrough, H. (2003). Open Innovation: The new Imperative for Creating and Profiting from Technology. Boston: Harvard Business School Press.

Chulok, A. A. (2017). *Megatrends of the future: where do we wait for threats and how to open the windows of opportunities?* International Scientific and Educational Foresight Center.

Decree of the President of the Russian Federation dated 1 December 2016 Nº 642 "About the strategy of scientific technology development of the Russian Federation". (n.d.). Retrieved from https://www.extech.ru/info/docs/ukaz_642.pdf

Epishkin, N. I. (2010). Historical Dictionary of the Gallicisms of the Russian Language. Academic Press.

Feldman, M. A. (2001). *Employees at large industrial facilities of the Ural in 1914-1941 //Ekaterinburg*. Ural University publishing.

Financial Dictionary Finam. (n.d.). Retrieved from https://www.finam.ru/dictionary/

Glazyev, S. Y. (1990). Economic theory of technical development. Moscow: Nauka.

Glazyev, S. Y. (1993). Theory of long-term technical and economic development. Moscow: Vlada Dar.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gurov, G., & Polunin, Y. (2017). The attack of “blue collars”. *Expert*, *3*, 12–17.

ILO. Analytical center’s calculations. URL: http://ac.gov.ru/files/publication/a/13612.pdf (address date: 05/01/2018)

Ivanov, V. V. (2017). Global humanitarian and technological revolution: Preconditions and prospects. *Innovations*, *6*(224), 11–16.

Ivanov, V.V., & Malinetsky, G.G. (2017). Digital Economy: Myths, Reality, Opportunities. Russian Lvov D.S. Theoretical and Applied Aspects of NTP Management. *Economics and Mathematical Methods, 1986*(5).

Jansen, F. (2002). *The Age of Innovation.*. INFRA-M.

Kagermann, H., Lukas, W. D., & Wahlster, W. (2011). Industrie 4.0: Mit dem Internet der Dinge auf dem Weg zur 4. industriellen Revolution. VDI Nachrichten, 13.

Kagermann, H., Helbig, J., Hellinger, A., & Wahlster, W. (2013). *Recommendations for Implementing the Strategic Initiative INDUSTRIE 4.0: Securing the Future of German Manufacturing Industry*. Final Report of the Industrie 4.0 Working Group.

Kolberg, D., & Zühlke, D. (2015). *Lean automation enabled by industry 4.0 technologies*. Academic Press.

Krivosheev, O.V. (2017). *Digital economy in Russia. Technological backlogs*. Academic Press.

Kupriyanovsky, V. P., Dobrynin, A. P., & Sinyagov, S. A. (2017). A holistic model of transformation in digital economy – how to become digital leaders. *International Journal of Open Information Technologies*, *5*(1), 26–33.

Kurdyumov, S. P. (n.d.). *Development of the digital economy in Russia*. Retrieved from http://spkurdyumov.ru/digital_economy/razvitie-cifrovoj-ekonomiki-v-rossii-programma-do-2035-goda/

Labor productivity in Russia. A social bulletin for July 2017. (n.d.). The Analytical Center of the Government of the Russian Federation. Retrieved from http://ac.gov.ru/files/publication/a/13612.pdf

Lasi, H., Fettke, P., Kemper, H. G., Feld, T., & Hoffmann, M. (2014). Industry 4.0. *Business & Information Systems Engineering*, *6*(4), 239. doi:10.100712599-014-0334-4

Lee, J., Kao, H. A., & Yang, S. (2014). Service innovation and smart analytics for industry 4.0 and big data environment. *Procedia CIRP*, *16*, 3–8. doi:10.1016/j.procir.2014.02.001

Malinetsky, G. G. (2015). *To make a fairy tale happen ... High technology is Russia’s way to the future* (3rd ed.). Moscow: LENAND.

Piercy, N., & Rich, N. (2009). The implications of lean operations for sales strategy: From sales-force to marketing-force. *Journal of Strategic Marketing*, *17*(3-4), 237–255. doi:10.1080/09652540903064738

Primakov, E. M. (2012). *Country’s new industrialization. – A report on a meeting of “Mercury club”*. Retrieved from http://www. tpp-inform. ru/official/2393. html

Putin, V. V. (2012). On our economic problems. *Bulletin*, *30*(15), 5.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Re-industrialization of Russia: opportunities and constraints. (n.d.). Retrieved from http://www.council.gov.ru/media/files/41d477365af5651386f7.pdf

Regions of Russia. (2017). *Socio-economic indicators.* Retrieved from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/science_and_innovations/science/

Romanova, O.A., & Bukhvalov, N.Y. (2014). Re-industrialization as a determinative trend of economic development of industrial areas. *Fundamental Research,* 6.

Russia 2025: From talent to cadres. (2017). The Boston Consulting Group (BCG).

Sanzharevsky, I. I. (2010). *Political science: Dictionary-reference book*. Retrieved from http://www.glos.virmk.ru/

Sberbank Annual Report. (2017). Retrieved from http://www.sberbank.com/ru/investor-relations/reports-and-publications/annual-reports

Schmidt, E., & Cohen, J. (2010). The Digital Disruption-Connectivity and the Diffusion of Power. *Foreign Affairs*, *89*, 75–88.

Schummer, J. (2009). From Nano-Convergence to NBIC-Convergence: "The best way to predict the future is to create it". Governing Future Technologies, 57-71.

Schwab, K. (2017). *The Fourth Industrial Revolution*. Publishing House "E".

Sorokin, D.E., Tolkachev, S.A. (2015). Conditions and factors of efficient re-industrialization and industrial policy in Russia. *Economic Revival of Russia*, *4*(46), 87 – 99.

State Program. (n.d.). *Digital Economy in the Russian Federation*. Retrieved from http://government.ru/docs/28653/

Statistical data of the Gaydar Forum. (2018). Retrieved from Official Telegram-channel of the Forum: https://t.me/gaidarforum

Stiglitz, J. (1997). Economics of the public sector. Moscow University Publishing.

Sukharev, O. S. (2014). Re-industrialization of the Russian economy and technological development. *National interests: priorities and security, 10*. Retrieved from https://cyberleninka.ru/article/n/reindustrializatsiya-ekonomiki-rossii-i-tehnologicheskoe-razvitie

Sukharev, O.S. (2015). *Information Economy: Knowledge, Competition and Growth*. Finance and Statistics.

Sukharev, O. S. (2018). Strategy of growth and renewal of industrial and technological base. *Metals of Eurasia*, *2*, 2–5.

Sukharev, O. S. (n.d.). *Digital economics – «irrational optimism» of management*. Retrieved from http://www.osukharev.com/images/present/21-11-2017.pps

Tapscott, D. and Williams, E. (2009). *Wikinomics. How mass cooperation changes everything*. BestBusinessBooks.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Tatarkin, A. I., Sukharev, O. S., & Strizhakova, E. N. (2017). The definition of the vector of the new industrial policy based on the neo-Schumpeterian theory. *Bulletin of Perm University*, *12*(1), 5–22.

The program of economic re-industrialization of Novosibirsk region till 2025. (n.d.). Retrieved from https://www.nso.ru/page/15755

Usoltseva, A.V. (2017). Re-industrialization of industry as a state's priority objective. *NovaInfo*, *3*(62), 198-202.

Yermakova, Zh. A. (2013). Scientific and technical progress as a basis of social and economic development of the region. *Bulletin of the OSU*, *3*(152), 202–208.

KEY TERMS AND DEFINITIONS

NBICs (Nano-Bio-Info-Cogno-Technologies): "Breakthrough" innovation technologies in the field of convergence of nanotechnologies, ICT, biotechnologies, and cognitive technologies. Many modern technologies are at the interface of NBIC, for example, construction of cellular and fabric structures, new information interfaces (info+cogno), bioinformatics (nano+info+bio).

This research was previously published in Industrial and Urban Growth Policies at the Sub-National, National, and Global Levels; pages 270-299, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 30
Design Solutions Guided by User Behavior:
A Practical Inquiry Approach

Mariam Ahmed Elhussein
University of Dammam, Saudi Arabia

ABSTRACT

Tagging systems design is often neglected despite the fact that most system designers agree on the importance of tagging. They are viewed as part of a larger system which receives most of the attention. There is no agreed method when it comes to either analyzing existing tagging systems or designing new ones. There is a need to establish a well-structured design process that can be followed to create tagging systems with a purpose. This chapter uses practical inquiry methodology to generate a general framework that can be applied to analyze tagging systems and proceeds to suggest a design process that can be followed to create new tagging systems. Existing user behavior while tagging is the main guide for the methodology.

INTRODUCTION

User-centric approach in information systems tries to discover how users' behavior is affected by the design of the system. With users in mind, user-centric design tailors how the information system is constructed according to the user group that is expected to interact with the system. This chapter introduces the concept with social tagging by following a methodology that is focused on providing solutions to specific problems. After a solution is found, the methodology suggests ways to expand it to similar problems within the domain.

Social tagging has been linked to Web 2.0 technologies. Most of the current online systems employ tagging to support retrieval, categorization or ranking of shared content. Tagging is also provided as means for self-organization and future reference. For such diverse functions, social tagging has been studied extensively. Researchers explored tagging starting from answering the question of "why do users tag?" to modeling tagging behavior.

DOI: 10.4018/978-1-7998-7297-9.ch030

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Tagging is a low-cost attachment of metadata since it is done voluntarily by non-expert users. It is also considered to be a democratization of the classification process where people have their say on the different aspects of the content (G. Smith, 2007). The return value of tagging has two dimensions; one dimension concerns the user and the other concerns the designers of the system.

From the system designer's point of view, tagging is favored over expert indexing since the latter is expensive and time consuming. Tagging is done by far more users who will do it for free most of the time. Quality might be questioned in this case, but research conducted by Heymann and Garcia-Molina (2009) showed that 50% of the keywords used by expert indexers were also used by free-lance taggers.

Although tags are considered useful to the support of the system in many ways, it is sometimes problematic. One problem that can be associated with this freedom is that users can be unpredictable as to which type of tags they may provide (or provide tags at all). Existing online systems that allow tagging are bound to continue to support freedom of tagging and deal with the problems that arise from that such as tags used for self-reference. The designers of these systems usually state the reasons behind adding tagging in their help sections, but they do not enforce users to tag accordingly. The main issue here is to preserve users' freedom while tagging and benefit from their tags to support the web content. Attempts to solve this problem have previously all focused on working around the outcome of tagging. An immediate concern of allowing users to tag freely is that tags can be exploited in spamming. They can be used to promote products and services that are not of direct benefit to the tagged resource. Other problems were linked to tagging that was directly influenced by taggers motivations. Researchers propose three possible ways to overcome the problems that were identified with tagging; identification-based (detection), rank-based, and interface-based (prevention) (Heymann, Koutrika, & Garcia-Molina, 2007). This chapter presents a method based on interface-based (prevention) solution.

According to Liu (2000) there is always a need to incorporate methodologies that depend on the social aspects of information systems rather than the technical aspects. This need drove research into incorporating theories and methods that enable the consideration of people within the system of information. Organizational semiotics (OS) and activity theory (AT) are examples of theories that have been used in research to accommodate people as an integral part of the information system.

The questions that this chapter is based on call for changing the existing behavior of users in a certain context by understanding how they interact together. The research aims at contributing to the practice of a problem that has been developed and used. Existing tagging systems are studied in order to verify the problem and propose a solution by following practical inquiry methodology.

Background

A 'tag' is defined as a user-generated keyword and "A lightweight way to enhance the description of online resources to improve their access through broader indexing." (Trant, 2009, p. 1). When tagging is conducted in a shared context, it is called 'Collaborative Tagging'. According to Golder and Huberman (2006, p. 1), "Collaborative Tagging describes the process by which many users add metadata in the form of keywords to shared content". Systems with tagging capabilities enable users to add terms that classify or describe certain content. In that way, users add different tags to the same content depending on the way they see it, which provides diverse views for the same content. One image can be tagged many times which allows it to be grouped in many categories depending on these tags. An image of a flower can be tagged as 'flower', 'spring' or 'yellow' and can be found using any of these terms. Tags can also take the form of content evaluation. Reddit.com allow their users to rank content using 'up' and 'down' tags which reduces

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

or increases its ranking and reflects how popular it is (Morrison, 2008). A visual display of tags is provided using tag-clouds, where tags that are shown in larger bolder fonts are the most popular tags.

The collection of all tags produced is called, folksonomy (Trant, 2009). The term folksonomy was derived from the words 'folks' and 'taxonomy'[1]. The 'folk' was added to reflect on the fact that the conceptual structures created were by non-professional indexers as opposed to taxonomies that are created by professional indexers (Hotho, Jäschke, Schmitz, & Stumme, 2006). There are other terms in the literature that refer to the same concept, including 'democratic indexing' (M. Smith, 2006), 'communal categorization' (Sturtz, 2004), 'collaborative tagging' (Golder & Huberman, 2006) and 'user-generated metadata' (Dye, 2006).

The main focus of research is to identify the reasons that motivate users to provide tags. This is also known as studying user tagging behavior or tagging models (Peters & Becker, 2009). The significance of these studies comes from the fact that taggers' freedom, while tagging, is supposed to be maintained. Tagging motivations are explored in order to provide systematic solutions to encourage users to provide more tags while their autonomy is preserved. In general, tags are objective depending on the purpose behind tagging which is referred to as 'tagging motivation'. Gupta, Li, Yin and Han (2010) provided a classification of users' tagging motivations as follows:

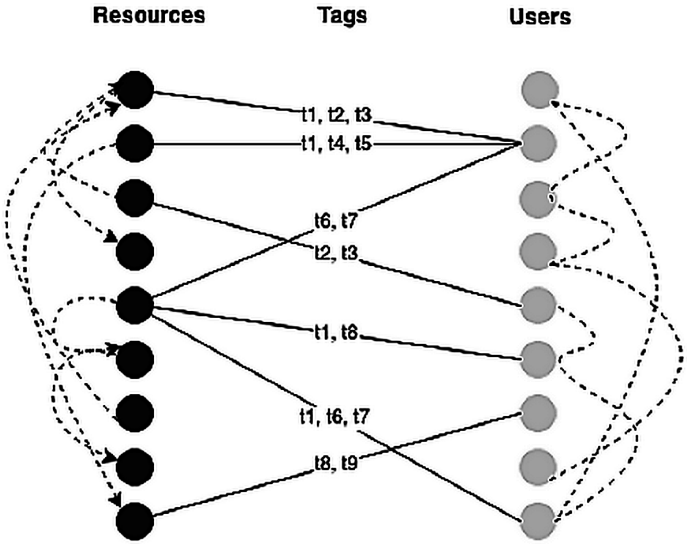
- **Future Retrieval**: This can be aimed at personal retrieval or for others to retrieve content.
- **Contribution and Sharing**: Tags are used as a way of categorizing content and group it with other similar content.
- **Attract attention**: Using popular tags, users can attract other users to view resources.
- **Play and Competition**: Some systems use incentives and competition to encourage users to tag.
- **Self-Referential Tags**: Tags are used as a mark or an identity on the content. A good example for this can be tags that start with 'my'.
- **Opinion Expression**: They can be used as a way to express opinion such as 'like'.
- **Task Organization**: Tags such as 'to read' or 'view later' are used for self-organization. The user can use tags to organize content according to tasks.
- **Social Signaling**: This is how tags are used in Facebook where users use tags to identify people in an image or signal users to view certain content.
- **Money**: Users can tag in order to receive money, sites such as Amazon pay users for tags.
- **Technological Ease**: Users sometimes tag because it is easy. Some systems make it very easy for users to add tags such as allowing tag suggestion.

Tagging takes place within tagging systems. They are the context where tagging takes place. The basic structure model of social tagging system consists of: the user, the resource, and tag(s); Figure 1 shows this structure. According to the figure users can tag each other (dotted lines between users) such as on Facebook and Twitter. Resources can also be linked to each other. The resource is the content to be tagged which can be an anything, a video, a blog or an image. The user is the tagger who will perform the tagging and the tag is the keyword that will be attached to the resource.

There are many ways to classify tagging systems. One of these is dependent on the type of content it allows its users to publish. This includes many content types such as: social bookmarking services (e.g. Delicious), e-commerce (e.g. Amazon), libraries 2.0 (e.g. PennTags), photosharing services (e.g. Flickr), videosharing services (e.g. YouTube), social networks (e.g. Facebook), blog search engines (e.g. Technochrati), and games with purpose (GWAP) (Bateman, Brooks, McCalla, & Brusilovsky, 2007).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. A model of tagging systems (Marlow, Naaman, Boyd, & Davis, 2006)



Tagging Systems Design

Farooq et al. (2007) suggested some guidelines to be followed when designing a tagging system. They suggested three heuristics to be followed when constructing a tagging system:

1. Tagging interface is supposed to induce tag reuse
2. Recommend tags that are considered powerful from an informational point of view
3. Enhancement of tagging by showing relevant resources i.e. supporting the categorization function of tagging

Another attempt was presented by Marlow et al. (2006), who identified two areas that would affect tagging outcome. This includes:

- Tagging systems' design attributes
- User incentives to provide tagging

They defined seven attributes that affect design decisions when designing tagging systems. Table 1 provides a summary of these design attributes, the tagging systems types they identify and the expected impact of each of these. Despite the contribution, there is no guide on how these attributes are to be used in an arranged step-by-step process that can be followed. It might also be difficult to predict how tagging behavior would be influenced when different combinations of the attributes are applied. On another note, the design process did not explain the dynamic and interrelations that governs attributes together.

There is a need to establish concrete theoretical grounds to base the understanding of the different components of a tagging system and hence identify how they affect tag quality. The theoretical analysis of tagging systems points out the way each of its components affects the users while tagging which

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Summary of tagging systems design attributes adopted from Marlow et al. (2006)

Attribute	Tagging system types	Potential impact
Tagging Rights	Self-tagging, permission based, free-for-all	Nature and type of tags, role of tags in system
Tagging Support	Blind, suggested, viewable	Convergence on folksonomy or overweighting of tags
Aggregation Model	Bag, set	Availability of aggregation statistics
Object Type	Textual, non-textual	Nature and type of tags
Source of Material	User-contributed, system, global	Different incentives, nature and type of tags
Resource Connectivity	Links, groups, none	Convergence on similar tags for links/grouped resources
Social Connection	Links, groups, none	Convergence on the localized folksonomy

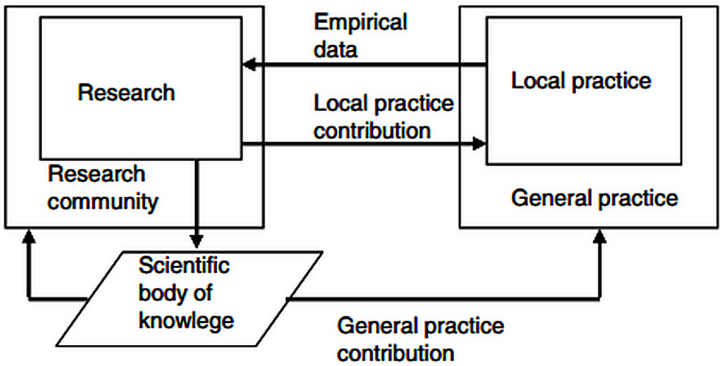
leads to supporting the system by enhancing those components. The framework can also be the basis for identifying a design process that can be followed to create new tagging systems.

PRACTICAL INQUIRY METHODOLOGY

The purpose of practical inquiry methodology is to apply "empirical study on practical matters in local practices, to contribute to general practical knowledge. This practical knowledge will be part of the scientific body of knowledge and it aims to be useful for practical affairs" (Goldkuhl, 2008, p. 1).

According to Figure 2, the methodology starts by identifying problems that are faced by practitioners in a local practice. The problem is investigated through empirical data that is researched extensively to formulate a solution. Once a solution is reached and applied to the local practice, it is generalized and becomes part of the scientific body of knowledge. The generalization of the problem is often done by the introduction of a theory. Despite the fact that the major outcome of IS research is tools and artefacts, introduction of theory in IS was inevitable since researchers are expected to produce knowledge out of their works (Gregor, 2002). Gregor (2006) believes that theory is required to understand what constitutes IS, linking the natural world, the social world and the artificial world of human constructions.

Figure 2. Practical inquiry (A research approach aiming at knowledge as a general practice contribution) Source: Goldkuhl (2008a)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Theories are used to explain or predict human or organizational behavior in order to assess existing tools or develop new ones (Hevner, March, Park, & Ram, 2004). They are used to inform researchers about the interaction between people, tools and the organization they all operate within.

In this chapter, semiotics theory and activity theory are used in order to study tagging systems as local practice, Figure 3 explains the role of theories within the methodology. Both theories were applied to different types of problems. In this chapter these are applied for specifically discover particular matter in order to discover the factors that influence tagging behavior. An empirical analysis of data from existing tagging systems is done which resulted in an understanding of the components of the tagging system. The methodology goes on to suggest a design process for tagging systems based on a framework identified using organizational semiotics and activity theory. Figure 4 shows the research process based on practical inquiry. Practical inquiry methodology consists of two stages, practice theorizing and situational inquiry (Goldkuhl, 2011).

1. The first step is practice theorizing, at this stage, practical theories are identified as guide for the inquiry process. Semiotics analysis and activity theory are shown as bases for analysis of existing tagging systems. As the process of inquiry evolves, the need for an emergent practical theory arises where a new framework based on both theories is identified. This analysis framework is considered as theoretical result of practice theorizing.
2. The second stage is the situational inquiry, where the analysis framework is used in order to analyze existing tagging systems and to identify a design process for new tagging systems. This process is considered an outcome of the first stage of practice theorizing and the framework identified from the emergent practical theory. Situational inquiry calls for empirical analysis to verify the design process. Data was collected based on the situational model (the design process) and finally the situational results are achieved. Data collection of the situational model was done by retrieving data from existing tagging systems.

The following sections explain each step of the methodology.

Practice Theorizing

Using semiotics theory, organizations are understood to have messages communicated and acted upon. A simple definition of Semiotics might be 'the study of sign' (Chandler, 2002). Semiotics theory has been linked to many disciplines including linguistics, communication, computer science, human-computer interaction, and advertising. Semiotics originated in the first works of the Swiss linguist Ferdinand de Saussure (1857-1913) (cited in Chandler 2002) who called it 'semiology' and linked it to social sciences (Eco, 1979). The work was formalized by the American philosopher Charles Sanders Peirce, who provided an early definition of semiotics as being the: "quasi-necessary, or formal doctrine of signs" (cited in Hartshorne et al. 1967, p.139). Pierce's definition of sign to cover its meaning/interpretant. In this definition, the representation is: the form which the sign takes, an interpretant is the sense made of the sign and an object is to which the sign refers. The Peircian model shows the relation between the three components. The interaction between the three is called 'semiosis' which was described as 'the process of signification' (Peirce, 1960). From this definition many branches of semiotics emerged. One branch of semiotics is 'organizational semiotics' which was started by Ronald Stamper in 1973 (Chandler, 2000). According to Liu (2000, p.19): "Organizational semiotics is the study of organizations using the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. The role of practical theories (semiotics and activity theory) in practical inquiry methodology to solve the social tagging design problem. Source: Goldkuhl (2008a)

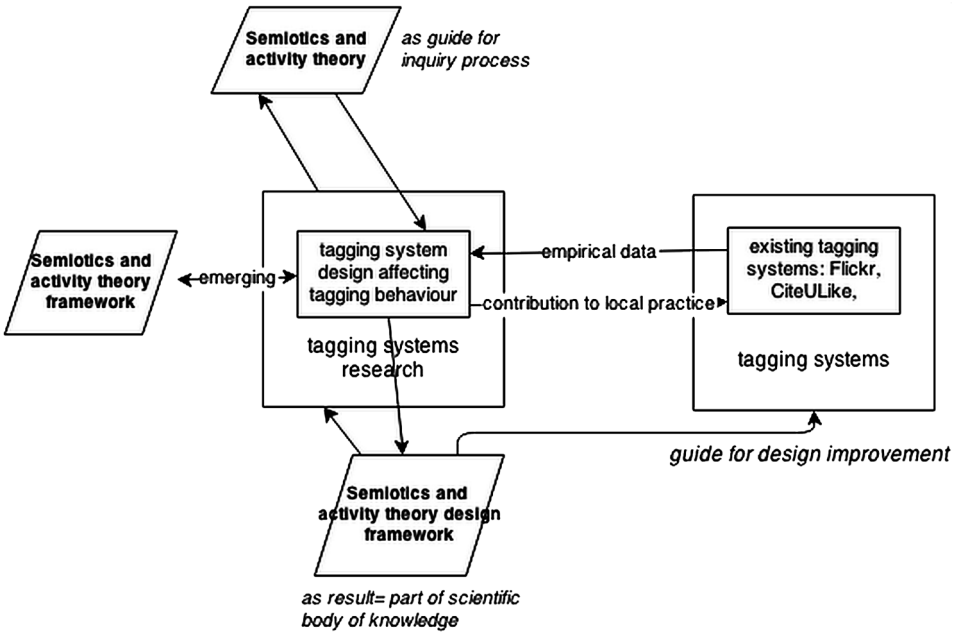
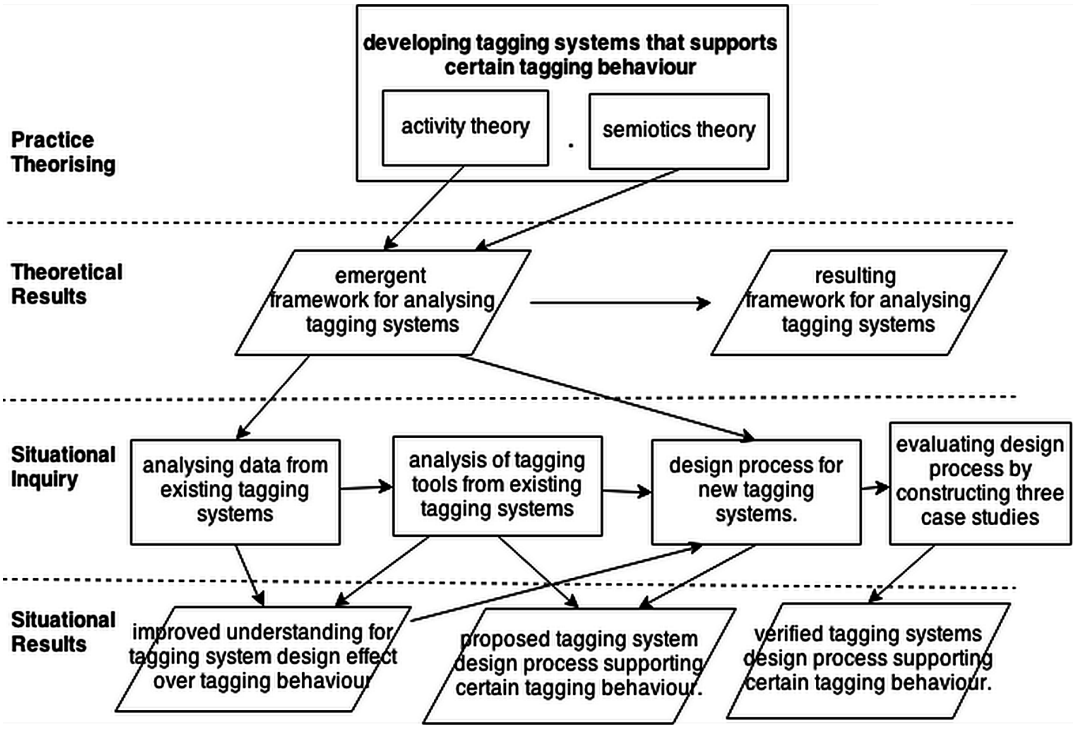


Figure 4. The research process based on practical inquiry. Source: Goldkuhl (2011)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

concept and methods of semiotics". This means that for the organization to function, it is important to study the communication that takes place between the people and groups within it. In order to analyze a sign to its components, the semiotics ladder was introduced. Originally it was called the sign's three dimensions which include the syntactic, semantic and pragmatic layers. These were extended later by Roland Stamper to include the physical world, the social world and empirics (Liu, 2000). The semiotic ladder is divided into two groups, the 'human-information function' and the 'IT-platform'. The human-information layers include the social world, pragmatics and semantics while the IT-platform includes the syntactic, empiric, and physical world.

According to Huang and Chuang (2009) a tag fits into Peirce's definition of a sign. It can be described using the triadic model comprising representamen, object, and interpretant. The representamen is the form the sign takes, which is the tag itself. The object is the entity to which the sign points to, which is the content to be tagged; it can be an image, a video, a book or a URL. The interpretant of the tag is the assignment of meaning the representamen is giving to the object.

Within the tagging system, the semantic layer is about the meaning of adding tagging capabilities to a system. This means that the system allows for its users to add tags to content. The pragmatic layer is about the system designers' intentions behind allowing users to tag. This means the reasons for allowing users to tag from the system designer's point of view. The social world is the user's understanding of the purpose behind adding tagging capabilities within the tagging system. Figure 5 shows the SL-based analysis of the tags tagging system while Table 2 summarizes the previous analysis of tags and tagging systems according to the semantic, pragmatic and social layers of SL.

Table 2. Tag and tagging system analysis according to SL human information functions

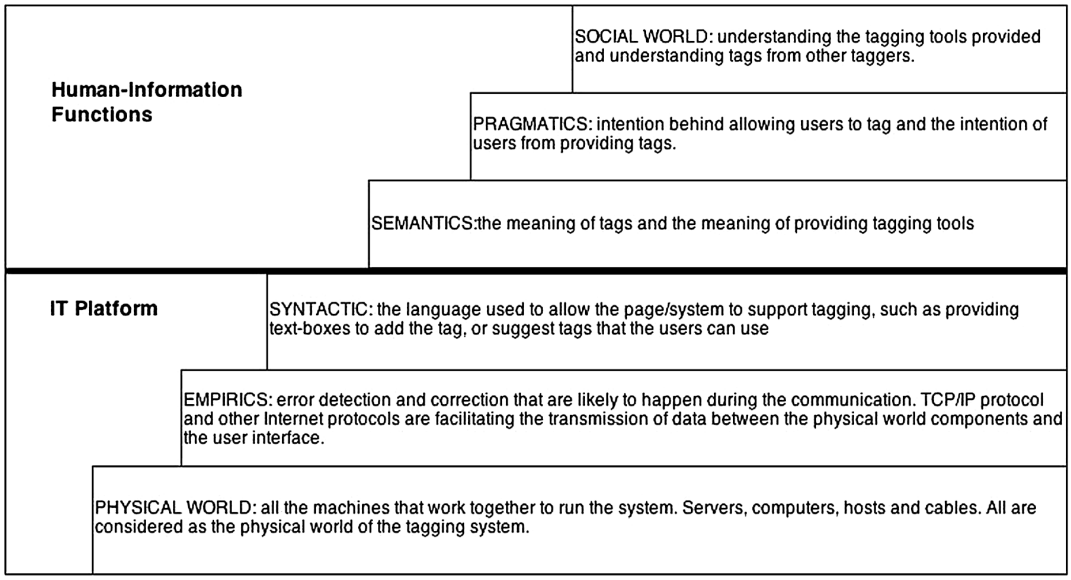
Layer	Tag level	Tagging System Level
Semantics	The direct meaning of the tag-content association	The direct meaning of adding tagging capabilities to the system.
Pragmatics	Intention of the user (description, categorization, self-reference, organization...)	Intention of the system designer (allowing users to categorize, facilitate retrieval, encourage imitation…)
Social	Social effect the tag has over taggers (imitation, forming an opinion, CLIR…)	Social effect of adding tagging capabilities to the system (forming groups of interest)

According to the semiotics analysis of tags and tagging systems these are viewed as messages that are conveyed from a sender to a receiver. A tag itself is a message communicated between the tagger who provided the tag and the reader who would view, interpret and act according to that tag. The tagging system is also considered to be a sign with semantic, pragmatic and social implications. When a certain system is supported by a tagging system, the system designer sends a message to the users of the system. These messages will accordingly act within the system towards the tagging facilities provided. Semiotic analysis of tags and tagging systems have allowed for an in depth view of the messages sent and their possible effects. It has also provided different dimensions of signs. However, while this analysis was useful in understanding the different layers of tags and tagging systems; it does not capture the tagging process as actions that are performed by individuals or groups. The semiotics ladder does not allow for a description of the tagging activity that takes place within the tagging system; hence activity theory (AT) is introduced here to depict tagging as an activity performed.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Activity theory (AT) is used to analyze the issues that comprise an activity, including cultural and social ones. It provides a language that describes people's behavior in certain context (Mwanza, 2001). AT has established presence in HCI research and has been used to analyze and improve existing systems, and constructing new ones. It became a tool for designing and analyzing in many disciplines including education, human computer interaction (HCI) and professional training (Westberry, 2009). The new development of AT by Engestrom was aimed at expanding the activity triangle defined by Vygotsky to include other components including community, rules, and division of labor. Figure 6 shows the model as realized by Engestrom. In a tagging system context, AT has not been utilized to describe tagging activity, yet it has been used to analyze social systems of a similar nature.

Figure 5. Semiotics ladder for tags and tagging systems



Kuutti (2005, p. 3) defines AT as "a school of thought on the relation and interaction between humans and the material and social environment- a kind of theory practices". The influence of activity theory on HCI research is notable in the attention it receives within the research community. AT is preserved as a tool that is used for both the design and redesign of computer tools used in systems such as BUILT-IT, a user-monitoring environment for activity systems and SupportTracker for Hewlett-Packard (Lazarou, 2011). As a theoretical framework, AT is used to analyze human practices in a form of a development process by describing both individual and social levels at the same time (Kuutti, 1995). In this context, AT is utilized to analyze tagging activity that takes place within a tagging system.

Activity theory is not a methodology, nor a predicative theory, but it provides researchers with a descriptive tool that clarifies how a goal of an activity is achieved (Westberry, 2009). The theory was built around five principles identified by Blanton et al. (2001) to include:

1. Human behaviour is social.
2. Human activity is mediated through tools.

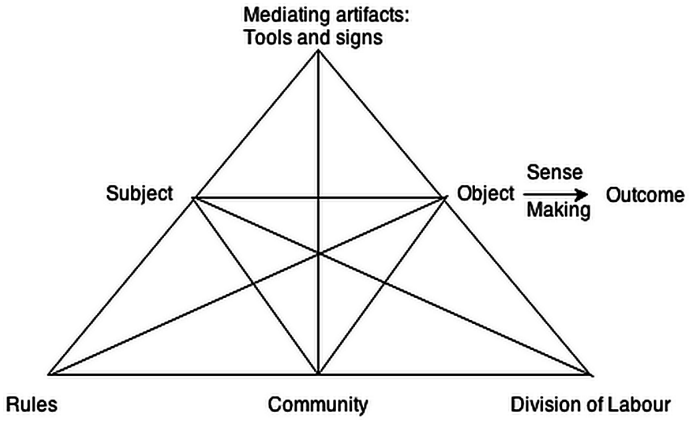
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

3. Centrality of communication during the activity
4. Normative expectations and rules
5. Learning and development are incorporated in the activities of the community.

Activity theory-based analysis is built around the object of the activity. The object of the activity separates one activity from the other, that is why it is said that activities are object-oriented (Kuutti, 2010).

The tagging activity which takes place within tagging systems is identified by its object. The unit of analysis is the activity directed at an object (goal). This includes the cultural (community, rule, role effects) and technical mediation (tool effect). This object is supported by the actions of the tagger who is considered to be the subject of the activity. The activity consists of goal-directed actions performed by the subject towards the object of the activity. The act of tagging performed by the subject is medicated through tools which are considered to be enabling and limiting, they enable the subject to perform the activity yet they limit what they can do (Kuutti, 1995). Tagging is considered a human behavior that is mediated through tools and conducted through communication within the tagging system. The tagger is found within a community consisting of taggers, tag consumers and the system designer. They all represent the community where the tagging activity takes place. Figure 7 shows the activity structure of a tagging activity.

Figure 6. The expanded Activity Triangle Model
Source: (Engestrom 1987, p. 78)



The subject of the activity is affected by all other components of the activity while performing the actions towards the goal. The subject represents the internalization of the activity when taggers try potential interactions in reality without performing actual actions. This includes mental stimulations, imaginings, considering alternative ways (Kuutti, 1995). In a tagging system, tools refer to the user interface components used to facilitate tagging, such as textboxes and buttons that allow users to provide tagging of contents. The rules of the activity are those set by the system designer and may take two forms, either the general terms of service of the system or other rules that govern how users of the system interact together. The latter can be rules that regulate who can tag or whether someone can tag someone else's content etc. As for the roles of taggers in a tagging system, following are the possible roles they may take

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

on: taggers, tag consumers and the system designers. The object of the activity is the goal that the subject is works towards achieving. The community of the tagging activity includes taggers, content publishers and moderators. In the tagging activity, the community is governed by rules. In all the publicly servicing tagging systems, there are is a set of terms that a user agrees to when s/he signs up for a username.

The outcome of the tagging activity is the goal of providing tagging support to the content (Maier, 2007). All of the abovementioned components of the activity work together to achieve this outcome. Echarte et al. (2007) found that tags can define the content, its type and/or the author among many other things. Each tag typically contributes to one or more function of tagging, which can be considered as the outcome of the tagging activity.

A Framework for Analyzing Tagging Systems

The suggested framework combines activity theory and semiotics ladder from semiotics theory.

Figure 7. Tagging activity

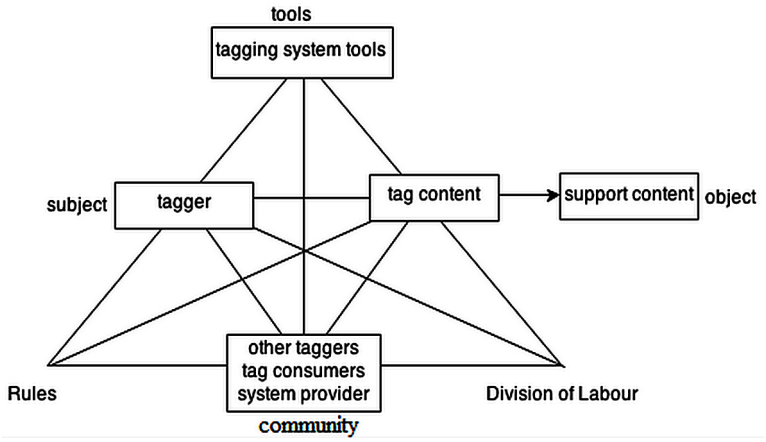
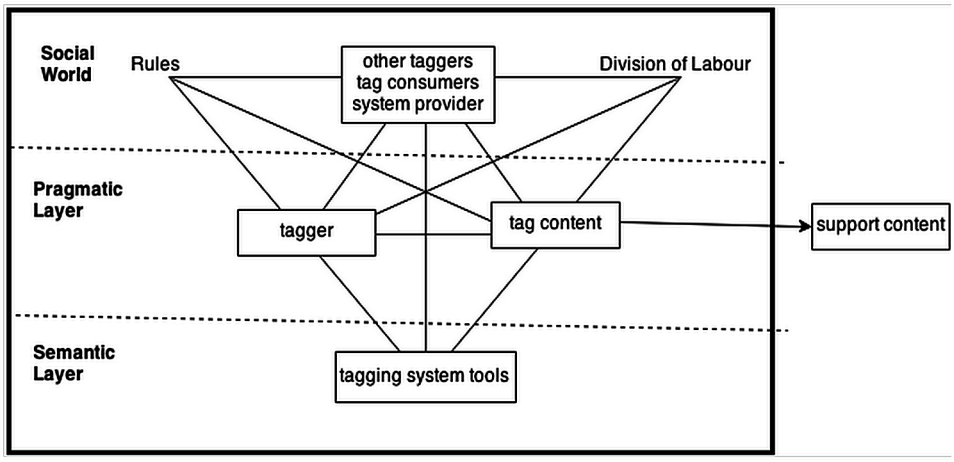


Figure 8. A framework for analyzing tagging systems (FATS)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

It consists of the top three levels of the semiotics ladder interlacing with activity theory components (see Figure 8). AT components represent human functions within the semiotics ladder. By viewing the tagging system as a sign, the system is decomposed into three levels of sign Semantic, Pragmatic and Social world. When decomposing the tagging system into activity components, they are reflected in the three levels of the ladder. This produces three types of activity components, Social components (rules, community and roles), Pragmatic components (subject and object) and the Semantic component (tools). The social components of the tagging system represent the social effects the system has on its users including identifying who they are (community), how the work is divided between them (roles) and what governs their behavior (rules). The community of the system describes the members who are part of the tagging system and affect or affected by it. The roles of the system represent how the community members are expected to contribute towards the system. While the rules are devised to govern how the tagging system ought to perform. The pragmatic components of the system represent the intention of the doers of the activity (subject) or taggers and the intention behind creating the tagging system (object). The subject is the tagger's intention towards the tagging system i.e. using tagging for retrieval purposes, categorization, self-organizing, or even vandalism by spamming the system. The object represents the intention that stands behind allowing tagging of content within the system. It can be understood as the main purpose of the tagging system which is expected to be the motive for taggers. According to the concept of mediation from AT, the relation between pragmatic components and semantic components can be described as follows:

- Object directs the subject of the activity.
- The subject is mediated through the tools.
- Tools shape how the subject interacts with the object.

As a semantic component of the tagging system, tools reflect the direct meaning of the system. They mediate the subject towards the object i.e. reflect the intention of the taggers towards the system by allowing them to tag. Tools are also affected by the object of the system i.e. the intention of the system designers affects the types of tools used for tagging.

The social components of the tagging systems include rules, community and division of labor (roles). The community includes the group of people who are part of the system. This includes taggers, consumers of tags and system providers. The subject may affect the community of the system either in a positive or negative manner. The tagger's intention maybe encouraged if for example they receive positive feedback from the community or may be discouraged if no feedback was provided. Community members divide how tasks are performed amongst them. This division of labor identifies what each member is supposed to do within the system. Roles are set based on the object and they affect the subject of the system. They also shape the relationship between the subject and the community. The third social component here is the rules, which are influenced by the object of the tagging system. In other words, they are shaped based on the object. "Rules shape the interactions of subject and tools with the object" (Russell 2003, p. 11). Rules are also created to influence the subject within the community and to resolve conflicts that may take place within the community that is related to roles.

From the previous discussion, FATS was shown to provide a new way of looking into tagging system components using semiotics and activity theory. The next section will identify the steps that can be followed based on the framework in order to analyze existing tagging systems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The analysis process aims at measuring performance and identifying problems in existing tagging systems if there are any. By following the proposed FATS, the analysis process starts by identifying the object of the tagging system based on the other components of the system. To provide a starting point, tools represent the direct meaning of the tagging system. If the system contains a textbox with a tag label for tagging tools, this means that it is a system that allows tagging i.e. attaching keywords to content. Starting from this point, the analysis process will be based on the tools used within the tagging system as follows:

1. Identify the tools that are used in the tagging system. This includes all visible tools in the tagging interface where users can attach tags to specific content.
2. Using the tools identified, the social components of the tagging system are described:
    a. Rules are inferred by reviewing what is allowed and what is not allowed. This can be shown from the tools.
    b. The Community component is revealed by identifying how the subject of the system is affected by the community.
    c. Division of labor (roles) are described by showing what possible roles the community members can play.
3. At the end of this analysis, the object of the system is determined.

To relate this phase of work to the practical inquiry methodology, the semiotics and activity theory framework Delicious has been selected as a practical theory that will be used in the analysis phase of inquiry. Tagging systems can be analyzed using FATS as described. The following section uses the FATS to analyze Delicious tagging system CiteULike and Flickr. The purpose of the analysis is to reveal the object of each system based on their tagging interface. The analysis is used later to show the effect of the design over the tagging behavior of the users of the system. Another advantage of the analysis is to show the different types of tagging tools used. This allows for a more comprehensive understanding of which tools to use in new tagging systems.

SAMPLE ANALYSIS

The main purpose behind the analysis of well-set up tagging systems is to identify their object according to the way they were designed. By analyzing tagging systems that are already functioning, there is an opportunity to retrieve data and examine tagging behavior from the actual users of the systems. The analysis is conducted for the system based on FATS, and then data is explored to investigate some of the users' tagging behaviors. The sample analysis is done over Delicious tagging system, one of the most extensively researched systems.

Delicious is an online bookmarking system that was created with the purpose of providing an online list of bookmarks that can be accessed from anywhere. It allows users to add URLs and provide textual descriptions and titles for them. It also allows users to optionally add tags to each URL they add. When researching social tagging, Delicious provides a rich database of bookmarks with tags. Delicious was used in the highly cited study by Golder and Huberman (2006) which described one of the earliest tagging models explaining stable patterns in tagging.

Using FATS, the analysis starts by defining each component of the Delicious tagging system.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1. The semantic component of Delicious which is represented by the tools used for tagging consists of:
   a. **Tool1**: A toolbox where tags can be typed into and it is marked optional.
   b. **Tool2**: A list of suggested tags that can be used instead of creating new tags. The list was extracted from the added URL. It can be an extract from meta HTML tags of the website, or a keyword extraction of its content.
   c. **Tool3**: Title and description textboxes
   d. **Tool4**: A checkbox that says 'Make private link' i.e. the link is by default public and can be made private.
   e. **Tool5**: 'No Image' checkbox, which means that the system will provide an image from the link but the user can choose not to use an image by checking this checkbox.
2. The pragmatic components of the tagging system include the subject and the object of the tagging system. The subject of Delicious is the users' intention towards the tagging system. Every user with an account is able to sign in, add a link and tag it. Delicious has over two million users since it was launched in 2003 (Chu, Rathi, & Du, 2010). There is no special profile for users in Delicious; they can be students or lawyers whose intentions are to benefit from the tagging system by saving their bookmarks. The users can have any intention for assigning tags to a bookmark including the list of tag intentions that were listed above (categorizing, providing opinion, retrieval, personal reference, and grouping). They can also be surfers with malicious intentions that aim at abusing the system.

The object of the tagging system is the reason why was it created by the system providers of Delicious. That is, the object of the tagging system represents their intention. According to the Delicious help page, the reason for allowing tagging is to for users to categorize their links and facilitate_retrieval[2]. Nonetheless, this analysis is concerned with revealing the intention through the components of tagging system, so what is written in the help section will be overlooked. The social components of Delicious include the community, rules and roles within the system. The rules of Delicious are set by the system provider:

- When a user adds a new link, they do not have to add tags to it; it is entirely optional. This means a user can add links without providing tags to the newly added link. This rule was understood from the first tool which had the 'optional' label attached to it.
- Users are encouraged to provide tags through tag suggestions. These suggestions are related to the link and extracted from it. They have no link to a user's previous tags or community tags. This rule was deduced from the tag suggestion list.
- In Delicious, links are by default public and seen by all users along with all their attached metadata. Users are allowed to search other users' link collections. Users can choose to make a certain link private. This rule is understood according to the fourth tool that gave the option for private links.

The Community of Delicious consists of taggers, tag consumers and system providers. The community has an effect on the subject since users in Delicious can view each other's content unless it is private. This affects their intention in the sense it prevents socially unacceptable tagging behavior.

The roles the users can play in a tagging system in general is to tag their own content and/or consume tags of others. According to the tagging interface of Delicious, public tagging allows for consumers to view how others tagged. The subject is influenced by consumers as they will be using the tags provided by taggers.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To identify the object of the tagging system, we summarize the analysis as follows:

- The user is allowed to tag freely, or not tag.
- Tagging is encouraged by providing tag suggestions that are extracted from the link.
- The subject is affected by the fact the links are public until made private. This leads to the assumption that the role of tag consumers has an effect on the subject.
- One additional influence of the object is the fact that there is a separate space for title and description. This may affect the subject to employ tags in other ways, such as categorization.

The analysis of Delicious was conducted by applying the analysis process based on activity theory and semiotics. The analysis showed the object of the tagging system as shown by the tools, rules, role and community components of the system. These components were revealed by interpreting the tagging system as a sign with semantic, pragmatic and social components. The structure of activity theory allowed for interpreting how each component was represented in the tagging system interface.

The tools used in tagging systems are limited to a small set of graphical user interface components such as textboxes and drop-down lists. In general, there are two tools used with tagging systems, tools that are used to insert tags and others that are used to provide tagging assistance. Free tagging is usually allowed using textboxes with labels that ask users to provide tags. When it comes to tagging assistance, it is in the form of suggested tags. Tag suggestion is provided is Delicious in the form of clickable buttons, each button represents a tag that can be attached to the URL.

In CiteULike tag suggestion is provided by clicking on a button that shows tags as links. When the links are clicked, tags are attached to the article being posted. In Flickr, tag suggestion is provided as a drop-down list that appears within the tagging textbox when the user types a tag. In some tagging systems, such as a system called nationbuilder[3], tag suggestion is provided in a form of checkboxes where users can check multiple tags to attach to content. In some cases, tags are provided in the form of specified list of choices from which users are supposed to select such as in the case of the priority tag list in CiteULike. Tag lists can also be optional such as in the case of Flickr's 'people tag' list, 'set' list and 'group' list. Table 3 summarizes the general guidelines to be followed when selecting tagging tools based on the analysis above.

Table 3 shows how tagging tools are selected according to the system's specification. The main issue here is the method to be followed in order to determine what the suitable type of tagging system is according to system's needs. The following sections propose a step by step process to design tagging systems. The process leads to a set of system rules that are translated into tools that form the tagging system.

Situational Inquiry

Data analysis is conducted in the photo-sharing system, Flickr, in order to explain tagging behavior using the results from the previous discussion. This will be done by comparing two version of Flickr tagging system.

Flickr introduced its new design sometime between 2007-2008. Before that time, the online photo-sharing system was using an older design. No reference was found to when the changes of the photo upload page were enforced (the interface where tagging takes place). These dates were tracked from the previous studies that discussed Flickr's tagging system (Marlow et al., 2006; Nov & Ye, 2008; Specia & Motta, 2007). The main difference between the two designs is about the metadata that are applied to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Tagging tools selection guidelines

Type of Tagging	Description	Suggested Tools
Free and optional tagging	**Used when users are free to provide any number of tags or no tags at all.**	**Textboxes that state that tagging is optional.**
Restricted tagging list	When users are supposed to select tags from a restricted list of tags where choice must be made	A drop-down list that has a default value and no empty option is allowed
Optional tagging list	Users are provided with a tagging list to choose from with the ability to choose no tags	A drop-down list with an empty option or 'no tag' option.
Tag suggestions	Tag suggestions are provided from users previous tagging experience, the community tagging preferences or through automatic suggestion based on the content being tagged	Suggested tags can be in the form of links that can be clicked, checkboxes to choose from or can be incorporated with the free tagging textbox appearing when users attempt to type tags as a drop-down list.

the photo when uploaded. Their earlier design did not incorporate user groups as part of the uploading interface of Flickr. The older uploader systerm of Flickr is still accessible.

The following is an analysis of the older design using the analysis process supported by activity theory and semiotics analysis. The tools of the tagging system consist of:

- 'Add tags' textbox, where tags can be added optionally.
- 'Add to a Set' textbox, where a set acts like a folder that combines similar resources. There is an option to create a new set.
- 'Title' textbox, which represents the image title and is automatically extracted from the name of the file.
- 'Description' text-area, where users can write lengthy descriptions about the photo being uploaded.
- 'Privacy Settings', where content is by default public and can be made private or visible to family and/or friends.

The next step was to identify the rules of the old tagging system of Flickr:

- When content is added all values are optional and the user can proceed to upload the content without add any of the data.
- Tags are optional, users get suggestions from previously applied tags when typing a new tag.
- Users can create new sets or use existing sets to add content to.
- Content is by default public and can be set to private or viewed by family and/or friends.

The system allows for the identification of two community members, family and friends. These groups of users can be allowed to view private content and add tags to it. The roles of users are no different from those identified in the new Flickr tagging system.

From the analysis, the object of the tagging system in Flickr can be summarized as follows:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Users can add content to sets as a way of organizing content. This influences the subject to provide tags that support the content in other ways i.e. descriptive tags which facilitate the retrieval of content.
- No tag suggestion is provided, which means that the subject is influenced to provide new tags instead of reusing existing ones.

The main difference between the two interfaces is that the new Flickr supports user groups, people tagging and sets for categorization. The system provides tag suggestions based on user's existing tags which also reduces the introduction of new tags. The old system gives more emphasis on the part tags can play in supporting the system; it provides categorization support in the form of sets which allow tags to support other types of categorization. This analysis may suggest that there will be a decrease in tags per user when comparing data from the two systems. To verify this assumption, data from Flickr was downloaded covering the tagging activity from January 2004 to September 2005 and another batch covering data from January 2010 to September 2011. The reason for the selection of these dates is to make sure that the right tagging system is being used since there is no exact date to refer to. Data retrieved contains user records consisting of, userID, contentID, date of upload, title and tags. The comparison here is based on the overall tagging behavior of users where the average number of tags per user is calculated. Table 4 provides a description of the data retrieved.

Table 4. Breakdown of tagging data from old Flick and new Flickr tagging systems

	Old Flickr	New Flickr
Number of Users	6197	9829
Number of Tags	1464542	1956568
Number of Items	230312	134906
Avg. Number of Tags/User	236	199
Avg. Number of Tags/Item (per user)	6.3	14.5
Number Untagged Items	21264	10268
Percentage of Untagged Items	9%	7%

According to the analysis, the first thing to notice is the average number of tags per user has decreased with the new Flickr tagging system. The average user in the old system applied 6.3 tags while in the new Flickr system they applied 14.5 tags. This decrease can be explained by the fact that the new system introduced multiple ways for users to tag images while the old system gave the option of free textual tagging. It is also worth noting that the percentage of untagged items decreased with the new system. The reason for that can be linked to the fact that the new tagging system provided tag suggestion, allowing users to choose from their previous list of tags.

Another analysis was conducted to extract a list of users who have records in both batches. The main reason for that was to compare tagging behavior of the same user using the two tagging systems. From the data retrieved, a total of 161 users were found to have posted images to the system within the two identified time frames i.e. having used both versions of Flickr's tagging system. The average number

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of tags applied by users who used the old Flickr was 18.7 tags per content. The same users applied an average of 12.4 tags per content using the new Flickr tagging system. This means that using the new Flickr tagging system, users reduced the number of tags applied by six tags on average. Again this can be attributed to the fact that the new design provided other options for users to annotate their images rather than textual tags.

FATS that was introduced in this was used as an analytical tool to understand current tagging systems dynamics. Semiotics analysis and activity theory allowed for a new approach to comprehend tagging systems' components and the relationship between each of them. The principles of mediation and object-orientedness coming from activity theory showed how components of the tagging activity are influenced, while the view of tagging systems as a sign identified how components of the tagging system are contributing to the dynamic of delivering the message of the system. Tools represent meaning to the tagging system that was conceptualized as intentions from users and system providers. Meanings and intentions have social effects that are reflected in how the rules are set, the community is formed and the roles are divided. The analysis process is the basis of a suggested design process that can be followed to design new tagging systems. The following section will introduce design processes that were based on activity theory. This will show how the theory can be implemented as a design tool.

SITUATIONAL RESULTS: PROPOSED DESIGN PROCESS FOR DESIGNING TAGGING SYSTEMS (DPTS)

The design process that is described here is based on the principle of object-orientedness. This means that the activity is directed towards transforming the object into its outcome, hence it is described by its object. The object of the tagging system activity is identified by the intention behind creating the system which motivates the tagging system while tagging. Tagging tools are designed based on the interaction of the other components of the system would result in what the possible tools are to be used to support the tagging system towards its object. In order to identify the tagging tools, we need to identify the object, community, roles and will then be followed by identifying the rules. The reason rules are identified at the end is because they represent the other three components of the system. There are object rules, community rules and role rules. Rules represent the constraints that need to be enforced to ensure the object is transformed into the desired outcome. In the design process, rules are to be expressed following the norm representation of business rules and regulations for clarity. These rules will "determine the conditions of events and actions" (Stamper & Liu, 2000, p. 16). The description consists of a condition, state, agent, deontic operator and action. The state of the rule is optional and determines a special circumstance or situation within the condition. The agent represents the person/concept that will be affected by the condition. Deontic operator specifies how the agent is expected to behave. There are three passives values "obliged", "permitted" and "prohibited" (Stamper & Liu, 2000). The action describes the expected result from the condition. The general structure of the rules is as follows:

- whenever <condition>
- if <state>
- then <agent>
- is <deontic operator>
- to do <action>

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

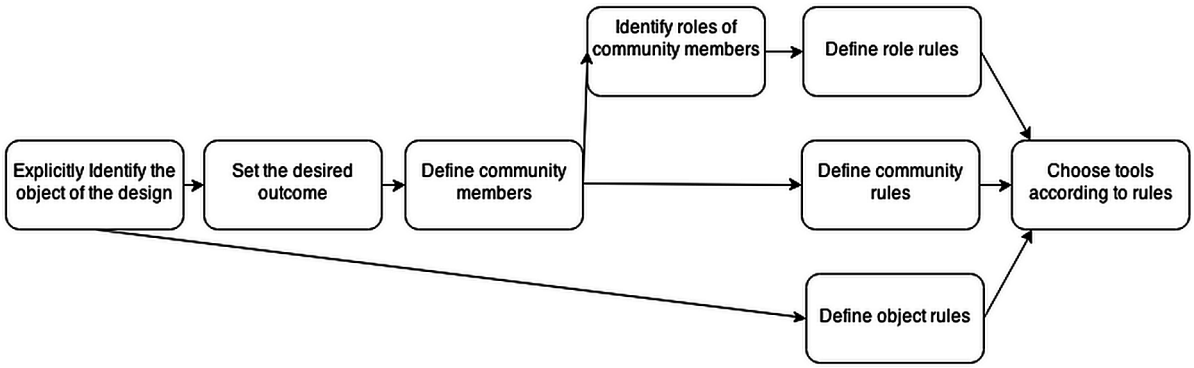
The following is an example of a rule expressed using the previous form, the rule states that taggers are supposed to provide three tags per content. (Note that the state part was not included since it is optional):

- whenever tagging for categorization
- if content is tagged
- then tagger
- is obliged
- to provide three tags per content

According to Stamper & Liu (2000), norm specifications can be translated into low-level language or a programming language. DPTS can be summarized by the following points and Figure 9:

1. Explicitly identify the object of the activity by stating the designer's intention behind allowing users to tag. This can be categorization/classification, retrieval facilitation, encourage giving opinion or feedback or description of content.
2. Setting the desired outcome: System contains few new tags and tag reuse, system provides, more new tags, etc.
3. Define the community members of the system.
4. Identify roles that the community members are playing within the system.
5. Define the rules of the system by identifying: object rules, community rules and role rules. Rules are to be expressed using norms format.
6. Choose proper tools to make sure that all rules are satisfied.

Figure 9. Design process for creating tagging systems (DPTS)



By following DPTS, a new design for tagging system can be generated based on the object i.e. the intention behind tagging. In terms of practical inquiry methodology, this is considered as a situational result that can be added to the body of knowledge. It can also be generalized and applied to similar problems as discussed in the following section.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

FUTURE RESEARCH DIRECTIONS

This section discusses the wider implications of this research that can expand its findings to cover other parts of knowledge. An area that is being considered is the application of FATS and the DPTS into other types of systems that may exhibit similar attributes to tagging systems. Such systems that are based on user collaboration can be analyzed using the analytical framework (FATS) for possible improvements and new systems can be designed by following the design process. This can be achieved since these systems are built to satisfy a goal by making the most out of user collaboration. Analysis of similar systems can be done using FATS in order to gain understanding of what influences user collaboration. The design process can be applied by setting the community component effect the roles users can play in the system. Rules and tools will emerge from the identification of the other components as applied in tagging systems within this chapter.

The future work gives the opportunity to identify other areas of strengths and weaknesses of the research. Some of the future research that can be conducted include the following:

- Design tagging systems based on DPTS and explore how the design affects the tagging behavior of the users.
- Applying DPTS by setting multiple objects for the tagging system. In some cases, the tagging system is provided to support the system in more than one way. This can be achieved by either doing this in one iteration of the design process or apply DPTS for each object at a time. When setting the first object, design rules and tools are produced. These will be built upon when the design rules and tools of the second object are identified and so forth.

CONCLUSION

Through this study, tagging systems were analyzed using an analytical framework that provided an understanding of their different components. This allowed for capturing tagging systems as interacting elements that affect each other. By applying the analytical framework, existing tagging systems could be studied to identify problems and evaluate what tagging behavior is expected from users. The research followed the practical inquiry methodology which attempts to solve problems while contributing to general knowledge. The design process that was identified can be followed to create new tagging systems based on desired tagging behavior. The design process can aid system designers in deciding about how user tagging is employed to support the entire system.

The following conclusions can be drawn from this chapter:

1. The semiotic analysis incorporated in FATS enables specification of norms for tagging system design, focusing on pragmatic components.
2. Better understanding of the effect tagging components have over tagging behavior was achieved through FATS. Although this is useful, it is sometimes hard to explain tagging behavior coming from multiple tagging interfaces e.g. Flickr taggers provide tags from the web-based system and/or the mobile based system.
3. By following DPTS, tagging systems that supports certain types of tagging behavior can be created.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

4. DPTS supports single tagging behavior which leads to directing users to this behavior. This can obstruct users from providing other types of tags that can support the system. This appears in the case of designing a system for organization, it limits the number of descriptive tags that the user can apply per content.

The overall conclusion of this chapter is that design can be guided by exploring user behavior. Following practical inquiry methodology, the design process emerged from investigating existing systems along with the support of organizational semiotics and activity theory.

REFERENCES

Bateman, S., Brooks, C., McCalla, G., & Brusilovsky, P. (2007). Applying collaborative tagging to e-learning. *Proceedings of the Workshop on Tagging and Metadata for Social Information Organization, held in conjuction with the 16th International World Wide Web Conference*. Banff, Canada.

Blanton, W., Simmons, E., & Warner, M. (2001). The Fifth Dimension: Application of cultural-historical activity theory, inquiry-based learning, computers, and telecommunications to change prospective teachers. *Journal of Educational Computing Research*, *24*(4), 435–463. doi:10.2190/YGJ0-WXUW-D0TR-9BGU

Chandler, D. (2000). *Semiotics for beginners*. Daniel Chandler.

Chandler, D. (2002). *Semiotics for beginners: glossary of key terms*. Aberystwyth University. doi:10.4324/9780203166277

Chu, S., Rathi, D., & Du, H. (2010). Users' Behaviour in Collaborative Tagging Systems. *Proceedings of the Annual Conference of the Canadian Association for Information Science (CAIS)*.

Dye, J. (2006). Folksonomy: A game of high-tech (and high-stakes) tag. *EContent*.

Echarte, F., Astrain, J. J., Córdoba, A., Villadangos, J., & Navarra, P. (2007). Ontology of Folksonomy: A New Modeling Method. Proceedings of Semantic Authoring, Annotation and Knowledge Markup (SAAKM).

Eco, U. (1979). *A theory of semiotics*. Indiana University Press.

Engestrom, Y. (1987). *Learning by Expanding: An Activity-theoratical Approach to Developmental Research*. Helsinki: Orienta-Konsultit.

Farooq, U., Kannampallil, T. G., Song, Y., Ganoe, C. H., Carroll, J. M., & Giles, L. (2007). Evaluating tagging behavior in social bookmarking systems: metrics and design heuristics. In *Human-Computer Interaction* (Vol. 1, pp. 351–360). ACM; doi:10.1145/1316624.1316677

Golder, S., & Huberman, B. (2006). Usage patterns of collaborative tagging systems. *Journal of Information Science*, *32*(2), 198–208. doi:10.1177/0165551506062337

Goldkuhl, G. (2008). Practical inquiry as action research and beyond. *Proceedings of the European Conference on Information Systems* '08.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Goldkuhl, G. (2011). Generic regulation model: the evolution of a practical theory for e-government. *Transforming Government: People. Process and Policy*, *5*(3), 249–267.

Gregor, S. (2002). A theory of theories in information systems. *Management Information Systems Quarterly*, *30*(3), 611–642.

Gregor, S. (2006). The nature of theory in information systems. *Management Information Systems Quarterly*, *30*(3), 611–642.

Gupta, M., Li, R., Yin, Z., & Han, J. (2010). Survey on social tagging techniques. *SIGKDD Explor. Newsl.*, *12*(1), 58–72. doi:10.1145/1882471.1882480

Hevner, A., March, S., Park, J., & Ram, S. (2004). Design science in information systems research. *Management Information Systems Quarterly*, *28*(1), 75–105.

Heymann, P., & Garcia-Molina, H. (2009). Contrasting Controlled Vocabulary and Tagging: Do Experts Choose the Right Names to Label the Wrong Things? *Proceedings of the Second ACM International Conference on Web Search and Data Mining (WSDM 2009), Late Breaking Results Session* (pp. 1–4). Stanford InfoLab.

Heymann, P., Koutrika, G., & Garcia-Molina, H. (2007). Fighting Spam on Social Web Sites: A Survey of Approaches and Future Challenges. *IEEE Internet Computing*, *11*(6), 36–45. doi:10.1109/MIC.2007.125

Hotho, A., Jäschke, R., Schmitz, C., & Stumme, G. (2006). Information retrieval in folksonomies: Search and ranking. *Proceedings of the European Semantic Web conference* (pp. 411–426).

Kuutti, K. (1995). Activity theory as a potential framework for human-computer interaction research. In *Context and consciousness* (pp. 17–44). Cambridge, MA, USA: Massachusetts Institute of Technology.

Kuutti, K. (2010). Defining an object of design by the means of the Cultural-Historical Activity Theory. *Proceedings of the European Academy of Design Conference*.

Lazarou, D. (2011). Using Cultural-Historical Activity Theory to design and evaluate an educational game in science education. *Journal of Computer Assisted Learning*, *27*(5), 424–439. doi:10.1111/j.1365-2729.2011.00410.x

Liu, K. (2000). *Semiotics in information systems engineering*. Cambridge UP. doi:10.1017/CBO9780511543364

Maier, R. (2007). *Knowledge Management Systems: Information and Communication Technologies: Information and Communication Technologies for Knowledge Management*. Springer.

Marlow, C., Naaman, M., Boyd, D., & Davis, M. (2006). HT06, tagging paper, taxonomy, Flickr, academic article, to read. In *Hypertext and Hypermedia* (pp. 31–40).

Morrison, P. J. (2008). Tagging and searching: Search retrieval effectiveness of folksonomies on the World Wide Web. *Information Processing & Management*, *44*(4), 1562–1579. doi:10.1016/j.ipm.2007.12.010

Mwanza, D. (2001). Where theory meets practice: A case for an Activity Theory based methodology to guide computer system design. *Proceedings of INTERACT' 2001: Eighth IFIP TC 13 Conference on Human-Computer Interaction*, Tokyo, Japan.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Nov, O., & Ye, C. (2008). What Drives Content Tagging : The Case of Photos on Flickr. *Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems,* Florence (pp. 1–4). . 10.1145/1357054.1357225

Peirce, C. D. (1960). *Collected Papers of Charles Sanders Peirce* (C. Hartshorne, P. Weiss, & A. W. Burks, Eds.). Harvard University Press.

Peters, I., & Becker, P. (2009). *Folksonomies: Indexing and Retrieval in Web 2.0*. De Gruyter/Saur. doi:10.1515/9783598441851

Russell, D. (2002). Looking beyond the interface: Activity theory and distributed learning. In *Distributed learning: social and cultural approaches to practice*. Routledge Falme.

Smith, G. (2007). *Tagging: People-powered Metadata for the Social Web, Safari*. New Riders.

Smith, M. (2006). *Viewer tagging in art museums: comparisons to concepts and vocabularies of art museum visitors. In 17th Annual ASIS* (pp. 1–19). Austin, Texas, USA: T SIG/CR Classification Research Workshop.

Specia, L., & Motta, E. (2007). Integrating Folksonomies with the Semantic Web. *The Semantic Web Research and Applications, 4519*(September), 624–639. doi:10.1007/978-3-540-72667-8_44

Stamper, R., Liu, K., Hafkamp, M., & Ades, Y. (2000). Understanding the roles of signs and norms in organizations-a semiotic approach to information systems design. *Behaviour & Information Technology*, *19*(1), 15–27. doi:10.1080/014492900118768

Sturtz, D. (2004, December). Communal categorization: the folksonomy. *INFO622: Content Representation*. Retrieved from http://www.davidsturtz.com/drexel/622/sturtz-folksonomy.pdf

Trant, J. (2009). Studying social tagging and folksonomy: A review and framework. *Journal of Digital Information*, *10*(1), 1–44.

Westberry, N. (2009). *An activity theory analysis of social epistemologies within tertiary-level eLearning environments*. The University of Waikato.

KEY TERMS AND DEFINITIONS

Activity Theory: A theory that focuses on human activities from a social perspective. It has been applied in many disciplines specifically in Human-computer interaction.

Delicious: An online bookmarking system that allows users to store, tag and share their favorite bookmarks.

DPTS: Stands for Design Process for Tagging Systems. A step-by-step process that can be following to create tagging systems that directs tagging behavior.

FATS: Stands for Framework for Analyzing Tagging Systems. A framework based on Semiotics and Activity theory used for analyzing tagging systems.

Flickr: An online system for posting, tagging and sharing pictures and videos.

Organizational Semiotics: The study of the organization based on Semiotics theory.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Semiotics: A theory that studies signs.

Practical Methodology: A research methodology that investigate the problem with a system and finds solutions that can be generalized to other similar systems. It employs theories to understand the problem and generate the solution.

Tagging: Annotating objects using words that relevant to it. They are used to organize and facilitate retrieval.

Tagging System: The interface where tagging takes place.

ENDNOTES

1 http://vanderwal.net/folksonomy.html

2 http://Del.icio.us.com/help

3 http://nationbuilder.com/jerimee/visitors_can_choose_multiple_tags_checkboxes_on_signup_form

This research was previously published in Design Solutions for User-Centric Information Systems; pages 138-161, copyright year 2017 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 31
Women in STEM Workplaces and Computer-Mediated Communication:
Obstacle or Advantage?

Seterra D. Burleson
Old Dominion University, Norfolk, USA

Whitney A. Tyler
https://orcid.org/0000-0003-4423-8507
Old Dominion University, Norfolk, USA

Debra A. Major
Old Dominion University, Norfolk, USA

Katelyn R. Reynoldson
https://orcid.org/0000-0002-1524-1566
Old Dominion University, Norfolk, USA

ABSTRACT

As women have the potential to bring unique perspectives to the workplace, the under-representation of women in STEM occupations is a severe limitation to global advancement through research and innovation. Workplace utilization of computer-mediated communication (CMC) may impact common barriers faced by women in STEM, such as stereotypes, a "chilly" workplace climate, lack of social support and mentorship opportunities, and work-family conflict. As organizations shift further into the use of virtual communication, it is essential to take advantage of CMC as a way to facilitate gender equality in the workplace while simultaneously mitigating barriers workplace CMC may present for women in STEM. The potential implications of workplace virtual communication, virtual teams, e-mentoring, cyber incivility, and telecommuting for women in STEM careers are discussed.

DOI: 10.4018/978-1-7998-7297-9.ch031

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Globally, women remain underrepresented in science, technology, engineering, and mathematics (STEM) fields (Catalyst, 2018; Jackson, Hillard, & Schneider, 2014). Whereas women constitute 47% of those employed in the United States (U.S. Bureau of Labor Statistics, 2017), only 25% of those employed in STEM occupations are women (U.S. Department of Commerce: Economics and Statistics Administration, 2017). Women who obtain STEM jobs are significantly less likely to persist in their careers compared to those in jobs outside of STEM (Glass, Sassler, Levitte, & Michelmore, 2013), and a considerable portion of the women who leave their STEM careers behind do so to pursue other occupations, not because they are choosing to leave the labor force altogether (Glass et al., 2013). Even when women graduate with STEM degrees, they are less likely than male STEM graduates to work in STEM occupations, often opting to work in education or healthcare instead (U.S. DOC: ESA, 2017).

Considering the importance of STEM skill development in an increasingly technical and automated job market (Soergel, 2015) and the need to remain competitive at a global level in areas of innovation and research (National Science Board, 2015), increasing the participation and persistence of women in STEM has become particularly important. As reliance on computer-mediated communication (CMC) outlets (e.g., email, video-based platforms, and instant messaging) becomes increasingly commonplace in organizations, it raises concerns about how such technological advances will affect women in male-dominated STEM fields. This article explores the current status of some common barriers women face in STEM occupations, including stereotypes, a "chilly" work climate, lack of mentorship opportunities, and work-family conflict and the potential impact workplace utilization of CMC may have on these barriers. Topics discussed include virtual teams, virtual communication platforms, e-mentoring, and telecommuting.

BACKGROUND

Substantial efforts have been made to understand barriers that contribute to the underrepresentation of women in STEM to inform the development of strategic interventions designed to rectify these issues. Gender stereotypes are a key factor in the underrepresentation of women in STEM (Dasgupta & Stout, 2014). Stereotypes are commonly held beliefs about groups of people classified into categories based on associated common traits or attributes (Koch, D'Mello, & Sackett, 2015), and they tend to be activated quickly and automatically (Banaji & Hardin, 1996). In STEM, stereotypes often contribute to women's experiences of a "chilly" or unwelcoming work climate because, by choosing to work in male-dominated fields, they are perceived to be violating traditional gender role norms (Dasgupta & Stout, 2014; Hughes, 2014). The "chilly" climate experienced by women in STEM is exacerbated by problematic gender dynamics in mixed-gender mentoring relationships as well as insufficient access to same-sex mentorship opportunities (Preston, 2004). Further, work-family responsibilities and inflexible working hours have been identified as key factors in women's decisions to leave their STEM careers behind (Heilbronner, 2013).

These established barriers take on new meaning in the context of a technologically advanced workspace through the utilization of CMC. Workplace utilization of virtual teams, e-mentoring, and telecommuting policies has the potential to impact women in STEM in positive ways, such as enabling women to overcome stereotype threat in group settings (Furumo & Pearson, 2007), reducing men's perceived risk

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in mentoring female protégés (Mertz, Welch, & Henderson, 1987), increasing opportunities for women to engage with female mentors and role models (Muller, Blake-Beard, Barison, & Wotipka, 2012), and enabling women to balance work and family roles (Golden, 2006). However, organizational utilization of CMC may have some negative ramifications. For example, women in STEM may experience mistreatment from coworkers and supervisors through CMC (Giumetti, McKibben, Hatfield, Schroeder, & Kowalski, 2012; Lim & Teo, 2009), increased feelings of social isolation (Golden, Veiga, & Dino, 2008; Morganson, Major, Oborn, Verive, & Heelan, 2010), and reduced visibility that may negatively impact their careers (Maruyama & Tietze, 2012). To effectively utilize CMC to promote the success and persistence of women in STEM, the advantages and obstacles presented by CMC must be considered.

GENDER ROLE STEREOTYPES AND STEM

There is substantial evidence that stereotypes exist in association with gender, and these stereotypes suggest there are divergent traits that generally characterize men and women (Broverman, Vogel, Broverman, Clarkson, & Rosenkrantz, 1972; Koch et al., 2015). Commonly attributed to men, *agentic* characteristics involve a tendency to behave in a way that is competitive, assertive, and confident (Eagly & Karau, 2002). Conversely, communal characteristics, involving a general concern for the welfare of others, are most commonly associated with women (Eagly & Karau, 2002). Descriptors such as helpful, socially skilled, and kind are often associated with those who display communal characteristics. Goal congruity perspective suggests that women often select out of or lose interest in pursuing STEM career paths due to perceptions that STEM careers are not aligned with communal goals (Diekman, Brown, Johnston, & Clark, 2010; Diekman, Weisgram, & Belanger, 2015). For example, STEM professions are typically not thought of as outlets through which communal goals like working with and helping others are often fulfilled (Diekman et al., 2015). However, involvement in many STEM fields, requires a great deal of collaboration and teamwork, and STEM projects often contribute to the betterment of society (Dasgupta & Stout, 2014).

When women choose career paths associated with agentic traits, they are burdened with what has been labeled a "backlash effect" (Kark & Eagly, 2010; Rudman, 1998). Paradoxically, women must display necessary agentic traits to be considered for STEM positions but, as a result, are seen as less likeable because they are deviating from female gender norms (Rudman, Moss-Racusin, Phelan, & Nauts, 2012). This contradictory expectation placed on women is likely to induce hiring discrimination, difficulty in attaining promotions, and a lack of social support, which exacerbates the harshness of the climate women encounter in STEM workplaces (Rudman et al., 2012). In addition, stereotype threat, the process whereby an individual does not perform to their best ability in a domain where there is a perceived threat of confirming a negative stereotype about a group he or she belongs to (Steele & Aronson, 1995), is a barrier women face while pursuing STEM careers (Diekman et al., 2015). In the workplace, negative stereotypes surrounding women, such as being inadequate in terms of competence or leadership capabilities in comparison to men (Koenig, Eagly, Mitchell, & Ristikari, 2011; Paustian-Underdahl, Walker, & Woehr, 2014), may cause highly competent and capable women to underperform (Kinias & Sim, 2016). Women in STEM are at particular risk for succumbing to stereotype threat due to perceptions that women do not have the competence necessary to succeed in STEM occupations relative to men (Logel et al., 2009; Schuster & Martiny, 2017). As women attempt to counter prevalent stereotypes regarding women's ability to succeed in STEM careers, they expend cognitive resources,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

normally utilized for performance, constantly monitoring their behavior (Appel, Kronberger, & Aronson, 2011; Reynoldson & Major, 2018).

Team Discrimination

STEM-related gender stereotypes may be particularly salient in team settings. For instance, men tend to display more verbal and nonverbal power-related behavior than women when engaging in masculine tasks and are more likely to assert dominance or assume leadership in group discussion (Coates, 2015; Dovidio, Brown, Heltman, Ellyson, & Keating, 1988). Women may encounter more displays of power from men in STEM, consistent with the stereotypical incompatibility of communal characteristics of women with the agentic qualities associated with STEM occupations (Carli, Alawa, Lee, Zhao, & Kim, 2016). Despite perceptions that STEM fields are more related to agentic than communal goals, teamwork is prominent in fields such as engineering and chemistry (Diekman et al., 2015). Collaboration is important in the production of scientific knowledge as well as the recruitment and retention of women in STEM (Frehill, Di Fabio, Layne, Johnson, & Hood, 2007; Wuchty, Jones, & Uzzi, 2007). An emphasis on teamwork and collaboration in STEM fields could spark women's interest in STEM careers, as women tend to be more interpersonally oriented and driven by communal goals than men (Diekman et al., 2015; Eagly & Johnson, 1990).

Moreover, promoting the inclusion of women on teams has been suggested as a way to increase the quality of team collaboration in STEM (Bear & Woolley, 2011). The proportion of women in a group is related to increased levels of group collective intelligence, which is closely related to the consistency and quality of group outputs, greater equality in participation in group conversation, and higher quality discussion that then predicts group performance (Curşeu, Chappin, & Jansen, 2018; Bear & Woolley, 2011; Woolley, Chabris, Pentland, Hashmi, & Malone, 2010). In a study of research and development teams in Spain, gender diversity was positively related to radical innovation involving drastic changes, which are key to maintaining a competitive advantage and creating novel opportunities for organizational success (Díaz-García, González-Moreno, & Sáez-Martínez, 2013).

There are, however, concerns related to gender and team dynamics relevant in a STEM context. For example, Joshi and Roh (2009) found that in gender-balanced occupations, gender diversity in teams was positively related to team performance, but in male-dominated occupations, gender diversity had a negative effect on team performance, suggesting that contextual information is important in understanding the role of gender composition in teams. In a study of engineering teams, female students in teams consisting of less than 25% women reported reduced confidence and involvement in teamwork, expressed reduced career aspirations in engineering, and participated less in group problem-solving discussion when compared to those in teams where women were the majority (Dasgupta, Scircle, & Hunsinger; 2015). Despite an emphasis on teamwork in fields such as engineering for recruitment and retention, the use of teams may lead to competitive hierarchies rather than collaboration (Frehill et al., 2007). Women in STEM have identified collaboration as being a key factor in their success (Wentling & Thomas, 2009), and competitive hierarchies may contribute to women's lack of a sense of belonging in STEM (Frehill et al., 2007). Facilitating more cooperative team environments in STEM is important, as egalitarian rather than competitive social relationships increase team effectiveness (Tonso, 2006).

Research shows that all-female groups exhibit more egalitarian behaviors than mixed-gender groups (Berdahl & Anderson, 2005). Dasgupta and colleagues (2015) found that the presence of female peers in workgroups was related to persistence, participation, and lower levels of anxiety for women in STEM,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

suggesting that women feel less threatened by gender stereotypes and more comfortable speaking up when group members are largely female. Indeed, women's level of social influence tends to be closer to that of men in groups that are gender-balanced, and men tend to resist female influence more than women do (Carli, 2001). Dasgupta and colleagues (2015) suggested that, in male-dominated fields with prevailing masculine stereotypes, attrition of women could be prevented by creating microenvironments, such as teams, where women constitute the majority or gender balance is achieved. In STEM fields, this may be difficult to accomplish, considering there may not often be a sufficient number of women to comprise 50% or more of a team.

Implications of Virtual Teams

In contrast to traditional teams, virtual teams provide a context in which demographic cues, such as age and gender, are less salient (Hoch & Kozlowski, 2014), potentially reducing the effects of stereotypes on women's success and enabling them to collaborate with others more easily, especially in male-dominated fields. Research shows that women enjoy participating in virtual teams to a greater extent than men and are more satisfied with the virtual team experience (Berdahl & Craig, 1995; Lind, 1999; Savicki, Kelley, & Lingenfelter, 1996). In comparison to their experiences in traditional teams, women are more satisfied with their virtual team experiences (Lind, 1999). Additionally, women in virtual teams perceive greater team cohesiveness, are more trusting, and feel more included than men in virtual teams (Furumo & Pearson, 2007; Lind, 1999). Stereotypes about gender and STEM aptitude may be less salient in virtual environments, as surface level characteristics may not be as apparent in the context of CMC.

A concern in traditional in-person working environments is that men tend to interrupt women in group and one-on-one verbal communication more than they interrupt other men and display more verbal and nonverbal power-related behaviors when working on masculine tasks than women (Dovidio et al., 1988; Smith-Lovin & Brody, 1989; West & Zimmerman, 1983). This concern may be mitigated by CMC because men have less opportunity to interrupt team members or engage their attention immediately in electronic communication such as e-mail and instant messaging (Furumo & Pearson, 2007). As communication in virtual teams is computer-mediated, the effects of men's nonverbal power-related behaviors may be reduced in this context. Women tend to be more reactive than their male peers to visual cues and often respond to men's interruptions and power-related behaviors by allowing them to dominate the conversation, and CMC has the potential to reduce gender discrepancies in participation by allowing all members to speak simultaneously and without interruption (Hamilton & Scandura, 2003). Therefore, asynchronous virtual communication may offer women in STEM an opportunity to compose responses in their own time with reduced stereotype threat and opportunity for interruption, leveling the playing field between women and men.

Additionally, virtual teams, in contrast to traditional teams, may provide a context in which the microenvironments of equal proportions of women and men suggested by Dasgupta et al. (2015) can be achieved more easily in a male-dominated STEM environment. Traditional teams rely on geographical proximity, which may be more of a challenge in recruiting women who constitute a smaller percentage of the STEM workforce compared to men (U.S. DOC: ESA, 2017). Comparatively, virtual teams are not constrained by geographical boundaries and can provide increased opportunities for women to form teams in organizational settings not dominated by men (Townsend, DeMarie, & Hendrickson, 1998). The use of gender-balanced or female majority microenvironments is one way to allow women to experience relief from the distraction of gender stereotypes, to focus on learning and mastery, and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to increase their confidence and aspirations in male-dominated fields (Dasgupta et al., 2015). Overall, virtual teams provide increased opportunities for women to communicate their ideas, collaborate with fellow team members, and connect with female peers, enabling women in STEM to overcome some of the stereotypes and stereotype threat they face in traditional team settings.

CHILLY CLIMATE

Women often identify a "chilly" organizational climate characteristic of many STEM workplaces as a contributing factor to feelings that they do not belong in STEM (Hughes, 2014). This chilly climate is perpetuated through a lack of role models, stereotypes regarding gender roles, and overt and subtle discrimination. Organizational climate constitutes the collective perceptions and interpretations employees have about the policies, practices, and procedures enacted by the organization that are rewarded, supported, and expected (Reynoldson & Major, 2018; Schneider, Wheeler, & Cox, 1992). Climate is related to critical individual-level outcomes such as psychological well-being, withdrawal, and job performance through its impact on an employee job satisfaction and organizational commitment (Carr, Schmidt, Ford, & Deshon, 2003).

Inclusive organizational climates contribute to a sense of belongingness through equality in terms of organizational members' ability to be heard and to have their contributions valued by others (Major & Morganson, 2009; Reynoldson & Major, 2018). While gender diverse, highly inclusive environments are related to reduced interpersonal conflict (Nishii, 2013), exclusive work climates are associated with decreased job satisfaction, reduced organizational commitment, and increased turnover (Major, Davis, Sanchez-Hucles, German, & Mann, 2006) as well as poor psychological well-being (Brimhall, Lizano, & Barak, 2014; Reynoldson & Major, 2018). Exclusive work climates are commonplace for women in STEM occupations, partially due to the inability of women to garner sufficient support given relatively low numbers of women in these occupations (Glass et al., 2013; Hughes, 2014; Reynoldson & Major, 2018; Walton, Logel, Peach, Spencer, & Zanna, 2015). One example of the effects of chilly climates is in STEM academia. Though equally committed to their academic positions in STEM, women faculty report higher turnover intentions than men (Xu, 2008). Explanations for this include inadequate opportunities for career advancement, opinion suppression, and insufficient support from peers and mentors.

Lack of Social Support

Formal discrimination practices are decreasing for women in STEM, but interpersonal sources of discrimination remain prevalent (Robnett, 2016). Social support consists of a person's overall sense that they are cared for, are esteemed, and belong in a group or situation (Kirmeyer & Lin, 1987). For women in STEM, social support can prove particularly important in terms of retention and feelings of inclusion (Chemers, Zurbriggen, Syed, Goza, and Bearman, 2011; Rosenthal, London, Levy, and Lobel, 2011; Walton & Cohen, 2007). Robnett (2016) found that, over the course of one year, 61% of participants, comprised of women in STEM undergraduate majors and doctoral programs, experienced gender bias while pursuing a STEM education. Male peers acted as the source of gender bias more frequently than females, mentors, teachers, or professors. Furthermore, to be taken seriously, over one-third of female students felt they needed to work harder than their male peers. Women's experience of gender bias was related to lower levels of STEM self-concept, an effect buffered by peer support. When women had a

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

supportive peer network in their STEM field, their STEM self-concept remained relatively high, despite encountering gender bias.

In a study of women in engineering careers, Fouad, Singh, Cappaert, Chang, and Wan (2016) found that women who persisted in their careers did not differ from those who left in terms of self-confidence, vocational interests, or perceived workplace barriers, but they did differ in terms of their experienced workplace support, including supportive supervisors. Mohr and Wolfram (2010) demonstrated that social support is an effective tool in mitigating the impact of stress. Social support acts as a coping mechanism that can be even more effective for women than for men in promoting persistence in STEM (Morganson, Jones, & Major, 2010). For women, perceived support from others as well as one's STEM program is associated with a greater sense of belonging and motivation and less insecurity in one's STEM major (London, Rosenthal, Levy, & Lobel, 2011; Rosenthal et al., 2011).

Implications of Workplace Computer-Mediated Communication

Organizations have become heavily reliant on both internal and external CMC platforms to improve efficiency in communication between employees (Cho, Lee, & Kim, 2019). CMC takes place through many outlets in the workplace, including email, social networks, blogs, video-based platforms, and instant messaging. Services such as Slack and Skype have gained momentum as popular workplace CMC platforms developed with a purpose of increasing knowledge sharing and communication among coworkers and teams. Slack recently surpassed six million daily users including 50,000 teams engaging in its services (Konrad, 2017). Skype, though primarily used by companies within the United States, is utilized by 33,759 companies globally to facilitate communication among employees, allowing users to conduct virtual meetings, message coworkers, and make calls (iDatalabs, 2017). Due to increasing global reliance on workplace CMC, it becomes important to consider the implications of CMC for women in the workplace and, specifically, women in male-dominated STEM fields.

Organizational promotion of CMC has been proposed as a way to create a more egalitarian environment where both women and men have equal opportunities to communicate and access information (Spears & Lea, 1994). Atai and Chahkandi (2012) conducted a study utilizing professional listservs and found that men's presence was more ubiquitous, with men often writing lengthier messages than women. In a longitudinal study, Barrett and Lally (1999) demonstrated that women were hesitant early in their use of CMC, but after familiarizing themselves with the platform, women and men participated at the same rate. However, men's messages were twice as long as those of women. Overall, this suggests that women in STEM may benefit from organizational reliance on CMC through more equal participation in communication.

Surface level characteristics, such as physical appearance, are not as salient through CMC platforms as they are in face-to-face communication, but employees remain likely to make discernments of characteristics such as gender based on assumptions made when interpreting usernames or the content and style of messages (Spottswood, Walther, Holmstrom, & Ellison, 2013). For instance, messages may differ in person-centeredness (i.e., the amount a message provides emotional support; Burleson, 2003; Spottswood et al., 2013). Highly person-centered messages are considered perceptive, effective, and supportive and are often attributed to women. Low person-centered messages are characterized as being critical, dismissive, and ineffective and are typically attributed to men. Spottswood et al. (2013) found that women preferred highly person-centered CMC in general, while men preferred highly person-centered messages only when perceived to have come from a man or gender-ambiguous helper.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Particularly relevant to women in STEM, even the anticipation of working with others through CMC has been found to activate stereotypical gender biases (Heilman, Caleo, & Halim, 2010). In a study of men and women who envisioned working in a business project through CMC or face-to-face communication, gender stereotypes were activated to a greater extent when participants expected to work with others through CMC. In addition to affecting initial impressions of others, the expectation of electronic communication also motivated judgments about individuals' abilities to execute different types of work tasks. This was associated with an increased rate of task assignments which were consistent with stereotypes. As women in STEM are often working in male-dominated contexts, the activation of stereotypes in anticipation of CMC may introduce additional barriers for these women. It is important for organizations to be aware of the potential for CMC to activate traditional gender stereotypes that may lead to gender biased task assignments and differential treatment for women in STEM.

Incivility

One contributing factor to "chilly" climate and lack of social support for women in STEM is incivility. Incivility is defined as subtle, deviant behavior characterized by an ambiguous intent to harm the target (Andersson & Pearson, 1999). Examples of uncivil behavior include rolling eyes, making condescending or derogatory remarks, or excluding someone from social interactions (Andersson & Pearson, 1999). Although uncivil treatment may seem minimal, these behaviors can have substantial effects on those who experience them. A meta-analysis by Hershcovis (2011) found that experienced incivility was negatively related to job satisfaction, psychological well-being, and physical well-being. Incivility is strongly related to turnover intentions (Hershcovis, 2011), and it is also associated with job withdrawal, counterproductive work behavior, and decreased organizational commitment (Cortina, Magley, Williams, & Langhout, 2001; Penney & Spector, 2005; Spence Laschinger, Leiter, Day, & Gilin, 2009). Incivility can be quite common in the workplace. In fact, studies have shown that over 70% of employees have experienced incivility (Cortina et al., 2001) with more recent studies demonstrating that this number is closer to 90% (Lim & Lee, 2011).

Some individuals may be at increased risk for uncivil treatment (Cortina, Kabat-Farr, Magley, & Nelson, 2017). Cortina (2008) developed the theory of selective incivility, positing that uncivil treatment is actually a covert form of discrimination in the workplace disproportionately leveled at those who hold less powerful social roles (e.g., women, people of color). This theory has been supported by several research studies (e.g., Cortina, Kabat-Farr, Leskinen, Huerta, & Magley, 2013; Lim, Cortina, & Magley, 2008; Miner, Pesonen, Smittick, Seigel, & Clark, 2014). Cortina and colleagues (2002) found that women reported significantly more incivility than men, especially in male-dominated occupations. Fouad and Singh (2011) examined women in engineering, a STEM field particularly dominated by men (National Science Board, 2015), and found that women who left engineering reported experiencing more incivility than those still in the field. Moreover, women experienced higher levels of work-family conflict when working in environments in which women were generally the targets of uncivil treatment (Fouad & Singh, 2011). Miner, Diaz, and Rinn (2017) found that women in STEM experienced more gender-based incivility than men. Further, experienced incivility was related to psychological distress, and this effect was buffered by social support, further emphasizing the importance of social support for women in STEM.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Cyber Incivility

While CMC has the potential to create a more egalitarian environment for women to communicate in STEM fields (Spears & Lea, 1994), it also opens the door to new types of uncivil treatment from coworkers and supervisors. Cyber incivility, like incivility, is behavior that violates workplace norms of mutual respect, but it is distinct in that the behavior occurs through the use of CMC (Lim & Teo, 2009). Examples include behaviors such as writing in a condescending manner or making hurtful comments over email or instant messaging, excluding an individual in an email chain or group chat, or making demeaning or derogatory remarks that individuals are uncomfortable making in face-to-face communication. While Lim and Teo (2009) found that more active forms of cyber incivility are most often engaged in by men, women tended to engage in more passive forms of incivility, such as sending time-sensitive messages with short notice and choosing not to respond to emails sent by employees.

Considering the importance of perceived support for women in STEM, cyber incivility may result in particularly undesirable outcomes for women in these fields. Cyber incivility is negatively related to workplace outcomes such as job satisfaction and organizational commitment and positively related to turnover intent and counterproductive work behavior (Lim & Teo, 2009). Further, cyber incivility instigated by a supervisor predicts subordinate burnout, absenteeism, and turnover intentions (Giumetti et al., 2012). This further emphasizes the importance of preventing uncivil behavior directed towards women in STEM workplaces, suggesting that uncivil behavior can be instigated by supervisors as well as coworkers and should be dealt with at the organizational and team levels. Further Cortina and colleagues (2017) suggested that organizational use of CMC may allow uncivil treatment to permeate the barriers of regular working hours into the home lives of targets, offering little chance for relief. This has further implications for women in STEM, as these women often report difficulty in balancing work and family life as an obstacle in their success and persistence in STEM fields (Burke & Mattis, 2007; Ferriman, Lubinski, & Benbow, 2009). Cyber incivility, if left unchecked, may perpetuate women's perceptions of a lack of social support and a "chilly" climate (Hughes, 2014) in STEM fields. Therefore, it is advisable that organizations consider implementing strategies, such as putting online etiquette practices in place, to alert employees to potential miscommunication that can occur online (Giumetti et al., 2012).

Though cyber incivility is often intentional, unintentional cyber incivility can occur through misinterpretations of CMC as well. Because cues such as pitch, tone, body language, and rate of speaking are lacking in CMC platforms, there is more opportunity for individuals to misinterpret messages, and these messages may unintentionally come across as harmful to recipients (Giumetti et al., 2012). Additionally, Giumetti et al. (2012) suggested that cyber incivility may become more prevalent than face-to-face uncivil behavior, as the consequences of uncivil behavior instigated through CMC may be less immediately observable or apparent due to the lack of physical proximity and potential anonymity between the instigator and the target of the uncivil behavior. As women in male-dominated fields are at particular risk for uncivil treatment at work (Cortina et al., 2002; Fouad & Singh, 2011), it is essential for organizations to identify and prevent instances of uncivil treatment to decrease women's sense of a "chilly" workplace climate and increase their sense of belongingness in the organization and their STEM field.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

LACK OF MENTORSHIP

Another barrier women in STEM face is a lack of opportunities to benefit from mentorship (Preston, 2004). Mentorship occurs when more experienced or senior employees provide both professional and personal assistance as well as guidance to less experienced protégés (Ghosh & Reio, 2013). Mentors experience positive outcomes, including higher levels of job satisfaction, organizational commitment, job performance, and career success (Ghosh & Reio, 2013). For protégés, mentoring is linked to increased socialization, job satisfaction, self-esteem, organizational commitment, and promotion opportunities, as well as reduced work stress and work-family conflict (Adya, 2008; Underhill, 2006). A lack of mentorship is often identified as an important factor in women's decisions to leave STEM fields (Rayman & Brett, 1995). In their review of mentoring research, McKeen and Bujaki (2007) suggest that female protégés may benefit from mentorship, as mentors can help women to navigate the masculine culture prevalent in many organizations, promote women's professional advancement, and foster a sense of belonging in their chosen field. Additionally, qualitative analysis suggests that mentorship allows women to feel connected, affirm their worth, garner support, and reduce feelings of isolation (Gibson, 2004; Langdon, 2001). This is particularly relevant for women in STEM, who identify experiencing a "chilly" climate, lack of social support as barriers to their success and persistence in STEM (Hughes, 2014).

Underhill's (2006) meta-analysis established that informal mentoring tends to produce larger effects on desired outcomes than formal mentoring. Informal mentoring occurs when individuals engage in mentoring relationships without an organizational intervention, while formal mentoring is sponsored by a program which pairs mentors with protégés (Chao, Walz, & Gardner, 1997). Mutual interests and shared characteristics drive mentors' and protégés' decisions to start informal mentoring relationships (Underhill, 2006), and gender of the protégé and the mentor may be a characteristic that influences these decisions (Mckeen & Bujaki, 2007). As women remain the minority in STEM fields, it follows that they will have less opportunity to engage in informal mentoring relationships, as many of their potential mentors are men who may be more inclined to start informal mentoring relationships with male protégés who they perceive as similar to them. It is important for women to be provided with opportunities to engage in informal mentoring relationships with male as well as female mentors. Turban, Dougherty, and Lee (2002) found the length of mentoring relationships to be more important than their gender composition, and for protégés, there are no gender differences in terms of receipt of career development (O'Brien, Biga, Kessler, & Allen, 2010). Additionally, the promotion of mixed-gender mentoring relationships has been proposed as a way to increase women's success in male-dominated organizations and occupations by enabling them to familiarize themselves with the organizational context (Scandura & Williams, 2001).

However, stereotypes may lead potential STEM mentors, especially men, to perceive women protégés as being higher risk than men with similar qualifications (Mertz et al., 1987). Stereotypes about men's aptitude in fields such as science may lead mentors to choose male protégés over women (Preston, 2004). Another source of risk may be perceptions that mixed-gender mentoring relationships can lead outside parties to make sexual insinuations about the relationship (Major & Morganson, 2009). Further, women report lower comfort levels and perceived support in mixed-gender mentoring relationships (Feldman, Folks, & Turnley, 1999; Scandura & Williams, 2001). Women who do seek male mentors may encounter societal barriers related to gender roles that make it difficult for them to engage with potential male mentors informally (O'Brien et al., 2010; Ragins & Sundstrom, 1989). For example, women often miss out on opportunities to engage in stereotypically masculine work-related leisure activities (e.g., golf;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Schwartz, 1989), though participation in these traditionally male-dominated activities increases informal exposure to potential male mentors.

One clear benefit of same-sex mentoring relationships is that they are more strongly related to role modeling than mixed-gender mentoring relationships (Scandura & Williams, 2001). Exposure to same-sex experts (e.g., advanced peers, professionals, and professors) in academic STEM environments is predictive of stronger implicit identification with STEM, greater self-efficacy, and increased effort on STEM exams (Stout, Dasgupta, Hunsinger, & McManus, 2011). This has clear implications for women in STEM, as these women are likely to have few female role models, with whom they may identify more, due to women's underrepresentation in STEM (Jackson et al., 2014). In contrast to male mentors, female mentors may provide women in science with an opportunity to connect with the broader community of women in science (Preston, 2004). Preston (2004) suggests that as women in male-dominated fields have less opportunity to encounter female mentors organically, organizations and educational programs should consider initiating formal mentoring programs to increase women's chances of connecting with female mentors and role-models (Preston, 2004). In recent years, however, opportunities to engage with mentors outside of formal mentoring programs have been presented through the use of CMC.

Implications of E-Mentoring

One way to overcome the barriers women in STEM face in engaging with mentors, especially with female mentors (Preston, 2004), is through e-mentoring. Similar to traditional face-to-face mentoring, *e-mentoring* is characterized as relationships that are mutually beneficial between a mentor and a protégé and provide learning as well as career and emotional support, but it is distinct from traditional mentorships in that interactions occur primarily through electronic modes of communication (e.g., e-mail, instant messaging, chat rooms, social networks; Ensher & Murphy, 2007). E-mentoring relationships can be entered into both formally and informally and can be particularly advantageous for women and minorities who tend to face more obstacles in their search for effective mentoring relationships (Muller & Barsion, 2003). It has been suggested that, due to its potential to cross barriers of race, gender, geography, and class, e-mentoring may provide women opportunities to explore male-dominated occupations by providing easy access to motivated role models and advocates (Bierema & Merriam, 2002).

A key benefit to e-mentoring is that it provides women, who may have had little exposure to successful women in STEM, with opportunities to encounter successful female role models outside of traditional mentorship programs and face-to-face interactions (Muller et al., 2012). This is important, as exposure to professional women in STEM helps to break down gender barriers that women may encounter in the field (Clewell & Campbell, 2002). Schwiebert, Deck, Bradshaw, Scott, and Harper (1999) suggested that it may be necessary for women to have mentors who are men, as fewer women hold high-level positions in male-dominated fields, but e-mentoring also presents a way for women to engage with other women who they would not have otherwise been able to access. E-mentoring has the potential to provide a foundation for the creation of an online community of female STEM professionals (Muller et al., 2012), presenting new opportunities for women to gain insight and advance their careers in STEM.

Because gender is less salient in virtual interactions such as email and instant messaging, it is less likely to influence the selection of protégés in these contexts (Hoch & Kozlowski, 2014). Therefore, CMC provides women in STEM with increased opportunities to engage both formally and informally with male mentors, who might typically be drawn to male proteges due to perceived similarity to them (Mckeen & Bujaki, 2007). Additionally, e-mentoring, as it is characterized by little in-person contact,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

may mitigate the perceived risk that comes with taking on a female protégé (Mertz et al., 1987). For example, reliance on CMC in e-mentorships may lessen the perceived risk of sexual insinuations that may arise in mixed-gender relationships as well as actual instances of sexual misconduct (Major & Morganson, 2009). Mitigating men's perceived risk could enable women to engage in mentoring relationships more easily and experience the benefits associated with having a male mentor in STEM. While gender influences the formation of mentoring relationships, perceptions of mentoring received are independent of gender in traditional mentoring relationships of long duration (Turban et al., 2002), and career development outcomes are the same for protégés regardless of the gender of their mentor (O'Brien et al., 2010). Overall, CMC presents an opportunity for women overcome societal barriers that inhibit them from encountering male mentors organically (O'Brien et al., 2010; Ragins & Sundstrom, 1989). E-mentoring has the potential to increase opportunities for women in STEM to engage with both male and female mentors and benefit from the increased socialization, professional advancement, and sense of belonging that mentorship often provides (Adya, 2008; McKeen & Bujaki, 2007).

MentorNet (www.MentorNet.net) is an example of a national program designed to help women in STEM engage with mentors through CMC, such as email, in an effort to increase the representation of women in these fields (Single, Muller, Cunningham, Single, & Carlsen, 2005). Another example of an e-mentoring program is *Career*Wise (http://careerwise.asu.edu), a free online program designed to support women in STEM through mentoring by focusing on strengthening resilience, problem solving, and coping skills to increase women's persistence in STEM programs and careers (Bernstein, 2011). Although online platforms for women in STEM to engage in e-mentoring are available publicly, organizations can facilitate formal internal e-mentoring programs to connect women entering the organization with experienced mentors. Additionally, organizations can provide employees, especially women, with resources that encourage them to seek informal e-mentoring relationships, both as mentors and protégés.

WORK-FAMILY CONFLICT

To sustain a competitive advantage, it is imperative that organizations employ interventions to promote employee work-life balance. Work-family conflict (WFC), occurs when an individual experiences pressure to participate in the work or family domain which interferes with participation in the other domain (Greenhaus & Beutell, 1985). If organizations seek to attract and retain women in STEM, measures should be taken to ensure work-family needs are met and WFC is mitigated. The consequences of WFC include decreased performance, poor job satisfaction, decreased overall life satisfaction, and emotional exhaustion (Alacorn, 2011; Nohe, Michel, & Sonntag, 2014). These detrimental experiences for employees often lead to costly turnover for organizations (Nohe & Sonntag, 2014).

A recent meta-analysis found that, overall, men and women do not differ in perceived WFC (Shockley, Shen, Denunzio, Arvan, & Knudsen, 2017). Despite experiencing equivalent levels of WFC, men are often apprehensive to discuss work-family issues, partly due to the potential of being perceived as less masculine and having more communal traits, which would be in violation of traditional gender norms (Vandello, Hettinger, Bosson, & Siddiqi, 2013). This may lead to inaccurate perceptions that women experience a greater amount of WFC. Another concern is the potential for unfavorable perceptions of employees who attempt to balance their work and family roles through the use of organizational flexibility policies. This flexibility stigmatization (Blair-Loy, 2003) is characterized by a strong belief that individuals who utilize family-friendly organizational policies and benefits (e.g., sick days, telecom-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

muting, paternity leave) lack commitment to the organization leading to negative career implications (e.g., lost advancement opportunities; Williams, Blair-Loy, & Berdahl, 2013). Cech, Blair-Loy, Correll, Kelly, and Williams (2014) examined this flexibility stigma among STEM faculty finding that those who experience this stigmatization reported lower job satisfaction, decreased work-family balance, and lower intentions to persist in the organization and industry.

A common explanation for the underrepresentation of women in STEM is the motherhood penalty that they experience (Correll, Benard, & Paik, 2007). Mothers in STEM are even more susceptible to gender biases stemming from violating gender role norms, as these biases tend to become more salient when a woman chooses to become a mother (Correll et al., 2007). According to the U.S. Bureau of Labor Statistics (2018), there is a stark gender disparity in parental employment. Married mothers were significantly less likely to participate in the workforce (68.6%) in comparison to married fathers (92.8%). Fathers are also more likely to remain at full-time status regardless of dependent age, whereas mothers are significantly less likely to work-full time, especially when they have a child under three years old.

Considering the demanding nature of STEM professions and the desire to maintain a fulfilling family life, women frequently identify difficulty in balancing work and family obligations as an obstacle in pursuing careers in STEM (Burke & Mattis, 2007; Ferriman, et al., 2009). However, Armstrong and Riemenschneider (2014) demonstrated that WFC for women in information technology (IT) careers has become less of a barrier. The authors stated that a shifting gender role perspective in society may be one potential reason behind this. Work-family policy (Lobel & Kossek, 1996), supervisor and mentor support (Frye & Breaugh, 2004; Nielson, Carlson, & Lankau, 2001), and promotion of a family-supportive work environment (Allen, 2011) are often suggested as ways for organizations to help employees in today's diverse workforce balance work and family obligations. However, advances in CMC have enabled organizations to allow employees to successfully meet work and home demands through telecommuting.

Implications of Telecommuting

As 80-90% of employees report a desire to telecommute and 20-25% of individuals in the U.S. workforce telecommute for some portion of their work (Global Workplace Analytics, 2015), it is important to consider the ways in which telecommuting can better women's experiences in STEM workplaces. *Telecommuting* is a work arrangement that provides employees flexibility in their schedules by allowing them to work from home either part-time or full-time through the use of technology, including CMC (Nieminen, Nicklin, McClure, & Chakrabarti, 2011). Telecommuting has the potential to mitigate the difficulty in meeting work and family responsibilities women in STEM face (Ferriman et al., 2009), as it is negatively associated with work-family conflict (Golden, 2006). Telecommuting is also related to increased job satisfaction and performance as well as decreased turnover intent and role stress and is not associated with decreased quality of workplace relationships overall (Gajendran & Harrison, 2007), suggesting that incorporation of telecommuting into flexible work policy could be a step towards increasing women's persistence and success in STEM.

Work-family balance is of greater importance to the millennial generation when compared with other generations (Carless & Wintle, 2007), and women often report difficulty in in balancing work and family roles as a major obstacle in their pursuit of careers in STEM (Burke & Mattis, 2007). This suggests that as organizations seek to attract and retain women in STEM, it is important to consider the implications of telecommuting in promoting work-family balance. Golden (2006) found that employees' WFC lessened as the amount of time spent telecommuting increased. Demonstrating the mutually beneficial outcomes

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of telecommuting, Meyer, Mukerjee, and Sestero (2001) identified a positive relationship between employee participation in telecommuting and firm profit, suggesting that telecommuting arrangements should be promoted by organizations when positions allow for it. Similarly, Bloom, Liang, Roberts, and Ying (2015) randomly assigned employees at a Chinese call-center to telecommuting positions and found that employees who telecommuted improved their productivity based on objective criteria, experienced increased job satisfaction, and had lower intentions to quit compared with the employees who worked onsite.

Though there are clear benefits associated with telecommuting, an obvious concern is the potential for telecommuters to experience social isolation. As women in STEM fields report lacking a sense of belonging and social support in STEM (Frehill et al, 2007; Hughes, 2014), it is important that organizations proceed with caution when implementing telecommuting policies. Golden and colleagues (2008) identified a positive association between employees' feelings of social isolation and amount of time spent telecommuting. Further, research has shown that employees working from the office felt greater social inclusion than employees who worked from home, client-based employees, and satellite-office workers (Morganson et al., 2010). Given that women in STEM already suffer from feelings of exclusion due to the "chilly" social climates encountered (Glass et al., 2013), it is important for organizations to consider the potential for telecommuters to experience social isolation as well as ways of making sure those who telecommute are made to feel included when seeking to implement telecommuting policies.

Due to reduced opportunity to engage in informal face-to-face interactions, there are concerns that individuals who telecommute for a large portion of the work week will have lower quality relationships with coworkers and supervisors (Gajendran & Harrison, 2007). In support of this, Gajendran and Harrison (2007) found in their meta-analysis that telecommuting more than 2.5 days in a week reduces WFC but negatively impacts relationships with coworkers. Maruyama and Tietze (2012) found that, in comparison to men in similar occupations, women who telecommute and have dependents are concerned that they will suffer from reduced visibility and will lack opportunities for career development from an inability to be noticed by their supervisors. However, meta-analytic evidence demonstrates that regardless of the time spent telecommuting, there is a positive association between telecommuting and supervisor ratings of performance as well as the quality of employees-supervisor relationships (Gajendran & Harrison, 2007). Considering the reduced visibility associated with telecommuting, organizations should develop strategies to ensure employees who telecommute are being given equal access and consideration in promotion opportunities. Additionally, organizations should reassure women that telecommuting will not negatively impact their opportunities for career development or their performance reviews, so that they feel comfortable utilizing this family-friendly policy. This has important implications for women in STEM, as dissatisfaction with pay and promotion opportunities has been identified as an explanatory factor for attrition in fields such as engineering (Hunt, 2016).

Another potential concern is that telecommuting can only be offered for positions where work can be completed from home, leaving a portion of employees without the option of telecommuting. Research has demonstrated that uneven allocation of telecommuting privileges can be perceived as unfair and may cause employees who are unable to telecommute to become less satisfied with coworkers who are given the opportunity (Golden, 2006, 2007). This is especially pertinent in STEM occupations, as certain positions may require physical attendance to perform work responsibilities. As women in STEM may already suffer from a lack of social support (Hughes, 2014), organizations should give careful consideration when implementing telecommuting policy to ensure that it combats rather than exacerbates the barriers they face in the workplace.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

FUTURE RESEARCH DIRECTIONS

Research is needed to more fully understand how organizations can effectively utilize CMC to benefit women in STEM while mitigating any potentially negative implications associated with CMC. Future research should consider the differential outcomes for female majority and female minority virtual teams in STEM in terms of overall team effectiveness and women's participation in group discussion, self-efficacy, satisfaction, and perceptions of social support in the virtual team setting. The effectiveness of e-mentoring initiatives in terms of increasing women's access to mentoring opportunities, feelings of belongingness in STEM, and perceptions of promotion opportunities should be explored. Further, gender differences in experiences and instigation of cyber incivility should be examined in a STEM context, and future research should examine the effects of cyber incivility on specific outcomes relevant to women in STEM such as self-efficacy, perceived social support, and intentions to leave. It is also important to examine the utility of organizational efforts to combat workplace uncivil behavior, such as the adoption of online etiquette practices (Giumetti et al., 2012) and implementation of interventions designed to increase employee awareness of cyber incivility related to gender stereotypes. Finally, the implications of telecommuting for women should be examined in a STEM context in terms of benefits, such as reduced WFC (Meyer et al., 2001), and negative implications, such as social isolation, reduced visibility of female STEM role models, and reduced quality of relationships with supervisors (Gajendran & Harrison, 2007; Golden et al., 2008). In addition, future research should consider the effects of telecommuting on women's career advancement opportunities in STEM. Researchers should seek to determine if there is an optimal proportion of time that women in STEM should spend telecommuting in terms of career development, socialization, sense of belonging, and persistence intentions.

CONCLUSION

Women face a variety of barriers in pursuit of STEM careers. Considering the consequences in terms of economics, innovation, and research associated with the underrepresentation of women in STEM professions (National Science Board, 2015; Shapiro & Sax, 2011), the attraction and retention of women in STEM should be a global focus. CMC can have a valuable impact in terms of helping women to overcome barriers associated with stereotypes, stereotype threat, perceived lack of social support, difficulty in managing work and family life, and the "chilly" workplace climate characteristic of women's experiences in STEM fields. Conversely, there are potential negative outcomes associated with organizational focus on CMC, underscoring the importance of furthering research in this area. Inclusive work climates are associated with organizational and job commitment (Major & Morganson, 2009), feelings of inclusion, job satisfaction, and reduced intention to leave (Brimhall et al., 2014), and organizational use of CMC has a potential to contribute to organizational efforts to foster such a climate. Although there are potential downsides, research regarding women's experiences with CMC in the workplace suggests that, overall, organizational implementation of CMC has many potential benefits, including increased opportunities to connect with other women in STEM (Muller & Barison, 2003), comfortability providing input in workplace interactions (Furumo & Pearson, 2007), and the ability to effectively balance work and life roles (Golden, 2006). This underscores the importance of workplace CMC in promoting the success and persistence of women in STEM.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Adya, M. P. (2008). Women at work: Differences in IT career experiences and perceptions between South Asian and American women. *Human Resource Management*, *47*(3), 601–635. doi:10.1002/hrm.20234

Allen, T. D. (2001). Family-supportive work environments: The role of organizational perceptions. *Journal of Vocational Behavior*, *58*(3), 414–435. doi:10.1006/jvbe.2000.1774

Andersson, L. M., & Pearson, C. M. (1999). Tit for tat? The spiraling effect of incivility in the workplace. *Academy of Management Review*, *24*(3), 452–471. doi:10.5465/amr.1999.2202131

Appel, M., Kronberger, N., & Aronson, J. (2011). Stereotype threat impairs ability building: Effects on test preparation among women in science and technology. *European Journal of Social Psychology*, *41*(7), 904–913. doi:10.1002/ejsp.835

Armstrong, D. J., & Riemenschneider, C. K. (2014, May). The barriers facing women in the information technology profession: An exploratory investigation of Ahuja's model. *Proceedings of the 52nd ACM conference on Computers and People Research* (pp. 85-96). ACM. 10.1145/2599990.2600006

Atai, M. R., & Chahkandi, F. (2012). Democracy in computer-mediated communication: Gender, communicative style, and amount of participation in professional listservs. *Computers in Human Behavior*, *28*(3), 881–888. doi:10.1016/j.chb.2011.12.007

Banaji, M. R., & Hardin, C. D. (1996). Automatic stereotyping. *Psychological Science*, *7*(3), 136–141. doi:10.1111/j.1467-9280.1996.tb00346.x

Barrett, E., & Lally, V. (1999). Gender differences in an on-line learning environment. *Journal of Computer Assisted Learning*, *15*(1), 48–60. doi:10.1046/j.1365-2729.1999.151075.x

Bear, J. B., & Woolley, A. W. (2011). The role of gender in team collaboration and performance. *Interdisciplinary Science Reviews*, *36*(2), 146–153. doi:10.1179/030801811X13013181961473

Berdahl, J. L., & Anderson, C. (2005). Men, women, and leadership centralization in groups over time. *Group Dynamics*, *9*(1), 45–57. doi:10.1037/1089-2699.9.1.45

Berdahl, J. L., & Craig, K. M. (1995). Equality of participation and influence in groups: The effects of communication medium and sex composition. *Computer Supported Cooperative Work*, *4*(2-3), 179–201. doi:10.1007/BF00749746

Bernstein, B. L. (2011). Managing barriers and building supports in science and engineering doctoral programs: Conceptual underpinnings for a new online training program for women. *Journal of Women and Minorities in Science and Engineering*, *17*(1), 29–50. doi:10.1615/JWomenMinorScienEng.v17.i1.40

Bierema, L. L., & Merriam, S. B. (2002). E-mentoring: Using computer mediated communication to enhance the mentoring process. *Innovative Higher Education*, *26*(3), 211–227. doi:10.1023/A:1017921023103

Blair-Loy, M. (2003). *Competing devotions: Career and family among women executives*. Cambridge, MA: Harvard University Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bloom, N., Liang, J., Roberts, J., & Ying, Z. J. (2015). Does working from home work? Evidence from a Chinese experiment. *The Quarterly Journal of Economics*, *130*(1), 165–218. doi:10.1093/qje/qju032

Brimhall, K. C., Lizano, E. L., & Barak, M. E. M. (2014). The mediating role of inclusion: A longitudinal study of the effects of leader–member exchange and diversity climate on job satisfaction and intention to leave among child welfare workers. *Children and Youth Services Review*, *40*, 79–88. doi:10.1016/j.childyouth.2014.03.003

Broverman, I. K., Vogel, S. R., Broverman, D. M., Clarkson, F. E., & Rosenkrantz, P. S. (1972). Sex-role stereotypes: A current appraisal. *The Journal of Social Issues*, *28*(2), 59–78. doi:10.1111/j.1540-4560.1972.tb00018.x

Burke, R., & Mattis, M. (2007). *Women and minorities in science, technology, engineering and mathematics: Upping the numbers*. Northampton, MA: Edward Elgar Publishing. doi:10.4337/9781847206879

Burleson, B. R. (2003). Emotional support skill. In J. Greene & B. Burleson (Eds.), *Handbook of communication and social interaction skills* (pp. 551–594). Mahwah, NJ: Erlbaum.

Carless, S. A., & Wintle, J. (2007). Applicant attraction: The role of recruiter function, work–life balance policies and career salience. *International Journal of Selection and Assessment*, *15*(4), 394–404. doi:10.1111/j.1468-2389.2007.00398.x

Carli, L. L. (2001). Gender and social influence. *The Journal of Social Issues*, *57*(4), 725–741. doi:10.1111/0022-4537.00238

Carli, L. L., Alawa, L., Lee, Y., Zhao, B., & Kim, E. (2016). Stereotypes about gender and science: Women ≠ scientists. *Psychology of Women Quarterly*, *40*(2), 244–260. doi:10.1177/0361684315622645

Carr, J., Schmidt, A., Ford, J., & DeShon, R. (2003). Climate perceptions matter: A meta-analytic path analysis relating molar climate, cognitive and affective states, and individual level work outcomes. *The Journal of Applied Psychology*, *88*(4), 605–619. doi:10.1037/0021-9010.88.4.605 PMID:12940402

Catalyst. (2018). *Quick Take: Women in Science, Technology, Engineering, and Mathematics (STEM).* Retrieved from https://www.catalyst.org/knowledge/women-science-technology-engineering-and-mathematics-stem#footnote27_777ra2y

Cech, E. A., Blair-Loy, M., Correll, S. J., Kelly, E. L., & Williams, J. C. (2014). Consequences of flexibility stigma among academic scientists and engineers. *Work and Occupations*, *41*(1), 86–110. doi:10.1177/0730888413515497

Chao, G. T., Walz, P. M., & Gardner, P. D. (1992). Formal and informal mentorships: A comparison on mentoring functions and contrast with nonmentored counterparts. *Personnel Psychology*, *45*(3), 619–636. doi:10.1111/j.1744-6570.1992.tb00863.x

Chemers, M. M., Zurbriggen, E. L., Syed, M., Goza, B. K., & Bearman, S. (2011). The role of efficacy and identity in science career commitment among underrepresented minority students. *The Journal of Social Issues*, *67*(3), 469–491. doi:10.1111/j.1540-4560.2011.01710.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Cho, J., Lee, H. E., & Kim, H. (2019). Effects of communication-oriented overload in mobile instant messaging on role stressors, burnout, and turnover intention in the workplace. *International Journal of Communication*, *13*, 21.

Clewell, B., & Campbell, J. R. (2002). Taking stock: Where we've been, where we are, where we're going. *Journal of Women and Minorities in Science and Engineering*, *8*(3-4), 255–284. doi:10.1615/JWomenMinorScienEng.v8.i3-4.20

Coates, J. (2015). *Women, men and language: A sociolinguistic account of gender differences in language*. New York: Routledge. doi:10.4324/9781315645612

Correll, S. J., Benard, S., & Paik, I. (2007). Getting a job: Is there a motherhood penalty? *American Journal of Sociology*, *112*(5), 1297–1339. doi:10.1086/511799

Cortina, L. (2008). Unseen injustice: Incivility as modern discrimination in organizations. *Academy of Management Review*, *33*(1), 55–75. doi:10.5465/amr.2008.27745097

Cortina, L., Kabat-Farr, D., Leskinen, E., Huerta, M., & Magley, V. (2013). Selective incivility as modern discrimination in organizations. *Journal of Management*, *39*(6), 1579–1605. doi:10.1177/0149206311418835

Cortina, L., Lonsway, K., Magley, V., Freeman, L., Collinsworth, L., Hunter, M., & Fitzgerald, L. (2002). What's gender got to do with it? Incivility in the federal courts. *Law & Social Inquiry*, *27*(2), 235–270. doi:10.1111/j.1747-4469.2002.tb00804.x

Cortina, L., Magley, V., Williams, J., & Langhout, R. (2001). Incivility in the workplace: Incidence and impact. *Journal of Occupational Health Psychology*, *6*(1), 64–80. doi:10.1037/1076-8998.6.1.64 PMID:11199258

Cortina, L. M., Kabat-Farr, D., Magley, V. J., & Nelson, K. (2017). Researching rudeness: The past, present, and future of the science of incivility. *Journal of Occupational Health Psychology*, *22*(3), 299–313. doi:10.1037/ocp0000089

Curşeu, P. L., Chappin, M. M., & Jansen, R. J. (2018). Gender diversity and motivation in collaborative learning groups: The mediating role of group discussion quality. *Social Psychology of Education*, *21*(2), 289–302. doi:10.100711218-017-9419-5

Dasgupta, N., Scircle, M. M., & Hunsinger, M. (2015). Female peers in small work groups enhance women's motivation, verbal participation, and career aspirations in engineering. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(16), 4988–4993. doi:10.1073/pnas.1422822112 PMID:25848061

Dasgupta, N., & Stout, J. G. (2014). Girls and women in science, technology, engineering, and mathematics: STEMing the tide and broadening participation in STEM careers. *Policy Insights from the Behavioral and Brain Sciences*, *1*(1), 21–29. doi:10.1177/2372732214549471

Diekman, A. B., Brown, E. R., Johnston, A. M., & Clark, E. K. (2010). Seeking congruity between goals and roles: A new look at why women opt out of science, technology, engineering, and mathematics careers. *Psychological Science*, *21*(8), 1051–1057. doi:10.1177/0956797610377342 PMID:20631322

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Diekman, A. B., Weisgram, E. S., & Belanger, A. L. (2015). New routes to recruiting and retaining women in STEM: Policy implications of a communal goal congruity perspective. *Social Issues and Policy Review*, *9*(1), 52–88. doi:10.1111ipr.12010

Dovidio, J. F., Brown, C. E., Heltman, K., Ellyson, S. L., & Keating, C. F. (1988). Power displays between women and men in discussions of gender-linked tasks: A multichannel study. *Journal of personality and Social Psychology, 55*(4), 580. doi: 3514.55.4.580 doi:10.1037/0022

Eagly, A., & Johnson, B. (1990). Gender and leadership style: A meta-analysis. *Psychological Bulletin*, *108*(2), 233–256. doi:10.1037/0033-2909.108.2.233

Eagly, A. H., & Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders. *Psychological Review*, *109*(3), 573–598. doi:10.1037/0033-295X.109.3.573 PMID:12088246

Ensher, E. A., & Murphy, S. E. (2007). E-mentoring: Next generation research strategies and suggestions. In B. Ragins & K. Kram (Eds.), *Handbook of Mentoring* (pp. 299–320). Sage. doi:10.4135/9781412976619.n12

Feldman, D. C., Folks, W. R., & Turnley, W. H. (1999). Mentor-protégé diversity and its impact on international internship experiences. *Journal of Organizational Behavior*, *20*(5), 597–611. doi:10.1002/(SICI)1099-1379(199909)20:5<597::AID-JOB977>3.0.CO;2-#

Ferriman, K., Lubinski, D., & Benbow, C. P. (2009). Work preferences, life values, and personal views of top math/science graduate students and the profoundly gifted: Developmental changes and gender differences during emerging adulthood and parenthood. *Journal of Personality and Social Psychology*, *97*(3), 517–532. doi:10.1037/a0016030 PMID:19686005

Fouad, N. A., & Singh, R. (2011). *Stemming the Tide: Why Women Leave Engineering.* Milwaukee, WI: University of Wisconsin-Milwaukee.

Fouad, N. A., Singh, R., Cappaert, K., Chang, W. H., & Wan, M. (2016). Comparison of women engineers who persist in or depart from engineering. *Journal of Vocational Behavior*, *92*, 79–93. doi:10.1016/j.jvb.2015.11.002

Frehill, L. M., Di Fabio, N., Layne, P., Johnson, A. T., & Hood, S. (2007). Women in engineering. *Society of Women Engineers*, *53*(3), 1–24.

Frye, N. K., & Breaugh, J. A. (2004). Family-friendly policies, supervisor support, work–family conflict, family–work conflict, and satisfaction: A test of a conceptual model. *Journal of Business and Psychology*, *19*(2), 197–220. doi:10.100710869-004-0548-4

Furumo, K., & Pearson, J. M. (2007). Gender-based communication styles, trust, and satisfaction in virtual teams. *Journal of Information*, *Information Technology & Organizations*, *2*, 47–60.

Gajendran, R. S., & Harrison, D. A. (2007). The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences. *The Journal of Applied Psychology*, *92*(6), 1524–1541. doi:10.1037/0021-9010.92.6.1524 PMID:18020794

Ghosh, R., & Reio, T. G. Jr. (2013). Career benefits associated with mentoring for mentors: A meta-analysis. *Journal of Vocational Behavior*, *83*(1), 106–116. doi:10.1016/j.jvb.2013.03.011

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gibson, S. K. (2004). Being mentored: The experience of women faculty. *Journal of Career Development*, *30*(3), 173–188. doi:10.1177/089484530403000301

Giumetti, G. W., McKibben, E. S., Hatfield, A. L., Schroeder, A. N., & Kowalski, R. M. (2012). Cyber incivility @ work: The new age of interpersonal deviance. *Cyberpsychology, Behavior, and Social Networking*, *15*(3), 148–154. doi:10.1089/cyber.2011.0336 PMID:22304404

Glass, J. L., Sassler, S., Levitte, Y., & Michelmore, K. M. (2013). What's so special about STEM? A comparison of women's retention in STEM and professional occupations. *Social Forces; a Scientific Medium of Social Study and Interpretation, 92*(2), 723-756. doi. doi:10.1093fot092

Global Workplace Analytics. (2015). *Latest Telecommuting Statistics*. Retrieved from http://globalworkplaceanalytics.com/telecommuting-statistics

Golden, T. D. (2006). The role of relationships in understanding telecommuter satisfaction. *Journal of Organizational Behavior*, *27*(3), 319–340. doi:10.1002/job.369

Golden, T. D. (2007). Co-workers who telework and the impact on those in the office: Understanding the implications of virtual work for co-worker satisfaction and turnover intentions. *Human Relations*, *60*(11), 1641–1667. doi:10.1177/0018726707084303

Golden, T. D., Veiga, J., & Dino, R. (2008). The impact of professional isolation on teleworker job performance and turnover intentions: Does time spent teleworking, interacting face-to-face, or having access to communication-enhancing technology matter? *The Journal of Applied Psychology*, *93*(6), 1412–1421. doi:10.1037/a0012722 PMID:19025257

Greenhaus, J. H., & Beutell, N. J. (1985). Sources and conflict between work and family roles. *Academy of Management Review*, *10*(1), 76–88. doi:10.5465/amr.1985.4277352

Hamilton, B. A., & Scandura, T. A. (2003). E-Mentoring: Implications for organizational learning and development in a wired world. *Organizational Dynamics*, *31*(4), 388–402. doi:10.1016/S0090-2616(02)00128-6

Heilbronner, N. N. (2013). The STEM pathway for women: What has changed? *Gifted Child Quarterly*, *57*(1), 39–55. doi:10.1177/0016986212460085

Heilman, M. E., Caleo, S., & Halim, M. L. (2010). Just the thought of it!: Effects of anticipating computer-mediated communication on gender stereotyping. *Journal of Experimental Social Psychology*, *46*(4), 672–675. doi:10.1016/j.jesp.2010.02.005

Hershcovis, M. (2011). "Incivility, social undermining, bullying...oh my!": A call to reconcile constructs within workplace aggression research. *Journal of Organizational Behavior*, *32*(3), 499–519. doi:10.1002/job.689

Hoch, J. E., & Kozlowski, S. W. J. (2014). Leading virtual teams: Hierarchical leadership, structural supports, and shared team leadership. *The Journal of Applied Psychology*, *99*(3), 390–403. doi:10.1037/a0030264 PMID:23205494

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hughes, R. (2014). The evolution of the chilly climate for women in science. In B. Irby, B. Polnick, & J. Koch (Eds.), *Girls and women in STEM: A never ending story* (pp. 71–92). Charlotte, NC: Information Age Publishing.

Hunt, J. (2016). Why do Women Leave Science and Engineering? *Industrial & Labor Relations Review*, *69*(1), 199–226. doi:10.1177/0019793915594597

iDatalabs. (2017). *Companies using Skype.* Retrieved from https://idatalabs.com/tech/products/skype

Jackson, S. M., Hillard, A. L., & Schneider, T. R. (2014). Using implicit bias training to improve attitudes toward women in STEM. *Social Psychology of Education*, *17*(3), 419–438. doi:10.100711218-014-9259-5

Joshi, A., & Roh, H. (2009). The role of context in work team diversity research: A meta-analytic review. *Academy of Management Journal*, *52*(3), 599–627. doi:10.5465/amj.2009.41331491

Kark, R., & Eagly, A. H. (2010). Gender and leadership: Negotiating the labyrinth. In J. Chrisler & D. McCreary (Eds.), Handbook of gender research in psychology (pp. 443–468). Springer. doi:10.1007/978-1-4419-1467-5_19

Kinias, Z., & Sim, J. (2016). Facilitating women's success in business: Interrupting the process of stereotype threat through affirmation of personal values. *The Journal of Applied Psychology*, *101*(11), 1585–1597. doi:10.1037/apl0000139 PMID:27504659

Kirmeyer, S. L., & Lin, T. R. (1987). Social support: Its relationship to observed communication with peers and superiors. *Academy of Management Journal*, *30*(1), 138–151. doi:10.5465/255900

Koch, A. J., D'Mello, S. D., & Sackett, P. R. (2014). A meta-analysis of gender stereotypes and bias in experimental simulations of employment decision making. *The Journal of Applied Psychology*, *100*(1), 128–161. doi:10.1037/a0036734 PMID:24865576

Koenig, A. M., Eagly, A. H., Mitchell, A. A., & Ristikari, T. (2011). Are leader stereotypes masculine? A meta-analysis of three research paradigms. *Psychological Bulletin*, *137*(4), 616–642. doi:10.1037/a0023557 PMID:21639606

Konrad, A. (2017, September). *Slack passes 6 million daily user and opens up channels to multi-company use*. Forbes. Retrieved from https://www.forbes.com/sites/alexkonrad/2017/09/12/slack-passes-6-million-daily-users-and-opens-up-channels-to-multi-company-use/#4c2746527fdb

Langdon, E. (2001). Women's colleges then and now: Access then, equity now. *Peabody Journal of Education*, *76*(1), 5–30. doi:10.1207/S15327930PJE7601_02

Lim, S., Cortina, L., & Magley, V. (2008). Personal and workgroup incivility: Impact on work and health outcomes. *The Journal of Applied Psychology*, *93*(1), 95–107. doi:10.1037/0021-9010.93.1.95 PMID:18211138

Lim, S., & Lee, A. (2011). Work and nonwork outcomes of workplace incivility: Does family support help? *Journal of Occupational Health Psychology*, *16*(1), 95–111. doi:10.1037/a0021726 PMID:21280947

Lim, V. K. G., & Teo, T. S. H. (2009). Mind your E-manners: Impact of cyber incivility on employees' work attitude and behavior. *Information & Management*, *46*(8), 419–425. doi:10.1016/j.im.2009.06.006

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lind, M. R. (1999). The gender impact of temporary virtual work groups. *IEEE Transactions on Professional Communication*, *42*(4), 276–285. doi:10.1109/47.807966

Lobel, S. A., & Kossek, E. E. (1996). Human resource strategies to support diversity in work and personal lifestyles: Beyond the "family friendly" organization. In E. Kossek & S. Lobel (Eds.), *Managing diversity: Human resource strategies for transforming the workplace* (pp. 221–243). Cambridge, MA: Blackwell.

Logel, C., Walton, G. M., Spencer, S. J., Iserman, E. C., von Hippel, W., & Bell, A. E. (2009). Interacting with sexist men triggers social identity threat among female engineers [Correction]. *Journal of Personality and Social Psychology*, *96*(6), 1089–1103. doi:10.1037/a0015703 PMID:19469589

London, B., Rosenthal, L., Levy, S. R., & Lobel, M. (2011). The influences of perceived identity compatibility and social support on women in nontraditional fields during the college transition. *Basic and Applied Social Psychology*, *33*(4), 304–321. doi:10.1080/01973533.2011.614166

Major, D. A., Davis, D. D., Sanchez-Hucles, J., Germano, L. M., & Mann, J. (2006). *IT workplace climate for opportunity and inclusion. Encyclopedia of gender and information technology* (pp. 856–862). Hershey, PA: IGI Global. doi:10.4018/978-1-59140-815-4.ch134

Major, D. A., & Morganson, V. L. (2009). An inclusive IS&T work climate. In M. Khosrow-Pour (Ed.), *Encyclopedia of information science and technology* (pp. 1899–1905). Hershey, PA: IGI Global. doi:10.4018/978-1-60566-026-4.ch299

Maruyama, T., & Tietze, S. (2012). From anxiety to assurance: Concerns and outcomes of telework. *Personnel Review*, *41*(4), 450–469. doi:10.1108/00483481211229375

McKeen, C., & Bujaki, M. (2007). Gender and mentoring. In B. Ragins & K. Kram (Eds.), *The handbook of mentoring at work: Theory, research, and practice* (pp. 197–222). Thousand Oaks, CA: Sage.

Mertz, N., Welch, O., & Henderson, J. (1987, November). Why women aren't mentored. *Paper presented at the annual meeting of the American Educational Research Association*, Portland, OR. AERA.

Meyer, C. S., Mukerjee, S., & Sestero, A. (2001). Work-family benefits: Which ones maximize profits? *Journal of Managerial Issues*, *13*(1), 28–44.

Miner, K., Pesonen, A., Smittick, A., Seigel, M., & Clark, E. (2014). Does being a mom help or hurt? Workplace incivility as a function of motherhood status. *Journal of Occupational Health Psychology*, *19*(1), 60–73. doi:10.1037/a0034936 PMID:24447221

Miner, K. N., Diaz, I., & Rinn, A. N. (2017). Incivility, Psychological Distress, and Math Self-Concept among Women and Students of Color in STEM. *Journal of Women and Minorities in Science and Engineering*, *23*(3), 211–230. doi:10.1615/JWomenMinorScienEng.2017018506

Mohr, G., & Wolfram, H. (2010). Stress among managers: The importance of dynamic tasks, predictability, and social support in unpredictable times. *Journal of Occupational Health Psychology*, *15*(2), 167–179. doi:10.1037/a0018892 PMID:20364914

Morganson, V. J., Jones, M., & Major, D. A. (2010). Understanding women's underrepresentation in science, technology, engineering, and mathematics: The role of social coping. *The Career Development Quarterly*, *59*(2), 169–179. doi:10.1002/j.2161-0045.2010.tb00060.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Morganson, V. J., Major, D. A., Oborn, K. L., Verive, J. M., & Heelan, M. P. (2010). Comparing telework locations and traditional work arrangements: Differences in work-life balance support, job satisfaction, and inclusion. *Journal of Managerial Psychology*, *25*(6), 578–595. doi:10.1108/02683941011056941

Muller, C., Blake-Beard, S., Barsion, S. J., & Wotipka, C. M. (2012). Learning from the experiences of women of color in MENTORNET's one-on-one program. *Journal of Women and Minorities in Science and Engineering*, *18*(4), 315–335. doi:10.1615/JWomenMinorScienEng.2013004006

Muller, C. B., & Barsion, S. J. (2003). Assessment of a large-scale e-mentoring network for women in engineering and science: Just how good is MentorNet? *Proceedings of the Women in Engineering Program Advocates Network*, Chicago, IL. Academic Press.

National Science Board (U.S.). (2015). *Revisiting the STEM workforce: A companion to Science and Engineering Indicators 2014*. Arlington, VA: National Science Foundation. Retrieved from https://www.nsf.gov/nsb/publications/2015/nsb201510.pdf

Nielson, T. R., Carlson, D. S., & Lankau, M. J. (2001). The supportive mentor as a means of reducing work–family conflict. *Journal of Vocational Behavior*, *59*(3), 364–381. doi:10.1006/jvbe.2001.1806

Nieminen, L., Nicklin, R., McClure, G., & Chakrabarti, J. (2011). Meta-analytic decisions and reliability: A serendipitous case of three independent telecommuting meta-analyses. *Journal of Business and Psychology*, *26*(1), 105–121. doi:10.100710869-010-9185-2

Nishii, L. (2013). The benefits of climate for inclusion for gender-diverse groups. *Academy of Management Journal*, *56*(6), 1754–1774. doi:10.5465/amj.2009.0823

Nohe, C., Michel, A., & Sonntag, K. (2014). Family–work conflict and job performance: A diary study of boundary conditions and mechanisms. *Journal of Organizational Behavior*, *35*(3), 339–357. doi:10.1002/job.1878

Nohe, C., & Sonntag, K. (2014). Work–family conflict, social support, and turnover intentions: A longitudinal study. *Journal of Vocational Behavior*, *85*(1), 1–12. doi:10.1016/j.jvb.2014.03.007

O'Brien, K. E., Biga, A., Kessler, S. R., & Allen, T. D. (2010). A meta-analytic investigation of gender differences in mentoring. *Journal of Management*, *36*(2), 537–554. doi:10.1177/0149206308318619

Paustian-Underdahl, S. C., Walker, L. S., & Woehr, D. J. (2014). Gender and perceptions of leadership effectiveness: A meta-analysis of contextual moderators. *The Journal of Applied Psychology*, *99*(6), 1129–1145. doi:10.1037/a0036751 PMID:24773399

Penney, L., & Spector, P. (2005). Job stress, incivility, and counterproductive work behavior (CWB): The moderating role of negative affectivity. *Journal of Organizational Behavior*, *26*(7), 777–796. doi:10.1002/job.336

Preston, A. E. (2004). *Leaving science: Occupational exit from science careers*. New York, NY: Russell Sage Foundation.

Ragins, B. R., & Sundstrom, E. (1989). Gender and power in organizations: A longitudinal perspective. *Psychological Bulletin*, *105*(1), 51–88. doi:10.1037/0033-2909.105.1.51

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Rayman, P., & Brett, B. (1995). Women science majors: What makes a difference in persistence after graduation? *The Journal of Higher Education*, *66*(4), 388–414. doi:10.1080/00221546.1995.1177478

Reynoldson, K. R., & Major, D. A. (2018). How exclusive work climates create barriers for women in IS&T. In *Encyclopedia of information science and technology* (4th ed., pp. 3382–3392). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2255-3.ch295

Robnett, R. D. (2016). Gender bias in STEM fields: Variation in prevalence and links to STEM self-concept. *Psychology of Women Quarterly*, *40*(1), 65–79. doi:10.1177/0361684315596162 PMID:29051685

Rosenthal, L., London, B., Levy, S. R., & Lobel, M. (2011). The roles of perceived identity compatibility and social support for women in a single-sex STEM program at a co-educational university. *Sex Roles*, *65*(9), 725–736. doi:10.100711199-011-9945-0

Rudman, L. A. (1998). Self-promotion as a risk factor for women: The costs and benefits of counter-stereotypical impression management. *Journal of Personality and Social Psychology*, *74*(3), 629–645. doi:10.1037/0022-3514.74.3.629 PMID:9523410

Rudman, L. A., Moss-Racusin, C. A., Phelan, J. E., & Nauts, S. (2012). Status incongruity and backlash effects: Defending the gender hierarchy motivates prejudice against female leaders. *Journal of Experimental Social Psychology*, *48*(1), 165–179. doi:10.1016/j.jesp.2011.10.008

Savicki, V., Kelley, M., & Lingenfelter, D. (1996). Gender, group composition, and task type in small task groups using computer-mediated communication. *Computers in Human Behavior*, *12*(4), 549–565. doi:10.1016/S0747-5632(96)00024-6

Scandura, T. A., & Williams, E. A. (2001). An investigation of the moderating effects of gender on the relationships between mentorship initiation and protégé perceptions of mentoring functions. *Journal of Vocational Behavior*, *59*(3), 342–363. doi:10.1006/jvbe.2001.1809

Schneider, B., Wheeler, J. K., & Cox, J. F. (1992). A passion for service: Using content analysis to explicate service climate themes. *The Journal of Applied Psychology*, *77*(5), 705–716. doi:10.1037/0021-9010.77.5.705

Schuster, C., & Martiny, S. (2017). Not feeling good in STEM: Effects of stereotype activation and anticipated affect on women's career aspirations. *Sex Roles*, *76*(1), 40–55. doi:10.100711199-016-0665-3 PMID:29367799

Schwartz, F. N. (1989). Management women and the new facts of life. *Women in Management Review*, *4*(5), 65–76. doi:10.1108/EUM0000000001789

Schwiebert, V. L., Deck, M. D., Bradshaw, M. L., Scott, P., & Harper, M. (1999). Women as mentors. *The Journal of Humanistic Counseling, Education and Development*, *37*(4), 241–253. doi:10.1002/j.2164-490X.1999.tb00153.x

Shapiro, C., Sax, L., & Gayles, J. G. (2011). Major selection and persistence for women in STEM. *New Directions for Institutional Research*, *2011*(152), 5–18. doi:10.1002/ir.404

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Shockley, K. M., Shen, W., DeNunzio, M. M., Arvan, M. L., & Knudsen, E. A. (2017). Disentangling the relationship between gender and work–family conflict: An integration of theoretical perspectives using meta-analytic methods. *The Journal of Applied Psychology*, *102*(12), 1601–1635. doi:10.1037/apl0000246 PMID:28749157

Single, P. B., Muller, C. B., Cunningham, C. M., Single, R. M., & Carlsen, W. S. (2005). Mentornet: E-mentoring for women students in engineering and science. *Journal of Women and Minorities in Science and Engineering*, *11*(4), 295–310. doi:10.1615/JWomenMinorScienEng.v11.i3.60

Smith-Lovin, L., & Brody, C. (1989). Interruptions in group discussions: The effects of gender and group composition. *American Sociological Review*, *54*(3), 424–435. doi:10.2307/2095614

Soergel, A. (2015). Report: Non-STEM fields increasingly require STEM skills. *U.S. News & World Report*. Retrieved from http://www.usnews.com/news/stem-solutions/articles/2015/04/21/national-science-board-report- suggests-non- stem-fields-now-require- stem-skills

Spears, R., & Lea, M. (1994). Panacea or panopticon? The hidden power in computer-mediated communication. *Communication Research*, *21*(4), 427–459. doi:10.1177/009365094021004001

Spence Laschinger, H., Leiter, M., Day, A., & Gilin, D. (2009). Workplace empowerment, incivility, and burnout: Impact on staff nurse recruitment and retention outcomes. *Journal of Nursing Management*, *17*(3), 302–311. doi:10.1111/j.1365-2834.2009.00999.x PMID:19426367

Spottswood, E. L., Walther, J. B., Holmstrom, A. J., & Ellison, N. B. (2013). Person-centered emotional support and gender attributions in computer-mediated communication. *Human Communication Research*, *39*(3), 295–316. doi:10.1111/hcre.12006

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*(5), 797-811. doi: .69.5.797 doi:10.1037/0022-3514

Stout, J. G., Dasgupta, N., Hunsinger, M., & McManus, M. A. (2011). STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM). *Journal of Personality and Social Psychology*, *100*(2), 255–270. doi:10.1037/a0021385 PMID:21142376

Tonso, K. L. (2006). Teams that work: Campus culture, engineer identity, and social interactions. *Journal of Engineering Education*, *95*(1), 25–37. doi:10.1002/j.2168-9830.2006.tb00875.x

Townsend, A. M., DeMarie, S. M., & Hendrickson, A. R. (1998). Virtual teams: Technology and the workplace of the future. *The Academy of Management Executive*, *12*(3), 17–29. doi:10.5465/AME.1998.1109047

Turban, D. B., Dougherty, T. W., & Lee, F. K. (2002). Gender, race, and perceived similarity effects in developmental relationships: The moderating role of relationship duration. *Journal of Vocational Behavior*, *61*(2), 240–262. doi:10.1006/jvbe.2001.1855

Underhill, C. M. (2006). The effectiveness of mentoring programs in corporate settings: A meta-analytical review of the literature. *Journal of Vocational Behavior*, *68*(2), 292–307. doi:10.1016/j.jvb.2005.05.003

U.S. Bureau of Labor Statistics. (2017). *Women in the labor force: a databook*. Retrieved from https://www.bls.gov/opub/reports/womens-databook/2017/pdf/home.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

U.S. Bureau of Labor Statistics. (2018). *Employment characteristics of families – 2017*. Retrieved from https://www.bls.gov/news.release/pdf/famee.pdf

U.S. Department of Commerce. Economics and Statistics Administration. *Women in STEM: 2017 update*. Retrieved from http://www.esa.doc.gov/reports/women-stem-2017-update

Vandello, J. A., Hettinger, V. E., Bosson, J. K., & Siddiqi, J. (2013). When equal isn't really equal: The masculine dilemma of seeking work flexibility. *The Journal of Social Issues*, *69*(2), 303–321. doi:10.1111/josi.12016

Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology*, *92*(1), 82–96. doi:10.1037/0022-3514.92.1.82 PMID:17201544

Walton, G. M., Logel, C., Peach, J. M., Spencer, S. J., & Zanna, M. P. (2015). Two brief interventions to mitigate a chilly climate transform women's experience, relationships, and achievement in engineering. *Journal of Educational Psychology*, *107*(2), 468–485. doi:10.1037/a0037461

Wentling, R. M., & Thomas, S. (2009). Workplace culture that hinders and assists the career development of women in information technology. *Information Technology, Learning and Performance Journal*, *25*(1), 25.

West, C., & Zimmerman, D. H. (1983). Small insults: A study of interruptions in cross-sex conversations between unacquainted persons. In B. Thome, C. Kramarae, & N. Henley (Eds.), *Language, gender and society* (pp. 103–117). Rowley, MA: Newbury House.

Williams, J. C., Blair-Loy, M., & Berdahl, J. L. (2013). Cultural schemas, social class, and the flexibility stigma. *The Journal of Social Issues*, *69*(2), 209–234. doi:10.1111/josi.12012

Woolley, A. W., Chabris, C. F., Pentland, A., Hashmi, N., & Malone, T. W. (2010). Evidence for a collective intelligence factor in the performance of human groups. *Science*, *330*(6004), 686–688. doi:10.1126cience.1193147 PMID:20929725

Wuchty, S., Jones, B. F., & Uzzi, B. (2007). The increasing dominance of teams in production of knowledge. *Science*, *316*(5827), 1036–1039. doi:10.1126cience.1136099 PMID:17431139

Xu, Y. J. (2008). Gender disparity in STEM disciplines: A study of faculty attrition and turnover intentions. *Research in Higher Education*, *49*(7), 607–624. doi:10.100711162-008-9097-4

This research was previously published in the International Journal of Virtual Communities and Social Networking (IJVCSN), 10(3); pages 1-22, copyright year 2018 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 32
Mastering Change Management for Successful Digital Supply Chain Transformations

Ehap Sabri
KPMG LLP, USA & University of Texas at Dallas, USA

ABSTRACT

In response to the dramatic changes in the business landscape over the last few years, many companies are launching business transformations leveraging digital technologies to drive sweeping changes in their supply chain processes. The digital supply chain transformation can be evident establishing collaborative forecasting processes, optimizing networks and inventories, etc. Digital supply chain transformation is not a new buzz word. It is the application of digital capabilities to processes, products, and assets to improve supply chain efficiency, enhance customer value, manage risk, and achieve competitive advantage. However, organizations are still facing numerous challenges to transform and perform. Perhaps the most common misunderstanding is that digital transformation is all about the implementation and use of cutting-edge technologies. This chapter will dive deep to understand major challenges to digital supply chain transformations, identify the key drivers and enablers of digital opportunity, and provide a change management framework for digital supply chain transformation.

INTRODUCTION

In today's complex and ever-changing business world, firms of all types are rethinking every aspect of their supply chain performance. Firms are exploring new enablers like digital technologies to optimize and manage their supply chains; beginning with demand planning and order management reviewing the entire supply chain up to procurement and transportation.

In today's globalized world, firm's success is not just dependent on its own efforts. However, the success of an organization depends largely on how effectively it can orchestrate a vast, global network of supply chain partners to deliver goods and services that meet the needs of individual consumers. It's all about engaging with customers efficiently through new and improved customer experiences. Early

DOI: 10.4018/978-1-7998-7297-9.ch032

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

adopters of digital disrupters such as Amazon, Uber, Netflix have redefined the traditional business model and demonstrated how it's to be done. They focused on customers and not just provided exceptional, unique customer experience, but also engaged customers that keep coming back for more.

Digital Transformation is not restricted to the supply chain; it's everywhere. It's in the marketing, sales, products, Support, HR, Supply chain etc. It opens new opportunities, challenges traditional methods and changes the way we think and act. One of the key challenge faced in transforming a business is to train workforce new skills necessary to participate in the new way of doing business and to make the changes for digital transformation.

In all kinds of industries from the relatively slow-moving ones such as Utilities and Cement to the rapidly changing businesses of the High-Tech and Retail industries, efficient and agile supply chain processes have become critical in achieving competitive advantage. Companies can no longer view the supply chain as a back office and a transactional focused function. It is becoming extremely prevalent in that companies are not simply looking to drive cost out of their businesses, but also striving to be more agile in securing a supply chain that can quickly adapt to a rapidly changing market.

Taking the initiative to transform supply chain leveraging best practices and the latest digital technologies is no longer an option; it is a strategic mandate in order to stay relevant in the industry. Evidently, it is crucial to act rapidly and launch transformation activities. However, the industry's reality is that 70% of all transformation initiatives (programs) fail. The author has witnessed several firms struggle with implementing the transformation improvement programs and achieving the promised value or "Return on Investment" (ROI).

The low success rates of other transformation programs and the scary statistics make firms who are about to take the transformation journey to reconsider moving forward. These firms typically have doubts and questions about the best practice in integrating new digital technologies into supply chain operations. At times they even postpone their efforts until an expert is able to address their concerns. Firms seek how to:

- Master change management and ensure users' adoption
- Address the need for new skills to support processes that span across suppliers and partners
- Ensure continuous senior management support
- Identify comprehensive metrics and ensure continuous monitoring
- Choose the right digital technology and the right software provider

Based on relevant research and the author's professional experience, the main cause for the low success rates of business transformation initiatives can be grouped into two categories: 1) The lack of preparation and familiarity with the transformation lifecycle, and 2) People-related aspects that are poorly managed or altogether neglected. This chapter provides the top 7 challenges under each respective category and explains how to address these challenges during supply chain transformation programs. This chapter also provides a practical change management framework to ensure a smooth and successful digital supply chain transformation programs. This framework includes 8 steps (phases) needed to implement change in the culture of the organization and 5 success factors for companies to maintain throughout the lifecycle of change. These five factors can be used as a checklist to evaluate the readiness of the organization to change and its chances of a successful digital transformation.

Historic background on change management in the context of digital supply chain transformations is provided in the next section.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

BACKGROUND

Direct Correlation Between Change Management and Transformation

The complex, cross-functional nature of supply chains forces executives and managers to be more knowledgeable about the successful implementation of change. Greer and Ford (2009) conducted an extensive study on this topic and provided evidence in support of the differences between implementing non-supply chain management (NSCM) changes and supply chain management (SCM) changes, and a lower level of success was shown to be realized when implementing SCM changes than when implementing NSCM changes due to complexity. Therefore, the majority of supply chain leaders are keen to transform their organizations, but they recognize that their organizations lack the knowledge and readiness to do so successfully.

Nadler and Tushman (1989) mentioned that because broader change programs are often more difficult to implement, the degree of success realized from implementing SCM changes might differ as well. Their article provides a good insight into managing large-scale planned change.

Research shows the success rate of supply chain transformation has a direct correlation to the degree of mastering change management. Ford and Greer (2005) research has indicated relationships between various change management activities and change achievement or success.

In Prosci's 2009 benchmarking study (http://www.change-management.com/tutorial-case-mod3.htm), the top trend identified by study participants was a greater recognition of the need for mastering change management. The same study showed a direct correlation between struggled projects and lack of effective change management as shown in Table 1.

Table 1. Change management impact on meeting project objectives, staying on schedule and budget

Project Criteria for success	Poor Change Management	Effective Change Management
Correlation of excellent change management to **meeting project objectives**	16%	95%
Correlation of excellent change management practice to **staying on schedule**	16%	71%
Correlation of excellent change management practice to **staying on budget**	51%	82%

Source: Prosci's 2009 Change Management Benchmarking Report

The table shows a clear correlation between effective change management practice and meeting project objectives while staying on budget and according to the schedule. For example, of the participants that had effective change management programs in place, 95% met or exceeded objectives; while only 16% - or about 1 in 6 - of those with poor change management programs met or exceeded objectives. The Prosci's benchmarking studies over the last few years suggest that mastering change management increases the success rate of organizational changes to as high as 95%.

Therefore, mastering change management is very crucial for successful supply chain transformations.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Effective Change Management Practices

Effective change management practices embrace both the inner shift in the individual's values, aspirations and behaviors and the outer shift in process, strategy, policies, and systems (Karp 2005). So, effective change management practices target the organizational culture, organizational structure and recruiting, performance measurements, incentive compensations, and alignment with corporate goals and strategies.

Carolyn Aiken and Scott Keller (2009) have identified insights into how human nature gets in the way of successfully by applying the following four conditions required for behavioral change:

Creating a Compelling Story

What motivates senior leaders may not motivate most of the employees. Therefore change leaders need to be able to tell change story that covers what motivates employees the most in their work. In doing so, they can unleash a tremendous amount of drive. Secondly, Leaders should give an opportunity for employees to write their own story. It's detected in human nature that when we choose for ourselves, we are far more committed to the outcome. So, employees should be asked to suggest change rather than directly implementing change. Then this will help drive change that comes through a sense of ownership.

Role Modeling

It is a misconception that if we believe that if the leader is strong and influential then change will be successful irrespective of employees view. Carolyn and Scott (2009) has experienced that working with change program suggest that success depends less on how persuasive a few selected leaders are and more on how receptive the society is to the idea.

Reinforcing Mechanisms

Although it's difficult to establish a clear linkage between the successful change and money to be compensated, token of appreciation for the hard work of employees boost them to be more productive.

Capacity Building

Often change management initiatives require employees to develop the skills and talent needed for the desired change (new state of business). The important thing to understand here is that if employees are expected to play a new role with no proper training, they often feel neglected and lose belief. So, training is crucial and should include elements related to personality types, emotional intelligence, and another new process specific training.

Transformation Programs' Common Mistakes

Ramanan and Anil (2011) from Wipro Consulting Services believe that most of supply chain transformation fails because most companies tend to make common mistakes such as: Falling Into the "Leading Practices" Trap, where companies fails to understand its own supply chain situation in order to make the right choices and try to follow leading practices in market. They believe that companies will be more

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

successful if they rethink their supply chain in a way that is driven by how it supports their business strategy and meets customer requirements. They believe that if supply chain technology is deployed without incorporating critical business requirements and process redesign then it will be simply a collection of an automated system with routine supply chain issues.

Use of technology as an enabler is definitely important for effective supply chain but one needs to understand that technology can't fix the flawed supply chain design. Whenever processes are refined and new technology is implemented, organizational structure must be aligned to support these initiatives.

In the quest for growth, many companies implement change initiatives to create strong, differentiated and better customer experience. Leonard and Coltea (2013) believe that majority of failed transformation change initiatives didn't focus front-line managers on the exact actions they need to take to achieve the company's desired business outcomes.

In many companies, front-line employees receive dozens of high priority messages from managers, executives and change managers daily. These messages become conflicting to front-line managers to know what task or metrics should focus on during a given day to deliver service. So, in this situation, front-line managers are unclear about work to perform which ultimately affects the productivity of the company.

Leonard and Coltea (2013) highlighted also that implementing a successful change management initiative isn't a one-time thing. Creating lasting change requires companies to evolve, and those that evolve successfully can achieve stronger financial performance.

Mastering Change Management Framework

Sabri and Verma (2015) provided a detailed analysis of the most common transformation failures. They also suggested a practical and comprehensive framework to master change management addressing typical challenges and common mistakes in addition to leveraging best practices. This framework will be leveraged and enriched in this book chapter to support digital supply chain transformation.

The next section will explain the top 7 transformation challenges for supply chain transformations based on research, including the above ones, and the authors' experience.

TRANSFORMATION LIFE CYCLE CHALLENGES

"Where" and "When" to Start

When making these kinds of drastic changes, the biggest challenges are often to know when and where to begin in order to translate the vision into goals, goals into strategies and strategies into process changes and projects. Very few companies have a good digital supply chain strategy. Some reasons are: 1) The lack of resources and time, 2) The lack of familiarity with the strategy development process in general, 3) The lack of knowledge of the full opportunities that digital technologies can bring to supply chain processes, and 4) The difficulty of securing a consensus since digital supply chain strategy is an integrated cross-functional strategy and requires investment from resources and money standpoints.

The author has observed some companies try to take the easy route and avoid spending time on rethinking their supply chain in a way that is driven by how it supports their business strategy; meets customer needs, and deploys key enablers like digital technologies.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Environment Is Not Ready

The culture of "playing it safe" is the first challenge. Firms get used to executing low-risk incremental improvements on the same business environment for an extended period of time, and they become resistant for big ideas of significant improvement because they do not know how to handle transformation programs and target big results.

Specific related challenge, which is relevant to digital supply chain transformation, is the need for intensive cooperation and cross-functional collaboration among executive peers. This would force executives to get out of their comfort zones and their respective areas of responsibility and find time out of their busy daily operation schedule to envision an entirely new business.

In a consulting engagement for the author with a semiconductor company, and after conducting a risk analysis workshop with the respective managers and directors, the highest significant and probable risk for the transformation initiative came to be a definite commitment from executives to follow through and provide the needed support. There were 3 previous half-baked and half-hearted transformation initiatives in the past targeting the same supply chain processes, which undermined confidence that the current program will be treated differently (Sabri and Verma, 2015). When a company has a previous record of transformation failure, lack of strong vision, no visible commitment from above, and no clear articulation of why this program is different, then the result would be upsetting.

Also, McKinsey research (2009) showed that organizations that took the transformation journey for defensive reasons (to stem trouble) due to the difficult circumstances had lower success rates than the companies that took the journey for offensive reasons (like boosting growth or increasing market share). Extra care from the top is much needed when a transformation initiative is taken for defensive reasons, and more emphasis on people change management and sufficient resources are crucial.

Lack of Convincing "ROI"

Several companies struggled to find the best way to determine the business case and ROI (return on investment), and identify the right metrics that would capture and display the benefits in addition to defining "success" when it comes to business transformations. Therefore, they couldn't sustain the buy-in from executives.

Also, success and performance measures' targets have to be defined for the intermediate phases of the transformation in addition to the end state to sustain a high level of energy and focus. In one of the industry conferences, the author asked an audience of more than 80 managers to raise their hands if they are "OK" with their own performance measurement governance (metrics identification, measuring, tracking, and controlling), only 3 managers raised their hands! The widespread feeling among managers is that they are measuring too much or too little, or are measuring the wrong metrics. The majority also feel that their performance measurement governance doesn't drive good behavior.

Inability of Selecting "the Right" Software Provider

Selecting a software provider is a hard undertaking and consumes time and internal resources. Companies is not just struggling in identifying the right software provider (partner) for digital technology but they are still struggling with choosing the right supply chain planning technology platform. In addition, executives frequently express their concern about their companies' ability to ensure that the technology

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is fully utilized once deployed. Supply chain applications especially the planning ones require a steep learning curve for most companies.

New Technology Is the "Silver Bullet" Perception

Some executives perceived the new technology to be the "silver bullet" to all of their business problems and forgot the fact that it is just an enabler for best practice processes and requires effective change management to be adopted.

When the transformation program is driven by a date given by IT instead of a value achieved the milestone, then it is a recipe for disaster. In an attempt to meet the target date (often unrealistic); training, documentation, and change management are often neglected, resulting in something that has a short life span (people stop it after some time) or that does not deliver the full benefit. These transformation programs might be able to "go live" from an IT standpoint but will not be well accepted or embraced by end users.

For transformation programs to work, an amalgamation has to happen between process changes, new technology capabilities, people readiness with the required new skills, and organization structure alignment changes.

No Clear Priorities for Day-to-Day Operations

Typically, the day-to-day operation is already at full capacity when the executives call for a transformation program. Some companies try to add transformation activities to the preexisting calendar of "run the business" meetings, but it doesn't work because short-term operational issues typically come first. People are in most cases occupied more than 100% of their capacity. This affects the productivity of transformation activities since people find it difficult to prioritize their activities. Sometimes due to unavailability of the right person for transformation activity because of their preoccupancy with another day to day jobs, a substitute is chosen who may not be fully aware of the desired transformation activity and hence overall productivity is affected.

Also, when companies are in the process of implementing several incremental improvement projects like six sigma or Kaizen projects, it will be a challenge to add a transformation program to the mix targeting the same functions. Companies that try to stuff too much into the organization will clog it causing employees and managers' capacity to execute to become a choke point unless the programs are prioritized and sequenced correctly.

Lack of Proven Transformation Methodology

Not having a proven, comprehensive and practical methodology to show the way in the transformation journey makes it impossible to address any of the above challenges. To be successful, the transformation team will require having not only knowledge and skills in organizational design and change management, but also a comprehensive methodology for planning, implementing, and sustaining the transformation changes (Sabri and Verma, 2015). There are at least three common methodology mistakes:

1. Some companies put more emphasis on IT activities compared to change management activities. They rush things and focus only on IT activities that they have to accomplish and cannot shorten.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2. The author has also witnessed the other extreme, where companies spent a huge amount of time on the planning phase, little time on implementing the change, and no time on sustaining it.
3. Other companies put significant emphasis on the transformations' soft factors, such as culture, leadership, and motivation while missing out on the hard factors of change management like financial results, commitment level of executives, the resources required to execute the program, and program roadmap and duration.

The following real-life story would provide examples for some of the challenges mentioned in this section. A few years back, the author was asked to play the executive process advisory role for a global high-tech company. Their largest end-to-end supply chain transformation program was underway. The program included process improvement and technology implementation to the following processes: Sales and Operation Planning (S&OP), Demand Management, Supply Planning, Order Planning, Inventory Planning, Order Fulfillment, Logistics, and Channel Management. The author joined 18 months after the program started. In the first phase of his engagement, he spent two weeks on site conducting his own assessment and came to a conclusion that the transformation is at risk and immediate corrective action is desperately needed. Here are a few of the findings:

First, the company is taking the transformation journey for defensive reasons; they were losing market share to competition, their margin was getting smaller and smaller, and they wanted to reverse the trend. Everyone in the company was fearful for his or her job.

Secondly, the author uncovered that the employees did not understand why the business must change and their own role in making it happen, so before providing any specific recommendations, the author wanted to investigate this further to find out why there was a lack of communication and articulation of the need for change to employees. He started by asking for the business case and to his surprise, the sponsor didn't have it handy. During the meeting with the finance representative on the program regarding the business case, the author discovered that the major cost-saving element was "laying off" employees! This was the main reason why the company didn't want to give enough clarity to employees about the program.

Thirdly, all program tracks were working in silos with little coordination. There was no master project plan covering the overall program progress and dependency. The author had to attend the project status meetings for all tracks to have a good picture about the status of the program. It was easy to notice the mistrust that every team had regarding the other teams' ability to deliver on time. In addition, around the same time, the blame game had just started.

Fourthly, the author investigated the transformation program structure, and he found out that 9 different tracks were identified to execute the program; like program management, process, technology, data, testing, suppliers, and change management track. The role for the author was under the process track. The shocker was that appropriate expertise was identified for all tracks except for change management track, it was "TBD"! Basically, a major transformation program was underway for defensive reasons, a layoff is one of the outputs of the program, the culture of the company to work in silos, the company has not done this type/scale of transformation before, and yet no one is assigned for change management!

Fifthly, there was no clear and structured transformation methodology. The transformation team took 18 months to identify the business requirements and socialize it with the IT organization. And since the duration of the first phase of the transformation program was two years; everyone was under pressure to implement, go-live, and transition in the remaining 6 months. Senior management from the business organization decided to take the IT date to "go-live" as the date they would communicate to their execu-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tives. They thought that IT will be the bottleneck and assumed that all other activities like designing the new (to-be) process, coming up with new policies, developing training manuals, conducting training sessions, defining roles and responsibilities for the new processes, defining new metrics and reports to support the new processes, and overcoming resistance issues will not be the bottleneck and will fall within the IT timeline!

Finally, there were no supply chain strategies defined. The transformation team came up with all the business requirements without considering the new strategies that they have to adopt to address their challenges and reverse the trend of losing market share.

It took this company several months and several drastic adjustments to clean this mess and start going in the right direction. Unfortunately, several senior managers and executives lost their jobs because they were slow to react.

The challenges of supply chain transformation related to people are explained in the next section.

PEOPLE CHANGE MANAGEMENT CHALLENGES

This section will cover the top 7 people change management challenges based on the authors' experience and relevant research.

Executives Are Slow to Come Aboard

Not having all executives on the same page early on is one of the first challenges that the change agent has to address. It is highly recommended, for this purpose, to schedule a 15-minute one-on-one meeting with all executives in the first week of the engagement. This practice is used by the author and it was very effective in highlighting the disconnect and identifying the root cause behind it, which would make it easier to address it and bring all executives on board to support the transformation program.

Reluctant executives to support the transformation program visibly will disrupt the speed of the company's progress in planning effectively and undermine transformation significantly. Even the best-planned supply chain transformation initiative would fail if top management fails to demonstrate a commitment to creating the sense of urgency necessary to overcome resistance to change. Executives' support is key to set proper expectations for their employees.

Keeping Stakeholders Engaged and Motivated

Stakeholders are the employees and managers who will be impacted by the process changes or will play a role and have an impact on the success of the transformation program. In a nutshell, the stakeholders are the people who will make the transformation happen. Disengaged stakeholders can really slow down progress and can be a reason by itself for transformation failure.

Many firms underestimate this challenge which results in catastrophic implications because no matter how sophisticated and powerful the software applications or digital technologies are and how effective best practices processes may be, in the end, it is the stakeholders who play the most significant role in the success or failure of the program. Supply chain stakeholders represent different organizations and different roles (operators, managers, planners, suppliers, customers, warehouse receivers, carriers, etc.) which add another dimension to the challenge.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lack of Organizational Structure Alignment

It is necessary to look at the structural support for the change transformation program. If the foundation structure is deemed to be inadequate, restructuring becomes critical. Restructuring changes range in degree from minor adjustments to large-scale organization-wide changes that affect virtually every member of the organization.

One of the author's organizational change management engagements was to help a tire manufacturing company become a global supply chain organization and to streamline and standardize their processes. One of the deliverables was to recommend a structure for the global supply chain organization and the related roles and responsibilities. Assigning an executive vice president reporting to CEO and leading a centralized and global supply chain organization was one of the recommendations. Unfortunately, the sponsor did not have enough political clout with the CEO to make it happen before starting the design phase. This was one of the main reasons that the transformation program ran into serious delays in the program and severe change management and ownership issues.

Gartner research (July 2012) captured several organizational alignment challenges: the top two are: 1) determining the optimal level of centralized leadership, and 2) finding and cultivating capable planning talent.

Inability to Build the Right Transformation Team

Building the right transformation team is the most important change management activity in a business transformation program. In the process of building the team, senior management must be sensitive to the unique needs of the program environment. For example, it requires training and experience for the transformation team members to identify resistance and find its root causes, then, come up with strategies to handle and overcome resistance.

Building the right (effective) team optimizes the efforts of the team and increases the chances of having a successful program. On the other hand, a weak team structure would undercut the efforts of hard-working team members, reduce moral, and impede project success.

Lack of Effective Communication Plan

Most of the time when people resist change it is not because they are unwilling to change, it's just because they don't know why. Effective communications within the transformation team and between the team and other program stakeholders are essential for a smooth and successful journey.

It's a common misconception that if people are talking to each other it means they are communicating; communication needs to have a framework and format to be effective. Another common pitfall is that one communication plan template fits all programs or projects. While all programs or projects share the need for a communication plan, they differ in the type of information needed, frequency, and methods of communication (Sabri, Gupta, and Beitler, 2006).

Inability to Sustain On-Going Learning and Coaching

Supply Chain transformation programs require extensive and on-going training especially when it includes digital technologies and new skills and attitudes for the users of the new or improved processes.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The proper allocation and commitment of resources (time, energy, and money) to conduct training and coaching to help employees in their skills acquisition is critical to the success of implementing and sustaining changes.

Although the "sustain" phase is the most difficult phase in any transformation program, there is relatively little attention by executives concerning sustaining change in organizations. While planning and implementing a change can occur relatively quickly, sustaining change involves a long period of time. Maintaining a sense of urgency and a significant level of interest is difficult over a long period of time. This phase can take months and sometimes a few years. Therefore, the author typically suggests a separate budget for this phase to bring attention to it.

During this phase, the new process must be reinforced by the policies for recruiting, selecting, promoting, compensating, evaluating, and on-going training of employees. Also, acknowledging and rewarding stakeholders for new behaviors are essential to stabilize the new process and anchor the new culture.

Lack of Comprehensive Incentive Program

While the Communication plan addresses the "why" question by providing the "awareness" about the importance of change and the risks of not changing for the company, the incentive plan addresses the "what's in it for me" question and creates the "desire" to change. Only when managers and employees have the "awareness" of the need to change and the "desire" to support the change, then learning "how" to change can start.

Unfortunately, the lack of comprehensive incentive programs is an issue in almost every transformation program that the first author has audited. In some companies, they make the incentive programs limited to managers and executives and don't include the employees. In other companies, incentive programs are in place, but not aligned to support the desired behavior and new process. Very few companies go the extra mile to come up with an incentive program for every member of the transformation team and stakeholders who are responsible to plan and implement change.

The rule of thumb that every stakeholder, which their processes will be impacted by the change or who will have an impact on the transformation, should be part of the incentive program. Also, the objectives of the transformation should be reflected in the stakeholders' scorecards and aligned with their incentives. Therefore, the company's human resources (HR) department should be involved early on.

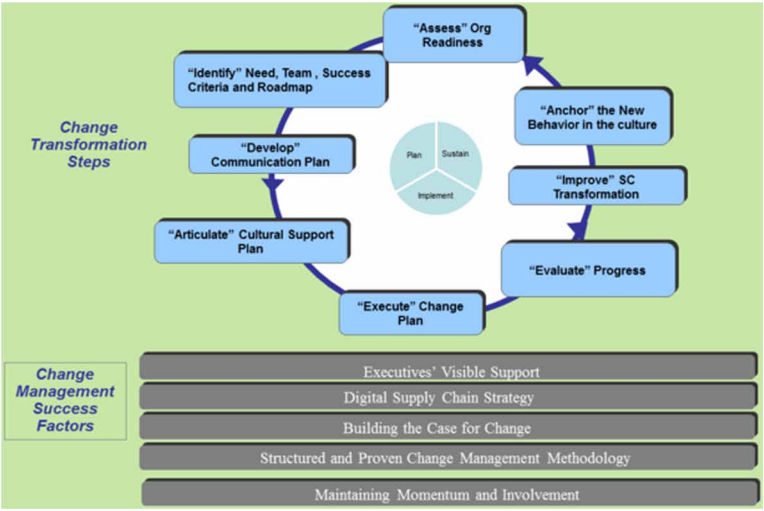
COMPREHENSIVE FRAMEWORK FOR MASTERING CHANGE MANAGEMENT

Figure 1 provides a comprehensive framework for mastering change management to ensure a smooth and successful digital supply chain transformation programs, and address the above challenges. This framework includes 8 steps (phases) needed to implement change in the culture of the organization and 5 success factors for companies to maintain throughout the lifecycle of change.

What follows are the required steps to be taken during the life cycle of change transformation and success factors for effective change management (as shown in Figure 1). Using these steps as a systematic and comprehensive framework, executives and managers can understand what to expect and how to engage the entire organization in the process.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Digital supply chain change management framework



Eight Change Transformation Steps

The proposed framework proposed suggests eight steps to go thru the life cycle of change transformation effectively as shown in Figure 1 which are summarized as follows: 1) Assess, 2) Identify, 3) Develop, 4) Articulate, 5) Execute, 6) Evaluate, 7) Improve, and 8) Anchor. These steps can be also grouped under 3 phases:

- **Plan phase** which includes steps 1 to 4
- **Implement phase** which includes steps 5 & 6
- **Sustain phase** which includes steps 7 & 8

Let's understand about every step in more details:

Step 1: "Assess" Organization Readiness

Organization Readiness for change gives an idea about the current state of the organization with respect to the desired position after the change. So the first activity in assessing organizational readiness is to identify the anticipated and desired change (end state). To clearly define the desired change, start off with program description which an organization is considering for change. This will help assure whether stakeholders have the same vision. Then next activity is to assess the alignment of the proposed change project with the organization's current vision, mission, and strategic plan.

A SWOT Analysis is a beneficial exercise in assessing organizational readiness for implementing a new program. SWOT identifies an organization's strengths and weaknesses and may identify any areas that need a change in order to move forward. It identifies opportunities which can contribute towards success and also identifies threats which may be barriers in the process.

Another major activity for this step is evaluating the existence of the five success factors for mastering change management: 1) executives' engagement and visible support, 2) commitment to developing end-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to-end SC strategy, 3) the ability to develop a convincing business case, 4) deciding on change management methodology, and 5) the ability and previous record in maintaining the engagement & involvement of all stakeholders. This evaluation can be accomplished by scheduling one-on-one interviews, group meetings, questionnaire, and reviewing documentations.

Step 2: "Identify" Need, Team, Success Criteria, and Roadmap

Once the problem statement is defined, stakeholders are identified, the scope of supply chain transformation is fixed and aligned with organizational goals then there is a need to articulate clearly the need for change. This activity is crucial to answering the question that everyone in the organization across all levels will have "why we need to change". It provides the "elevator pitch" or the key message that will be communicated to provide awareness. One example of a key message from a Manufacturing company is "we need to transform our supply chain to penetrate new market channels while maintaining low inventory levels and gain a competitive advantage in order to increase market share profitably" (Sabri, 2015). This activity is also important to secure the buy-in from the upper management who typically ask for an explanation of how the change helps in implementing the organization's strategic plan and achieving corporate goals.

Building the right (effective) team optimizes the efforts of the team and increases the chances of having a successful program. One of the biggest challenges of building and developing a transformation team for supply chain improvement programs in today's business is that every transformation program has its own nature and resources requirements. The senior management and sponsor must be sensitive to the unique needs of the program environment. Also, the structure of the organization plays also a big role in selecting and building the transformation team. There is a need to document the required skills for every role (functional consultant, change agent, process consultant, developer, architect, program manager, project manager, etc...) based on the program charter document. This includes also determining the number of resources needed for every role. In addition, establishing a process to evaluate the performance of resources and define an incentive plan to keep them motivated is crucial (Sabri and Shaikh, 2010).

This activity should consider "why we are changing" key message to come up with the success criteria which typically provides some guidance on the expected benefits and how to measure success. A success criteria example for a company trying to improve market share by gaining competitive advantage in customer service would be; 1) improve customer service level by 10%, 2) improve market share by 2% next year, 3) and maintain inventory turnover rate.

This activity is needed to identify the required process, technology and governance (KPIs, policies, roles, and responsibilities. etc.) changes and finalizes the implementation timeline to achieve the expected benefits (success criteria) of the transformation program. This activity includes conducting process analysis for supply chain processes based on the transformation scope. Process analysis determines the extent of process & governance changes and identifies additional software capabilities required to support the "end state" processes. Several industry-proven process analysis methodologies can help in this exercise like six sigma, value stream mapping, benchmarking, etc.

Step 3: "Develop" Communication Plan

Communications should have majorly two focus areas: communications about the program (why and how we are changing), and communications about the end state and solution being delivered. This includes

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

communication with stakeholders, team members, support team members, functional group members and, front-end users (both inside and outside the company).

Communications about the project to stakeholders is very important for the success of supply chain transformation programs. Lack of information about the project progress to stakeholders can be threatening to the program. Regular, targeted communication enables stakeholders to be educated, prepared and confident that the project is supporting their business needs. The mode and interval of communication should be clearly defined and shared with stakeholders. Program communication should be based on facts and figures. Showing progress helps to maintain confidence among stakeholders, instill pride in program members, and continue program energy. Program communication includes setting expectations, creating awareness of the desired solution, organizational changes, concerns, success. This communication should flow across all the stakeholders not only within the organization but also to vendors, suppliers, and customers etc. Many organizations underestimate the value of this part of the communication but awareness of solution to suppliers and customer helps them to prepare and understand their role and if required also help them plan their resources in advance.

Effective communication provides a clear understanding of what is taking place, motivates the team members, avoids any miscommunication between transformation team members, keeps senior executives committed, reduces the risk of conflicts, and more importantly keeps everyone informed on the progress.

The communication plan should be comprehensive enough to satisfy the information needs of all of the stakeholders. It should provide a description of what piece of information is needed, who needs it, why it is needed, when it is needed, how it is communicated, and by whom. In addition, the communication plan identifies meetings, reporting, methods and format of communications that will occur with the transformation team, program sponsor, stakeholders, partners, IT, internal and external organizations.

Step 4: "Articulate" Cultural Support Plan

Once the communication plan is established, it's necessary to articulate a culture support plan which includes the education plan and organization structure realignment activities. Any transformation program requires culture support. Organizational culture by its very nature refuses to accept change, but over time and with education, organization structure realignment, enforcement from executives, culture does change.

Leadership development is essential if some of the individuals who will be responsible for the program who have little or no leadership experience. The education plan should be tailored to help the individuals acquire these skills. Conflict resolution is one example of the soft skills that leaders need to master if the transformation program is to be effectively implemented and sustained.

Training and skills acquisition for end users should be part of the education plan as well. Digital supply chain transformation programs require training, new skills, and attitudes for the end users of the new or improved processes. The proper allocation and commitment of resources (time, energy, and money) to conduct training and help employees in their skills acquisition is critical to the success of changes.

On major activity of this step is to plan for organizational realignment to support the end state. Human resources department might need to update job descriptions and bonus structure to reflect the changes. This might require a pipeline of candidates with a mix of demand, supply and product expertise. Also, incentives for the company's talent should be aligned with the skill requirements for the end state.

Change leaders and agents (part of the transformation team) must anticipate resistance and be prepared to deal with various change adoption rates. It is important to focus on pioneers and early adopters

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

first. These individuals who are a subset of the stakeholders group are the most open to change; they are the first to embrace something new. Therefore, it is recommended to get these stakeholders on board as quickly as possible to help in changing the culture.

Step 5: "Execute" Change Plan

Once the change plan (which includes change implementation roadmap, communication plan, education plan, and organization structure alignment changes) is approved by senior management/executives, then transformation team has the green signal to go ahead and execute the plan.

Supply chain transformation program typically takes two to five years, with several intermediate projects (Go-Lives) that can pay for the rest of the program. Therefore, it is recommended to develop the change plan on the idea of incremental value delivery. It is crucial to have long-term (program) plan for success, but one should not ignore the importance of providing some quick wins (projects). Organizational stakeholders look for short-term results, and transformation team is under pressure to present short-term wins. Short-term wins should be woven into the timetable of the program. Each project delivers a set of capabilities that have a positive impact on process, metrics, and people and addresses a distinct business need and contributes to the success criteria.

Step 6: "Evaluate" Progress

In the transformation program, regular evaluation (health check) helps to understand the current progress status and also helps anticipate the future progress trend. It is critical that the transformation team understand the current progress and take key actions to avoid any unwanted delays. The prompt and proactive actions of the transformation team can save the transformation program from going off-track. If the program is delayed and the team is not able to bring back on track, then most of the time it goes off the radars of high-level executives' dashboard and eventually importance is lost and the program fails. Progress evaluation should be done against the schedule and expected benefits (success criteria). Since the implementation delivery strategy is to accomplish it in incremental steps (projects), the achieved value of the projects need be tracked and checked off with time.

It is acceptable for the program manager and sponsors while tracking the transformation progress toward achieving the expected benefits and reaching the new targets of the KPIs to rethink the goal and even adjust the targets either because of encountering roadblocks or because of some emerging opportunities that didn't exist earlier.

This step requires senior management's best efforts to stay engaged to build momentum for the change. Whenever executives or senior management let up before the job is done, critical momentum can be lost and the change effort can stall.

Step 7: "Improve" Supply Chain Transformation

Although the sustaining phase is the most difficult phase in any transformation, there is relatively little research concerning sustaining change in organizations. While planning and implementing a change can occur relatively quickly, sustaining change requires a significant amount of time. Maintaining a sense of urgency and a significant level of interest is difficult over a long period of time. This phase can take months or years.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Once positive a successful project improvement (short-term win) is accomplished, management must work to make it part of the organizational culture. Step # 7 helps in this aspect by encouraging the culture of continuous improvement and fine-tuning the new solution (combination of new process and technology). Improvement can also be achieved by enforcing the new process through drafting policies, providing additional coaching when needed and recruiting people based on the new required skills. In addition, developing corrective actions for the root causes when performance measure targets are not achieved would achieve incremental improvement.

Step 8: "Anchor" the New Behavior in the Culture

Acknowledging and rewarding stakeholders for new behaviors are essential to stabilize the new process and anchor the new culture. Because using new skills involves risk (the risk of failure), and acknowledging and rewarding those who use the new skills encourages others to do the same.

This step is also responsible for updating performance measures to reflect the process or the new performance baselines, by coming up with new performance measures, modifying existing ones, modifying targets or establishing owners to the performance measures.

Five Change Management Success Factors

Success Factor 1: Executives' Visible Support

Since change is difficult and inherently unsettling, stakeholders will turn to the CEOs and executives for direction and answers. The leaders of the organization must embrace change first and then display their commitment and support. They must speak with one voice and model the desired behaviors especially since supply chain transformations require intensive cooperation and cross-functional collaboration among executive peers. This would force executives to get out of their comfort zones and their respective areas of responsibility and find time out of their busy daily operation schedule to envision an entirely new business.

While there are many reasons for the failure of the transformation initiatives, but lack of executive's commitment is ahead of all the reasons. Interestingly enough, many executives don't know there is a direct correlation between leadership engagement levels and the success of a transformation initiative.

Having a broad picture about change in mind, executives would need dashboards and indicators in order to successfully pilot an organization to the desired destination. Actively executives will build planned benefits/results into their own and the leadership team's performance plans. They will initiate project-relevant communications in direct report meetings on a regular basis, visibly hold the organization's leaders accountable for the change and if required will ask frequently for their direct participation. They also engage in communication events at all levels of the organization, try to resolve resource issues or constraints, understand the implications of the change across the organization's groups and demographic groups, also monitors, identify and address organizational resistance.

Another important aspect regarding the leadership of change is to understand the level of effort required for success. The executive's role and importance continue to increase over the life of the project. At times while leading change the change leaders will have to let go some of their functional responsibility and tasks as their efforts become more critical than the roles of the program team. Towards the end of the change cycle, efforts from transition team are maximum because of sustain phase of change cycle.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Everything done up to implementation phase can fall apart if leader's proper attention and commitment are not there in the last phase of the change process.

Success Factor 2: Digital Supply Chain Strategy

Very few companies have a good and documented supply chain strategy. Executives struggle with assessing the current state of the supply chain and envisioning the new state that is required to support the vision and address current challenges, from digital technologies and processes to human resources and governance. They also struggle to decide when and where to begin and how to translate the vision into goals, goals into strategies and strategies into process changes and projects. Serious considerations should be given to following while developing strategy.

There is a growing trend to assign a Chief Digital Office role to responsible for defining and executing the digital use cases. This role would work closely with the head of supply chain on the digital supply chain strategy.

- **Market changes** - Strategies often fail because the market conditions which were intended to be exploited change before the strategy takes hold. Reasons can be shorter product life cycle, competition with new technology, and unexpected change in the financial market etc.
- **Uniqueness of the strategy** - Good strategy is one which can distinguish the company from others in ways that it makes a difference to customers. Michael Porter (1996) has written extensively and persuasively on this topic. So leaders should take three simple steps in developing a distinctive strategy – understand the company's genuine strengths (particularly those that span multiple functions), examine the marketplace to understand what market positions are unoccupied, focus the company's strategies on bringing its variable strengths to bear in capturing those unoccupied strategic positions. Also, the strategy must consider the potential reaction to a strategy by competitive companies. In order to effectively anticipate the reaction of competitors over strategy, a company should have competitive intelligence capability. The study should involve understanding the competitor's market position, their competitive advantages, and disadvantages, future planning, management decision trends etc.
- **Organizational design, capabilities and business models with the strategy** – Sometimes companies' fail to align their digital supply chain strategy with the organizational goal. This is a critical step which is often overlooked. A basic assessment of organizational capabilities and the capability gaps created by a change in strategy is a very direct means of improving alignment. Also, some strategies fail because they are based on the poorly conceived business model. Lack of research of market trend, miss connecting to customers, gap or misunderstanding of how demand would be met in the market can lead to a poor business model.
- **Culture of "playing it Safe"** – Companies get used to executing low-risk incremental improvements on the same business environment for an extended period of time, and they become close-minded for drastic improvements because they do not know how to handle transformation programs and target big results. The scope can be overwhelming.

When companies are in the process of implementing several incremental improvement projects like Six Sigma or Kaizen projects, it will be a challenge to add a large transformation program to the mix especially when it includes new technology like digital technologies. Companies that try to stuff too

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

much into the organization will clog it causing employees and managers' capacity to become a choke point unless the projects are prioritized and sequenced correctly.

Digital Supply Chain Strategy Ideally Includes

1. Flexible strategy as changes occur in the global marketplace,
2. Prioritized, actionable and practical improvement plans,
3. A three-to-five year roadmap that guides the transformation of supply-and-demand capabilities and takes planning processes to the next level,
4. Linkage to one or more corporate goals like growth or customer service levels,
5. Both large opportunities for improvement that deliver significant ROI over time, as well as "quick win" operations improvements with a fast payback,
6. Elimination to outdated roles and responsibilities, unnecessary activities, and performance metrics that no longer reflect current realities, and
7. Metrics across the supply chain to reflect the overarching digital supply chain strategy.

Success Factor 3: Building the Case for Change

The author believes strongly, in coming years, no better core competency will help companies to compete in the market other than the ability to effectively implement transformation change. With increasing pressure both external and internal, organizations will tend to undertake more projects and initiatives to remain competitive in the market. So the ability to achieve profit and benefits will directly be tied to how effectively we manage change by engaging employees. Building the business case for change is crucial to compel leadership to give the go-ahead for the transformation change program.

Developing a good business case for change is very important where every stakeholder's requirement is taken into consideration. Three steps should be followed in developing the case: First, articulate a convincing need for change based on the company's current situation and market opportunities. Here supporting details have to be strong enough to draw the attention of executives. The change case should be directly linked to the organizational goals, as this helps in grabbing the attention of stakeholders.

Second, quantify the expected operational and financial benefits, estimate cost, and calculate the return on investment (ROI). This can be a challenging step sometimes because when the case is in initial stage one has to come up with expected financial benefit and return on investment close to actual. If the exercise is done with detailed consideration then the case becomes very convincing and can grab the attention of executives based on the extent of research that went through developing the case.

Third, explain how to show progress and measure success, which metrics will be improved to achieve the expected benefits, what will be the new performance targets and deadlines, and who will accountable. If this step is not developed well then whole change process efforts can fail. As a part of developing the case, equal consideration should also be given in developing performance measurement governance to track progress (Sabri, 2015).

As mentioned earlier, when 80-plus member audience were asked to raise their hands if they are "OK" with their own performance measurement governance only three managers raised their hands. The root causes of these challenges can be summarized under four categories:

- The difficulty in identifying the metrics that would yield the most information on success

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Difficulty in identifying root causes when metrics targets are not achieved
- Lack of clear ownership and responsibilities
- Lack of consistently clean data

During business case development if consideration is given on identifying the key performance measures then while executing change program these performance indicators (measures) becomes more refined and can give accurate information on success. These measures should be able also to measure the additional improvement in efficiency and effectiveness of leveraging digital technologies.

Success Factor 4: Structured and Proven Change Management Methodology

Ensuring a structured and proven methodology to show the way in the change transformation journey is a must. Any significant supply chain transformation program creates uncertainty and people resistance. New leaders emerge, job descriptions are changed, new skills and capabilities must be developed for the digital age. Dealing with these change management issues on a reactive, case-by-case basis puts timeline, morale, and results all at risk.

A structured and formal plan for managing change—beginning with the transformation team and then engaging key stakeholders and leaders—should be developed early and executed effectively as changes move through the organization. The plan should be comprehensive to cover planning, implementing, and sustaining the transformation changes. It should also allow enough time for covering the soft factors of change management such as culture, leadership, and motivation because it takes time to change attitudes or relationships which are deeply ingrained in people as well as the organization. It requires time and efforts to change the culture.

In addition, the structured change plan should not miss out on the hard factors of change management like financial results, commitment level of executives, the number of resources and skills required to execute the program successfully, benchmarking and gap analysis, and program roadmap and duration which are vital for the success of the transformation program.

Success Factor 5: Maintaining Energy and Involvement

As transformation programs progress from defining strategy and setting targets to design and implementation, they affect different organizational levels and stakeholders. Disengaged stakeholders can really slow down progress and can cause by itself for transformation failure. Setting right KPIs & tracking, performance measurement and, award & recognition have the most significant impact in sustaining organizational improvement.

- **Right KPIs & tracking:** In order to maintain the momentum and involvement of people in change programs, it's important to develop and measure right performance tracking metrics. For example, as part of change initiatives a company adopts a new pricing strategy to obtain high margins. Measuring volume of sales was chosen to tracking the progress. But if were observe deeply we find that measuring volume encourages discounts, rebates, and warranties, all of which erode margins. So it becomes very important to measure the right things in order to create the right change (Sabri, 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Performance measurement and support mechanism**: When an organization is going through change then management's fostering of organizational trust, respect and caring pays off. Mistakes and unwanted things will occur in the change process but at that time benefit of the doubt and continuing support to employees helps build trust. Having a structured performance system also pays off. Communicate goals and performance targets to employees upfront and let them know about the expected behavior and importance of the change with respect to the employee (what's in it for them) and organization is crucial.

It is important to provide resources, key materials, training and enable tools for employees to achieve target performance. This proactive activity helps build positive energy among employees which signifies support of senior management in change implementation phase. Evaluating the performance of employees based on their target whether not achieved or exceeded, and providing feedback is a critical activity. Performance feedback activity should be motivating, encouraging including performance compensation to maximize the target performance. If employees are in sync and excited about the change initiatives they will give their maximum to achieve the target.

- **Award & recognition**: This is closely related to above two and refers how positive attitude and work gets rewarded. It's been observed that reward may not be exact compensation to the amount of effort put by employees but even a small token of appreciation encourages employees to such an extent that they may be able to boost their level of effort. So, highly visible incentives, such as promotion, bonuses, and recognition should be provided as reinforcements to maintain energy and sustain change.

To summarize, stakeholders should understand why change is happening, how their work will change, what is expected of them during and after the transformation program, how they will be measured, and what benefits success will bring to them personally. Transformation team leaders should be addressing all of these questions explicitly and keep stakeholders involved in the process and informed to maintain momentum throughout the organization.

The key driver for this success factor is the transformation team. Building and empowering an effective transformation team is very crucial to maintaining excitement and eventually embracing change. In building the transformation team, executives must be sensitive to the unique needs of the program environment and ensure that the team is having the right skills like identifying resistance root causes and coming up with strategies to overcome resistance. The team should also try to avoid resistance in the first place by being proactive and mitigate the risk ahead of time (Sabri, 2013).

CONCLUSION

Success of digital supply chain transformation depends majorly on mastering the change management throughout the life cycle of the change program. To be successful in the journey, the change leaders have to be more knowledgeable about the change lifecycle since digital supply chain transformations are complex and multifunctional in nature. For an effective supply chain, one must undergo a regular change in order to respond to the ever-changing operating environment.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

For effective change management, it is very important to have strong support from executives throughout the transformation cycle. Attacking change management with Digital Supply Chain Strategy and proven change management methodology makes transformation change cycle smooth. In order to sustain change management outcome, it is necessary to maintain energy and assurance of everyone's involvement.

When firms make the decision to implement digital supply chain management transformation programs which typically includes process improvement, software implementation, and organizational realignment across their global operations, there is a strong influence of cultural component to this program. The changes include in the way work gets done every day, in individual roles and responsibilities, and in key performance indicators (KPIs).

A proven and well-defined change management framework for digital supply chain transformation can help companies overcome the culture of "this is the way we've always done it" and get employees at every level on board with the transformation plan — and achieve the expected benefits from improving supply chain performance. It will also help in accelerating the pace of change and achieve the success criteria quicker.

Every digital supply chain transformation program is unique because every firm has its own culture, industry challenges, organizational structure and skills, process maturity, and performance. However, the proposed framework in this chapter is a comprehensive one that addresses all common challenges in implementing digital supply chain transformation programs and a practical one which provides executives and managers a good roadmap on what to expect and how to engage the entire organization in the process. This would ensure a successful and smooth supply chain transformation journey.

FUTURE TRENDS

Mastering change management is critical for the success of Digital SC Transformation. Importance of change management as a separate department within an organization is increasing. Development of structured approach and a formal process is a concern for many industries as the still failure rate of transformation programs is high. Several initiatives around the industry are under progress to develop the effective and efficient methodology on how to adopt a change in the organization. There is a demand to integrate change management throughout all levels of the organizational system. Leaders have to link organizations goals to functional level department goals to personal level individual goals. With the advent of increase in transformation initiatives, there is great demand for integration of project management methodology with change management cycle.

The author predicts more serious attention and enough allocated budget for change management track for transformation programs. This will be translated into higher industry success rate. This will have an impact on academia in two aspects: 1) more research and case studies will be available in this area, and 2) witnessing the introduction of change management as a separate MBA program in the universities.

REFERENCES

Aiken & Keller. (2009). *The irrational side of change Management.* McKinsey & Company.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Cynthia, B., & Keith, L. S. (2011). Organizational Change Management: A Test of the Effectiveness of a Communication Plan. *Communication Research Reports*, *28*(1), 62–73. doi:10.1080/08824096.2011.541364

Ford, M. W., & Greer, B. M. (2005). The Relationship between Management Control System Usage and Planned Change Achievement: An Exploratory Study. *Journal of Change Management*, *5*(1), 29–46. doi:10.1080/14697010500036031

Greer, B., & Ford, M. (2009). Managing Change In Supply Chains: A process Comparison. *Journal of Business Logistics*, *30*(2), 47–63. doi:10.1002/j.2158-1592.2009.tb00111.x

Isern, J., Meaney, M., & Wilson, S. (2009). *Corporate Transformation under Pressure*. McKinsey & Company. Retrieved from http://www.mckinsey.com/insights/organization/corporate_transformation_under_pressure

Karp, T. (2005). Unpacking the Mysteries of Change: Mental Modeling. *Journal of Change Management*, *5*(1), 87–97. doi:10.1080/14697010500057573

Kotter, J. P. (1996). *Leading Change*. Boston Harvard Business School Press.

Leonard & Coltea. (2013). *Most Change Initiatives Fail -- But They Don't Have To*. Retrieved from http://businessjournal.gallup.com

Nadler, D. A., & Tushman, M. (1989). Organizational Frame Bending: Principles for Managing Reorientation. *The Academy of Management Executive*, *3*(3), 194–204.

Porter, M. (1996). What is Strategy. *Harvard Business Review*. PMID:10158475

Ramanan & Anil. (2011). *The Top Three Reasons Supply Chain Transformations Fail*. Wipro Consulting Services.

Sabri, E. (2013). Strategies for Supply Chain Transformation. *Supply & Demand Chain Executive Magazine*. Retrieved from http://www.sdcexec.com/article/11122122/companies-struggle-to-decide-when-and-where-to-begin-and-how-to-translate-their-vision-into-goals-goals-into-strategies-and-strategies-into-process-changes-and-projects

Sabri, E. (2015). *Optimization of Supply Chain Management in Contemporary Organizations: Mastering Change Management for Successful Supply Chain Transformation*. IGI Global.

Sabri, E., Gupta, A., & Beitler, M. (2006). *Purchase Order Management in B2B Environment: Best Practice & Technologies. J*. Ross Publishing.

Sabri, E., & Shaikh, S. (2010). *Lean & Agile Value Chain Management: A Guide to the Next Level of Improvement*. J. Ross Publishing.

This research was previously published in Technology Optimization and Change Management for Successful Digital Supply Chains; pages 85-106, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 33
An Analysis of Web-based Document Management and Communication Tools Usage Among Project Managers

Tomislav Rozman
DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia

Tanja Kocjan Stjepanovič
DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia

Andrej Raspor
DOBA Faculty of Applied Business and Social Studies, Maribor, Slovenia

ABSTRACT

The article analyzes modern cloud document management systems and communication tools from the viewpoint of a EU project managers, who lead multidisciplinary, multilingual and international teams. It also explores the types of users who use these tools as well as the motivation factors guiding their choices. The research includes observation within the project group, interviews and semi-structured surveys among 40 EU project managers, who have managed 244 EU projects. The main finding is that a lot of project managers still don't use shared, cloud document system. The biggest obstacle to more efficient usage of existing systems is their un-friendliness, security concerns and lack of skills. Meetings are still perceived as the most efficient channel for distributing and receiving project tasks, but they are closely followed by communication software. Applying the authors' findings to the project management practice can lead to better communication and shared document storage management, which can influence overall effectiveness of project management.

DOI: 10.4018/978-1-7998-7297-9.ch033

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Imagine you are a project manager of an EU project, coordinating an international team. You are aware of the fact, that the single most significant factor affecting the success of a project is the communication ability of the project manager (Zulch, 2014).

How can you live up to such expectations when project participants come from various cultures and organizations? They have various beliefs and statuses within their organizations. Partners use their own documentation and communication information systems and processes used within their organizations. For shared project purposes, yet another documentation and communication system is usually selected. Project partners' knowledge and motivation to use such systems may vary significantly.

The question is: Is it possible to achieve smooth and effective collaboration of a virtual team and timely finalization of tasks, and eventually reach project objectives in such complex environment?

The authors of this paper are involved in management of virtual project teams on a daily basis and struggle with similar issues as described in literature. They are especially interested in the IT aspect of virtual team management: shared documentation and IT-supported communication. Cloud-based document management tools (such as Google Drive, Dropbox, SharePoint, Office 365 and similar) have been used for a decade and are quite mature in technological and usability terms. Nevertheless, their adoption and usage is still limited. Similarly, in the age of modern communication tools (email, sound & video conferences, chats, social media platforms), the selection of appropriate communication channels for different project management tasks is still an issue.

Firstly, we will present existing literature on the following topics: virtual teams, distributed teams, document management and similar. Then, we will present a typical EU project environment. Next, we will present the problem which is in the focus of our research: collaboration between project team members using online tools. We will summarize the types of project document management in 9 patterns. Next, we will present the results of the research (survey). These results include answers from various project participants and their attitude towards various communication tools and techniques. The results (descriptive statistics) were analyzed using pivot tables.

At the end, the results are discussed and guidelines for project managers are presented.

The results were used to create guidelines for project managers and reference processes for document and communication management, which are presented in the last chapter.

RELATED WORK

Virtual, Distributed Teams and Project Networks

Managing virtual teams is tightly integrated with effective usage of information technology (Olariu & Aldea, 2014). Electronic communication is ranked the highest among effective communication methods in some researches (Zulch, 2014) that were done among construction, occupational health, environment, safety, finance and claims managers in non-virtual teams.

Based on the vast research within project management area, the large share of knowledge-intensive projects performed by virtual teams struggle with serious issues (Ayoko, Konrad, & Boyle, 2012). Those issues can negatively influence achieving project objectives, communication and relations between team members.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(Harej & Horvat, 2007) state that a virtual team is defined by the degree of online communication, not the geographical dispersion. A temporary team is established for a specific time-limited project, whereas a permanent team is established for long-term tasks (such as open-source development community).

In contrast, other authors (Guzmán, Ramos, Seco, & Esteban, 2010) state the difference between virtual and traditional teams: members work at different geographical locations, they come from different cultures, have different teamwork practices, speak different languages, knowledge management and distribution is different and time difference makes agenda management difficult. Same authors also emphasize (among others) problems related to virtual teams: ineffective management of shared knowledge among different team members causes duplication and inconsistency.

Moreover, (Ale Ebrahim, Ahmed, & Taha, 2009) identified 12 factors which influence the virtual teams. The same authors compiled a comprehensive literature review on this topic and defined virtual team as geographically dispersed, driven by a common purpose, enabled by communication technologies and involved in cross-boundary collaboration. Other characteristics of virtual teams are: they are not permanent teams, the team size is small, the members are knowledge workers and may belong to different companies. Other authors offer similar definitions (Hertel, Geister, & Konradt, 2005; Joinson, 2002; Shea, Sherer, Quilling, & Blewett, 2011), (Watkins, 2013).

The main advantage of a virtual team is its agility. At the same time, those teams are especially vulnerable to mistrust, communication issues, conflicts and power struggles. (Ale Ebrahim et al., 2009) also compiled a list of advantages and disadvantages of virtual teams. Some of a virtual team's disabling factors are addressed in this research, such as: requirements for complex technological applications, task-technology fitness, technophobia, training.

Project networks thus maintain a stable core of project team members while at the same time dynamically tapping into the expertise within the personal networks of members as necessary (Cummings & Pletcher, 2011). When the task is non-routine, this set-up often increases the chance of success of a project. A project network combines the advantages of the project team with those of the personal network. EU projects can be viewed as a special type of project networks. Core members of an EU project represent the core of the project team, while their associates/assistants and sub-contractors represent non-core contributors of the project network.

We are aware of the fact that trust is very difficult to develop and maintain in a virtual team (Huls, Piggott, & Zwiers, 2014), because of different barriers (Kimble, 2011) in culture, time and geography. It is therefore even more important to select the adequate technological solution to support and not to diminish trust in project teams. A thorough research of VT development in the last ten years (Gilson, Maynard, Young, Vartiainen, & Hakonen, 2015) found different results for impact of technology use in virtual teams: from no effect to better overcoming of teamwork challenges. It recommends more investigation and attention to newer technological solutions, which is actually what we are doing specifically for EU funded projects.

Software development projects in virtual teams are especially common. For example, most of the open source software is being developed in virtual teams. Several authors have researched the performance of the virtual software development team. (Colomo-Palacios, Casado-Lumbreras, Soto-Acosta, García-Peñalvo, & Tovar, 2014) found out that the performance of such projects is lower than in-house projects. One of main reasons of lower performance of a team is lack of attention of virtual project manager to development tasks.

(Misra, Colomo-Palacios, Pusatli, & Soto-Acosta, 2013) discusses the role of people in GSD (global software development). Challenges in GSD virtual teams can be summarized as: communication, knowl-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

edge management, coordination, collaboration, socio-cultural distance and lack of trust challenges. Authors propose several ideas to overcome these challenges such: investment in people, promotion of mobility and improvement of the software development process.

(Colomo-Palacios, Soto-Acosta, García-Peñalvo, & García-Crespo, 2012) performed a research (focus group and delphi study) with special attention on packaged software development. Their main conclusion is that people are still the most important resource in SW development, regardless of the type of software. Therefore, the transparency of competences, reporting and quality process are the areas which needs to be well managed in distributed software development teams.

Virtual project teams are here to stay and growing (Shea et al., 2011). For example, 145,463.81 M € are spent for EU projects in a single year (EU_comission, 2014). A big part of this funds (e.g. 17,551.69 M € for Competitiveness and for growth and jobs) are managed in virtual teams. To ensure more optimal expenditure of EU project funds, the management of project teams should be improved.

The existing literature mainly explores key success factors for managing project teams, but skips the technological dimension and its relations to the project team members' motivation.

Factors Affecting Performance of Project and Virtual Teams

(Ebrahim, 2015) identified the main groups of factors, which influence the effectiveness of virtual teams. He found out that the 'knowledge worker' and 'process' group of factors positively relates to the effectiveness of the virtual team while the 'technology construct' group of factors relates to it in a negative way. (Salaheldin, Sharif, & Al Alami, 2010) describe the driving and resisting forces within project management software implementation. Their research of the effect of various factors on the success of project implementation (understanding of business case, objectives, management support, defined plan etc.). The effect of the usage of PM tools is only partially addressed in this research.

Acceptance of Cloud-based Document Management Tools

Online collaboration platforms have existed since the very beginnings of the internet, for example PLATO in 1973 (Woolley, 1994), which was the predecessor of the wide-spread system Lotus Notes. With the advancement of Web 2.0 in 2004 (O'Reilly, 2005), real-time sharing and syncing platforms emerged, such as Google Docs.

The academic research in the field of contemporary, especially cloud-based document management systems (Gilson, 2015) and its usage for collaborative project work is slowly growing. For example, a search using keywords 'google docs' in Mendeley returns around 400 results and Emerald Insight returns 190 results. A partial research on the usage of Google Docs within a specific domain has been done by: (Mansor, 2012) – collaboration between academics, and (Blau & Caspi, 2009; Suwantarathip & Wichadee, 2014; Watson, 2006; Zhou, Simpson, & Domizi, 2012) – collaboration between students for the writing tasks. User acceptance of Google Docs within organizational setting has been investigated by (Tan & Kim, 2015). They found out that the perceived usefulness and satisfaction positively affect the intention to continue using such tools.

The goal of this research is to explore the behaviour of project managers of virtual teams in relation to supporting IT tools. From the literature review we can conclude that a lot of research has already been done, but it mainly focuses on different aspects of project management, IT supporting tools and factors

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

influencing the effectiveness of the communication. Our focus is on the usage of IT tools for managing EU funded projects, which are usually performed by virtual teams.

EU Projects

EU projects are usually long-term relationships between organizations. For example: three year project actually means that the organization is joining in project-related relationships for a much longer period (up to nine years) from proposal preparation to the end of the possible evaluation period (Horvat, Harej, & Rozman, 2006). Web-based collaboration tools are considered as enablers for successful cooperation, which is of the utmost importance in such long periods (Schwarz, 2005).

Numerous programs and funding opportunities (EU_Commision, 2014) exist for different types of activities. Different types of organizations can apply for funding. The main characteristics of EU co-financed projects (like Lifelong Learning – Leonardo da Vinci, FP7 or the latest Erasmus+ and Horizon 2020), which are considered in this article, are:

- Duration: 1-3 years
- Types of projects: research, development of innovation, transfer of innovation, partnerships, knowledge alliances and similar
- Number of partners (organizations): min. 3, average 8, max. 12 with 1-5 people/ partners
- Location of partners: minimum 3 different EU countries (core partners) and other countries (associated partners), but generally more than that (typically 4-5)
- Partners' organization type: private companies, public organizations, NGOs, academic institutions, associations etc.
- Partners' organization size: micro to medium companies
- Expected project results: mostly intellectual outputs like research reports, events, training materials, courses, e-content, software, new processes and services
- Project organization: network/virtual team
- Project scope: multidisciplinary

The skills and characteristics of a successful project manager, associated with EU projects like Lifelong learning – Leonardo Da Vinci have been already characterized to some extent by (Draghici & Draghici, 2013). The authors have analyzed project managers, who are directly or indirectly associated with projects that contribute to the development of training courses under ECQA (European Certification and Qualification Organization). Within this survey, they have found out that the most common managerial style is based on the Germanic culture encouraging rational plan development and control of changes; it focuses on the processes and the background of the project manager is mainly in IT sector. This research does not include operational or IT details of project management, which are described in our research.

Patterns of Collaboration in a Project Using D&CM Tools

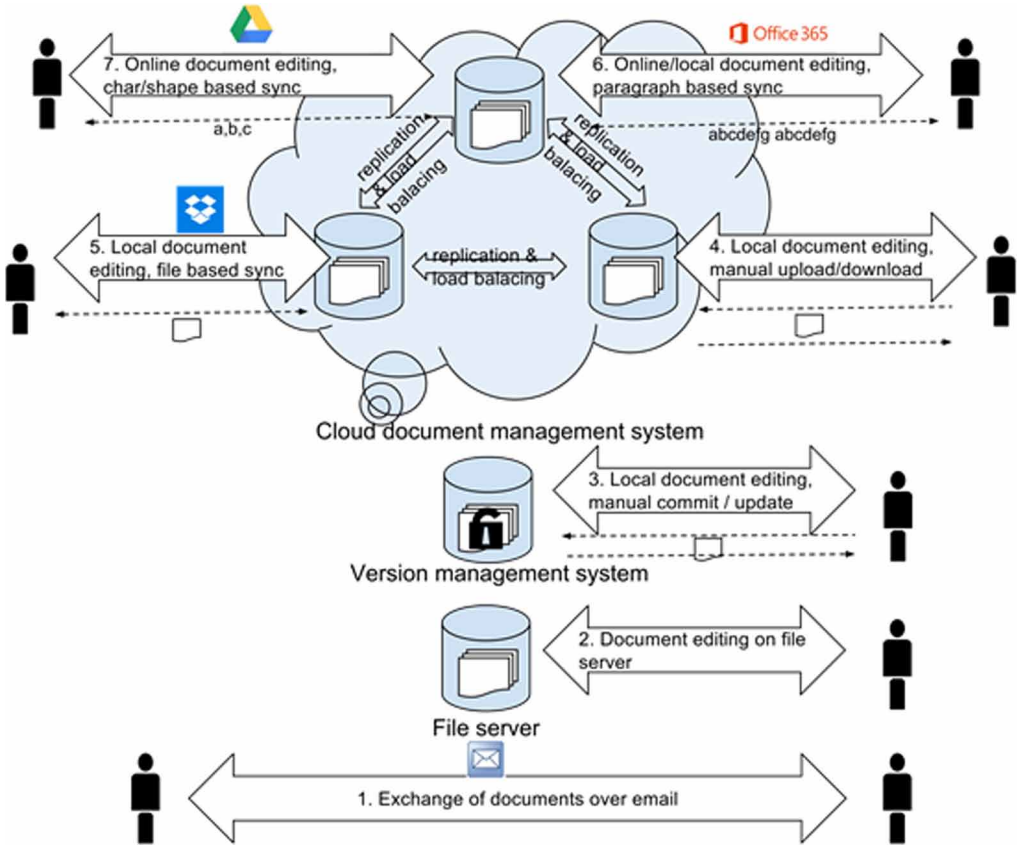
The possibility to access distributed and distinct computing resources can bring substantial advantages to project management. Cloud computing is particularly useful to support a lean and digitalized approach to project management (Nicoletti, 2012).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Cloud-based document management systems are used for intellectual outputs (documents, spreadsheets, presentations, schemes, etc.) exchange within knowledge-intensive projects. For several years our project partners report the usage of Google Drive, Dropbox or proprietary document management systems with mixed success. According to our experience, document management within a project team can be summarized in at least 9 patterns [Figure 1].

The first and simplest pattern is represented by local editing of files and their exchange by email system. The second pattern is represented by a traditional file server, which enables central storage of files, with no locking mechanism. The third pattern of document management is represented by CVS, Subversion or similar system, which allow versioning, committing, updating and branching of files. Some examples of the fourth pattern are SharePoint, Blackboard, Moodle, or any other web based system which allows manual document uploading and downloading. Examples of the fifth pattern are Office365 and Microsoft SharePoint, which allow paragraph-based online editing. Examples of the sixth pattern include Google Drive (local sync client), Dropbox and OneDrive, which allow automatic synchronization of the files. Examples of the seventh pattern are Google Drive/Docs system, Draw.io or similar, which allow simultaneous real-time editing of the documents. The eighth pattern could be represented by cloud project management tools, which also include event, task and project portfolio management. The ninth pattern includes social messaging.

Figure 1. Different models of cloud /other document management systems usage patterns[1]



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Other tools for online project management, which include event/task management and social messaging (e.g. Wiggio, Teambox, Manymoon, BaseCamp etc.[2]), were omitted from the research. Nevertheless, these tools could be interesting candidates for future research, because within this research we have found out their efficiency for task distribution is on-pair with e-mail communication [Figure 10].

Document management does not eliminate a need for proper communication between project partners. Communication patterns and channels have been well known for quite some time (Katz & Tushman, 1979), but what we wanted to find out is which channel is the most efficient for assigning and accepting project tasks.

Communication within EU project virtual project team is usually performed using different channels. There is less face-to-face communication (except on yearly meetings) and more e-communication. The communication can be asynchronous (e-mail, chat) or synchronous (chat, voice (e.g. skype), phone, video conference (many-to-many), webinar (one-to-many). Those communication channels are the only way of the project manager to reach project members, therefore it is useful to know which one is the most appropriate for which situation. The effectiveness of different communication channels was addressed within our research.

Research Questions and Hypotheses

The main research question is: *Which factors influence the usage of modern document management and communication (D&CM) tools for managing virtual teams in EU projects?*

Specific research questions are:

- **RQ1:** *Is the usage of D&CM tools influenced by demographics (age, location, education, etc.)?*

Based on these research questions, hypotheses were formulated:

- **H1:** *The majority (>½) of projects performed by virtual teams uses some kind of IT supported documentation management system*
- **H2:** Younger project managers from private companies prefer *using cloud-based document management tools*
- **H3:** *The most effective communication channels for assigning and accepting project tasks are those with IT support*

Within this article, we will mostly tackle the collaboration and communication aspects of project management. We will take a look at the factors that are related to collaboration and communication tools, such as messaging systems (e-mail, skype) and document management systems (Google Drive, SharePoint, Dropbox, proprietary systems).

Our research focuses on collaboration using online tools within virtual project teams. We are especially interested in temporary virtual project teams, which are common in EU co-financed projects.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

RESEARCH DESIGN

The Context

A typical project, as observed here, is usually led by the main partner (contractor) and coordinator, who are not necessary the same person. Project team members usually meet face-to-face twice per year. Therefore, the majority of the communication and collaboration is performed on-line.

The team usually consist of the following roles: project manager, quality manager, developers, teachers, administrative staff and technical staff, all from different organizations. Therefore, the term 'project network' could be used instead of 'project team'.

For the best collaboration, the team should use central storage for documents and results, which are produced within the project. But as we will see from the results, the majority of projects still exchanged documents exclusively via e-mail.

The online cloud-based document management systems have a lot of advantages over exchanging files using e-mail. Those advantages are: a single point of document storage, less document duplication, the proper (automatic) version management, better document visibility, less time wasted for local classification and storage, better information circulation, better collaborative work etc.

We wanted to find out, what are the reasons behind the low acceptance rate of online document management systems.

In addition to document management tools, we were interested in online communication platforms. Since teams are geographically dispersed we wanted to find out, which communication medium is suitable for task assigning and accepting.

We were interested in the influence of personal characteristics (self-starter, leader, being part of the hierarchy, motivation for participation in the project) to the usage of online collaboration platforms. We also wanted to know if the usage of online collaboration platforms is influenced by age or the type of organization that project members come from.

Our research was motivated by our own work: we (authors) are project managers and face these issues on a daily basis.

At the beginning of our research we suspected that acceptance of cloud-based IT tools for project management and communication depends on the age of the project team members. The younger generation (up to the age of 40) should be more inclined to using the tools mentioned above. But this theory was rejected by the fact that some of the older project team members have no problems using IT tools for project management. The next thought was: does it depend on the type of the organization? Each project manager who was interviewed had their own personal limiting factor of the usage of IT tools for collaboration.

Therefore, we started our research in 2014 by preparing a short article, which was posted on LinkedIn platform. We asked project managers: "Why do people resist using shared, cloud-based document management systems (such as Google Drive/Dropbox/Office365)?[3]" The received free-text answers were grouped in the following groups:

- I don't understand cloud based DMs
- I'm afraid of losing the files
- I'm concerned about my privacy
- Lack of knowledge (caused by generation gap)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- I don't know how to use it
- The DM system is not safe

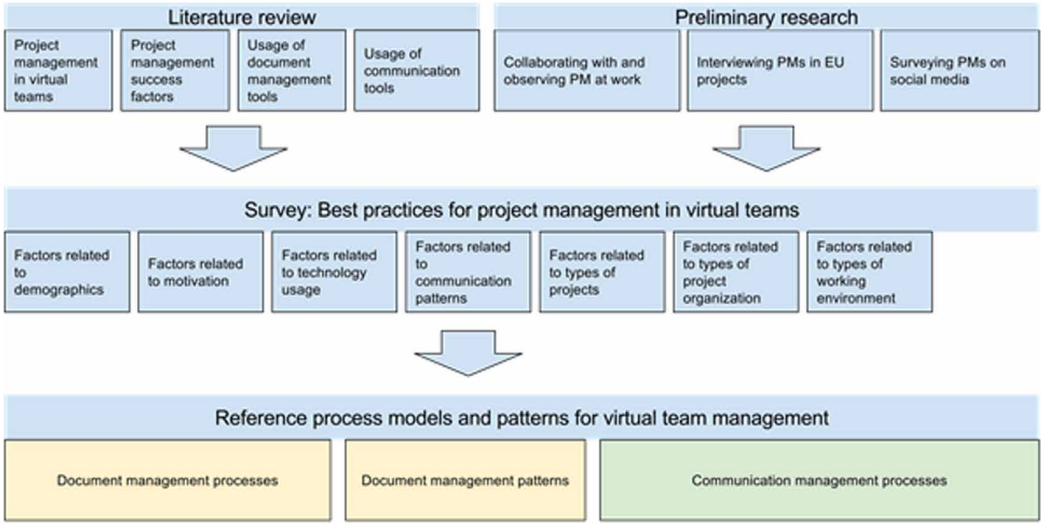
The participants' answers became the starting point for broader research, where we conducted a survey and asked project managers about their motivation to use modern cloud-based IT tools for collaboration. We wanted to find out which are the factors influencing acceptance, therefore we asked the research participants about their demographics, experiences, motivation, self-drive and similar.

Type

Our research includes qualitative (observation and interviewing EU project managers) and quantitative techniques (web survey). This kind of methodological triangulation gives a more balanced picture of the situation. To establish a preliminary set of factors that influence effectiveness of virtual teams in project management, the authors have conducted preliminary research. Firstly, the authors have been collaborating in EU projects for more than a decade and have been observing collaboration processes from within. Next, the authors have queried social networks (LinkedIn) and gathered responses from fellow project managers regarding the usage of cloud-based document management systems for project management tasks.

Design overview is shown in Figure 2.

Figure 2. Research design



Preliminary Research

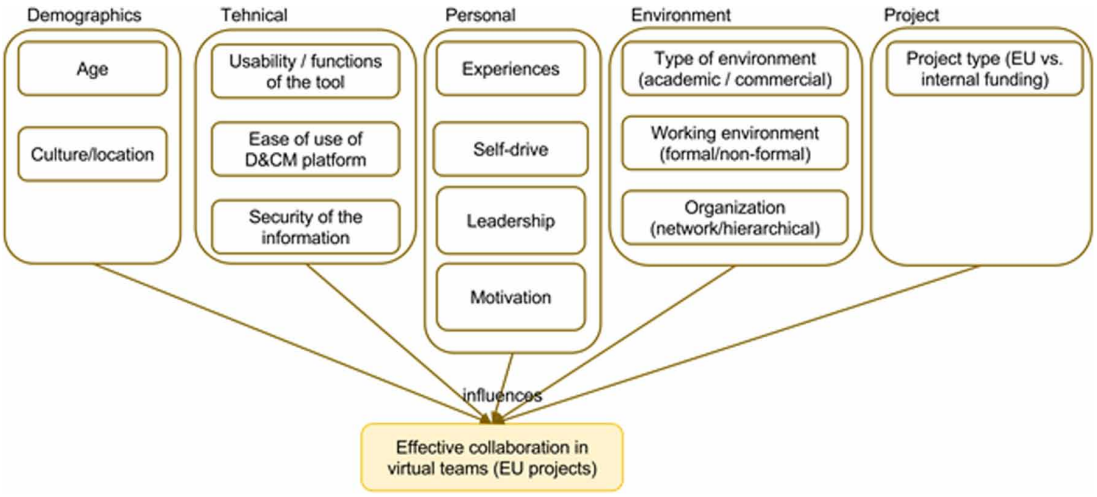
Within the preliminary qualitative research, the authors observed a small set of EU project managers for several years (fieldresearch - direct observation). The result of those observations and interviews is a set of factors which influences the effectiveness of project management in a virtual team. The main

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

research question was: What is the main reason for poor performance of a virtual project team? Each project manager had their own view of the reasons for poor performance and cooperation. For example, some older project managers thought that age is a limiting factor for effective use of online document management tools, while others thought that the difficulty of using the tools hinders their usage the most. The initial set of factors is shown in Figure 3.

As we can see from Figure 3, there is no clear consensus among project managers on which factors influence the effectiveness of collaboration in virtual teams. As it seems, the effectiveness itself is a term whose meaning depends on the observer.

Figure 3. Initial set of factors



A Survey

Using a web survey, we gathered data about project participant demographics (country, age, type of organization, educational background), experiences with project management (proposal preparation and coordination, the number of coordinated/collaborated/ administered projects), types of projects (source of financing, hierarchical structure), motivation (self-starter, being part of an organizational structure, leadership, motivation for participation). The most important questions included technology-related issues of collaboration and communication platform usage (main collaboration/communication platform, its effectiveness, user friendliness, obstacles for usage). In addition, we asked the participants, which factor is the most influential when assigning or receiving tasks. We also asked the participants about their self-drive, their motivation to participate in the most recent project and their leadership abilities.

Sampling and Validity of the Research

We used non-probability accidental sampling. We selected the participants for the survey from the authors' personal networks of current or past project partners. This type of sampling was used because we were mostly interested in collaboration improvement within our own project partner networks. We

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

extended the target group by posting a request to participate in the survey within a LinkedIn group, which is dedicated to EU project management. We are aware that the conclusions of this research are difficult to generalize to all project managers in EU but that was not our primary intention.

The survey was constructed using Google Forms and invitations were sent by e-mail and posted to LinkedIn groups. 44 persons who managed 244, partnered in 544 and administered 484 EU projects participated in this research. The full population of EU project managers is difficult to determine; there are currently more than 55 EU programmes (EU Commision, 2014) which comprise a large number of projects. Those calls/projects have various duration and funding. There is no summary information about the total number of EU projects granted per year for all calls. For example, only Horizon 2020 published 173 calls in the year 2014/2015 (EU commision, 2015).

Analysis

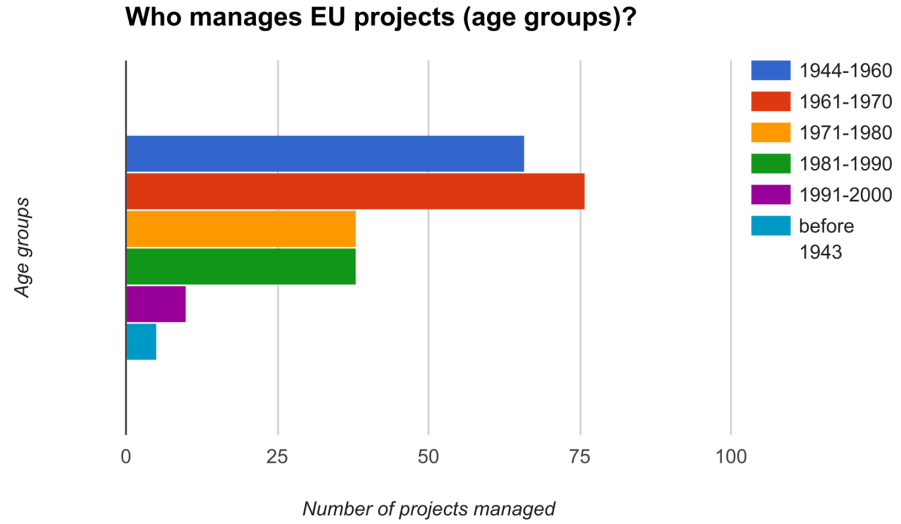
The data gathered was analyzed using Google sheets and IBM SPSS Software. First, we conducted a univariate analysis and then we used a bivariate analysis to investigate the correlation between the variables. Descriptive statistics were prepared using simple statistics (averages etc.). For the data summarization, pivot tables were used. Correlations were discovered using Pearson's' correlation coefficient.

There were no missing data to handle, because all questions, which used the 7-level Likert scale, were mandatory to answer. The answers to open questions were classified in groups (coded).

Demographics

Demographic data: age group (40% were born 1971-1980, 20%: 1961-1970, 22%: 1981-1990, 14%: 1944-1960) [Figure 4]; country of the respondents: France, Netherlands, Italy, Slovenia, UK, Romania, Iceland, Bulgaria, Spain, Belgium); organization type: 36% private institution, 28% public institution, 14% independent consultants, 11% NGOs, 11% others; educational background: 36% economics, 14% social sciences, 6% education, 22% technical sciences, 8% informatics.

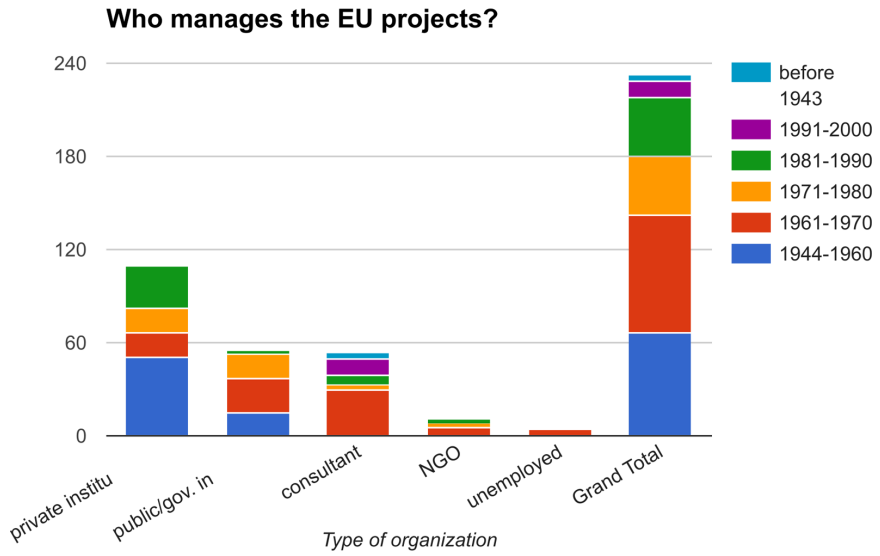
Figure 4. Who manages EU projects by age group



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Most projects overall are managed by the generation 1961-1970 (generation X).

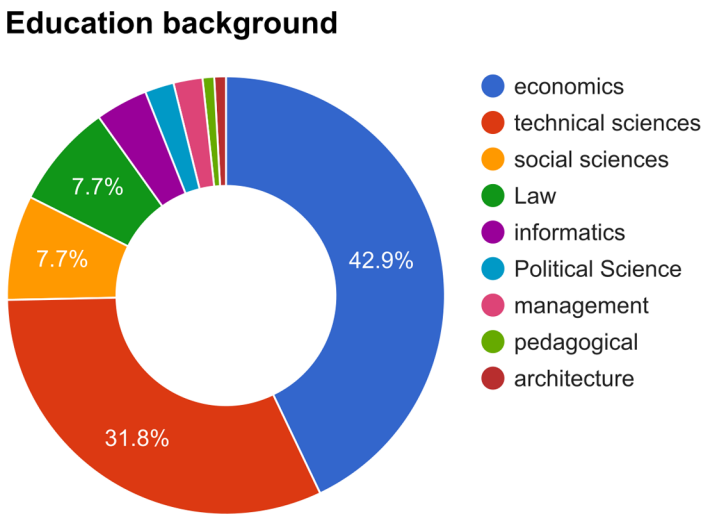
Figure 5. Who manages EU projects by types of organization



If we take a closer look, we notice, that most project managers in private organizations belong to the generation 1944-1960 (generation 'baby boomers') [Figure 5]. If we focus only on consultants, a majority of them are from generation X. Public/academic organizations show an interesting distribution: approximately one third of the sample is from 1944-1960, another third from 1961-1970 and the last third from the 1971-1980 generation.

Millennials (1980-2000) are underrepresented in all types of organizations except in private institutions.

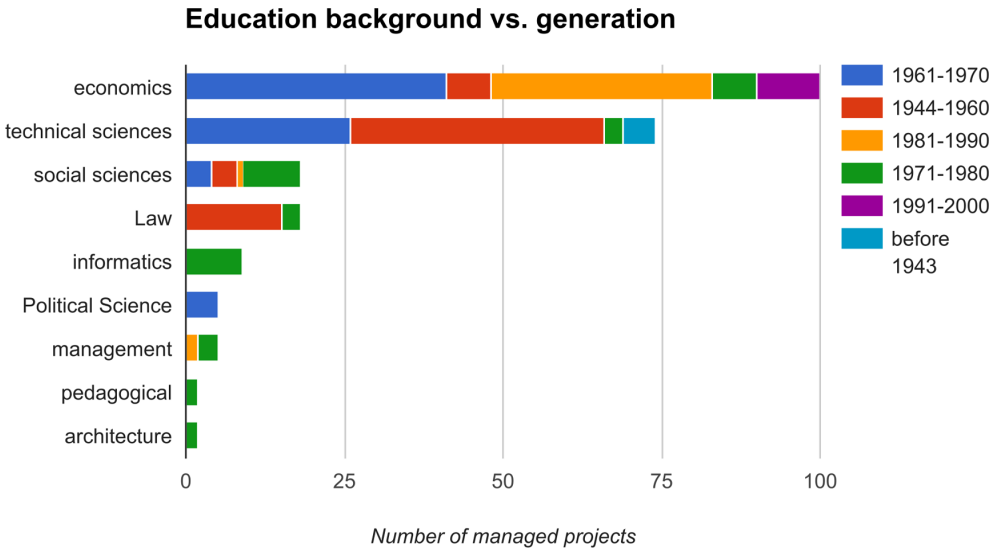
Figure 6. Education background of EU project managers



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Education background of the survey participants [Figure 6]: 32% technical sciences, 43% economics, 7,7% law, 7,7% social sciences and other. We have separated informatics and technical sciences categories to determine if there is any correlation with educational background and IT systems usage. Most projects are managed by persons with economics background, out of which most are from generation 1944-1960 [Figure 7].

Figure 7. Education background and age groups of EU project managers



Experiences: 66% participants have already prepared a full proposal, 30% have collaborated in one and 5% have not been involved in proposal preparation yet. 72% have coordinated preparation of a project proposal and 28% have not.

Project organization [Figure 8]: A majority of projects followed a network type of project organization (60%), followed by hierarchical organization (39%) and a mix of those (the remaining).

A network type of organization (as expressed by lead partners) is more common in Bulgaria, Italy and Slovenia whereas strict hierarchical organization is more common in Belgium [Figure 9]. Overall, the majority of teams are organized as networks.

This complies with the findings of (Hoch & Kozlowski, 2014), who have found out that shared leadership (including non-hierarchical organization) is significantly related to virtual team performance.

Receiving and Assigning Tasks Efficiency

As we see from Figure 10, live communication and formal meeting still present the most efficient communication channels, closely followed by live informal meeting. Surprisingly, e-mail is the third most efficient system for task assigning/receiving, closely followed by dedicated task assignment system.

It is not surprising that synchronous communication channels are seen as most effective. More interesting is the observation that asynchronous electronic communication channels (like e-mail & task assignment system) are seen as more effective as synchronous (skype, mobile, traditional phone). With

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

focus only on asynchronous electronic communication channels, skype with voice and video is considered as the most effective.

There are subtle differences between different communication channels and assigning/receiving tasks, which are considered not significant (comparison of red/blue bars).

If we focus only on the use of communication tools, results [Figure 11] show that most users are concerned with security and improper use of web etiquette.

Figure 8. Project organization

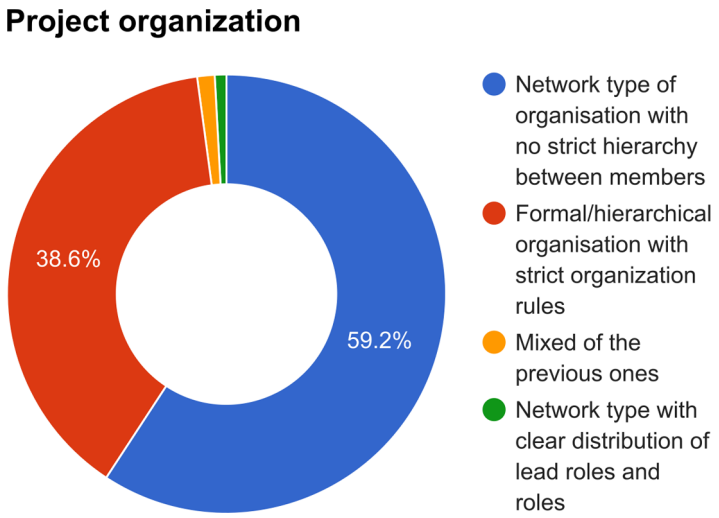
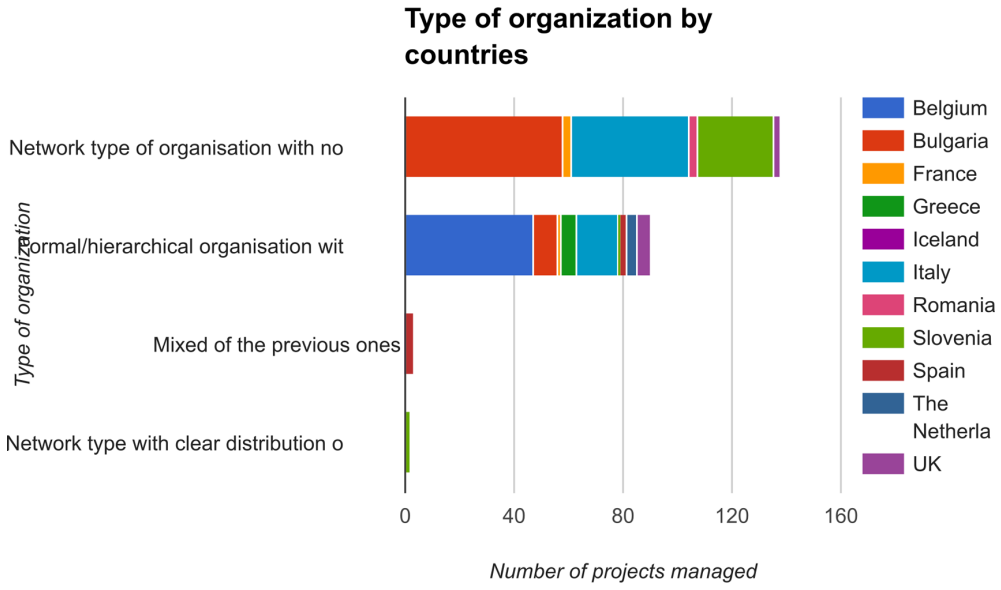


Figure 9. Demographics structure of survey participants by countries



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 10. Effectiveness of various communication channels for delegating and accepting project tasks

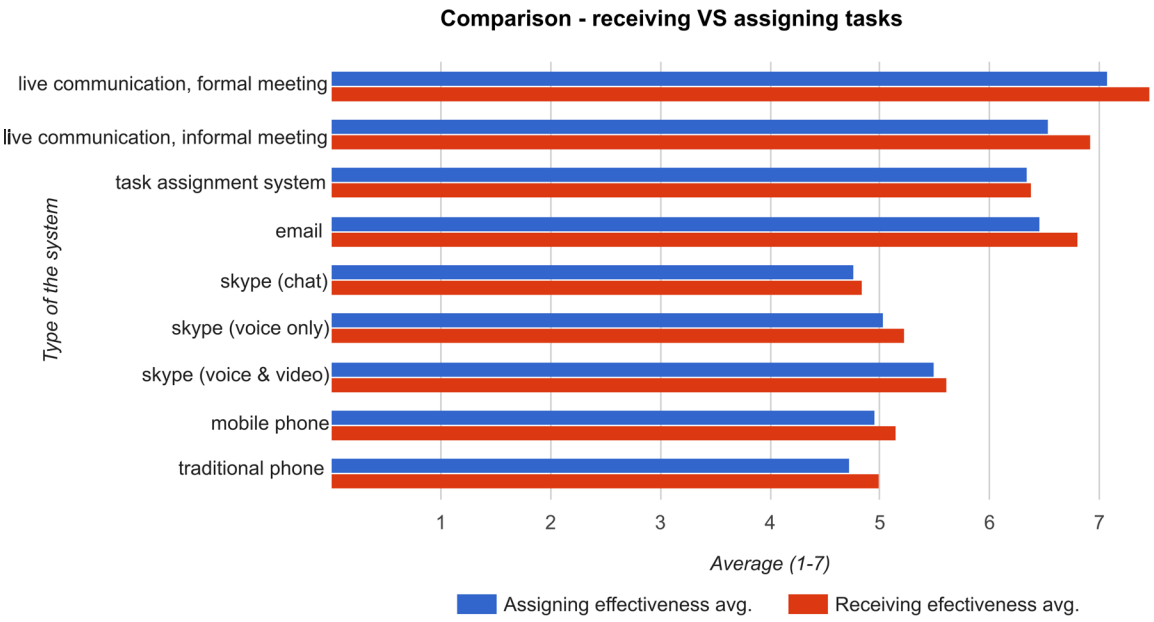
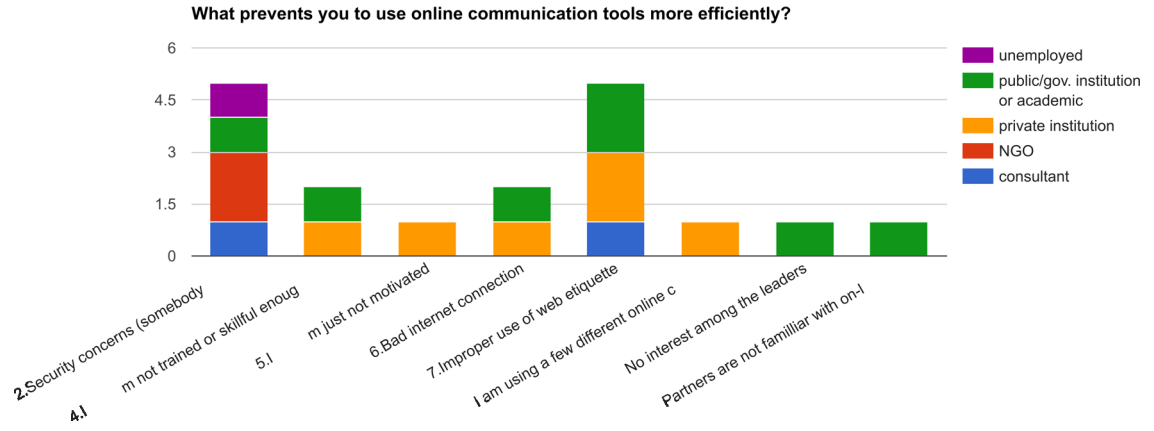


Figure 11. What prevents effective usage of online communication tools



Document Management System

Many projects are still being managed without a shared documentation system (32%). Among others [Figure 12], Google Drive and Dropbox are the most used systems with an approximately equal share (GDrive-34.1% and Dropbox 33.5%).

If we observe only those answers, which use some kind of document management (DM) and group them by user types [Figure 13], we find out that Google Drive is mainly used by project managers, which work as consultants or come from private organizations. The reason could be in this product's attractive pricing, quick learning curve and broad product coverage. Public, governmental and academic institutions mainly use Dropbox or a self-developed system.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 12. Which DM systems EU project managers use

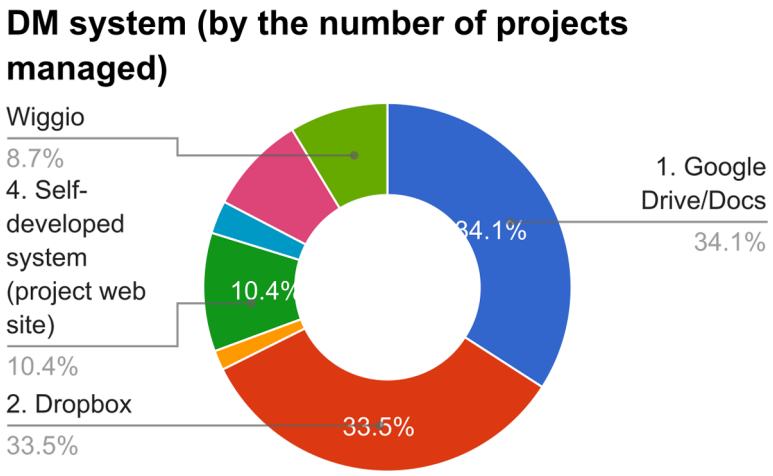
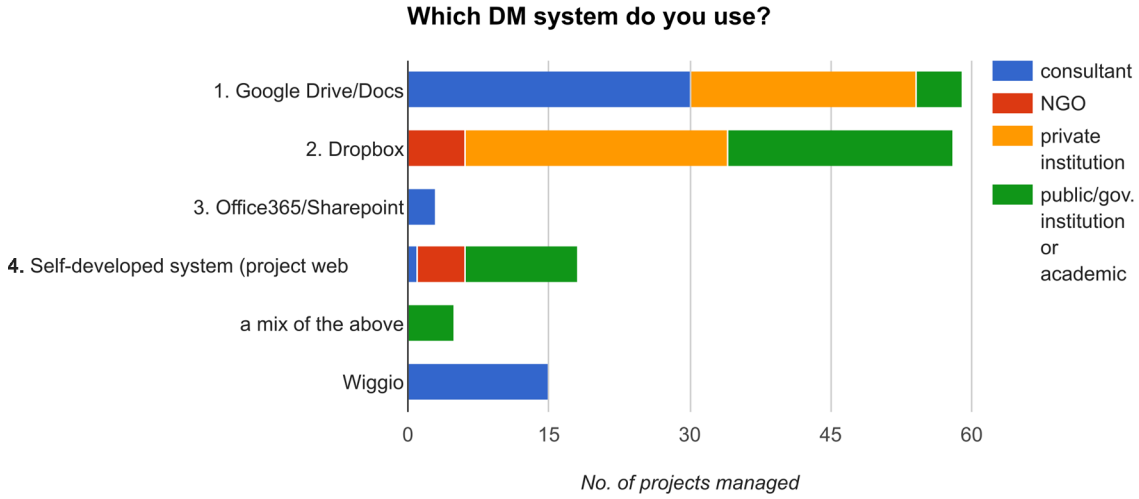


Figure 13. Which DM systems EU project managers use (by types of organizations)



An analysis of DM systems usage by age groups shows that generations 1961-1970 and 1944-1960 are less keen to use the cloud-based DM system [Figure 14].

The two main obstacles for using cloud-based DM systems are: 1. the system is too cumbersome (it takes too many clicks to perform a task) and 2. security concerns. Other responses are presented in Figure 15.

Motivation and Leadership of EU Project Managers

We asked our participants questions about motivation and leadership: 1. Do you consider yourself as a self-starter? 2. Do you prefer being part of a well-organised and led structure? 3. Do you prefer leading others? and 4. Have you felt motivated to participate in your recent project?

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 14. Which DM systems EU project managers use (by age groups)

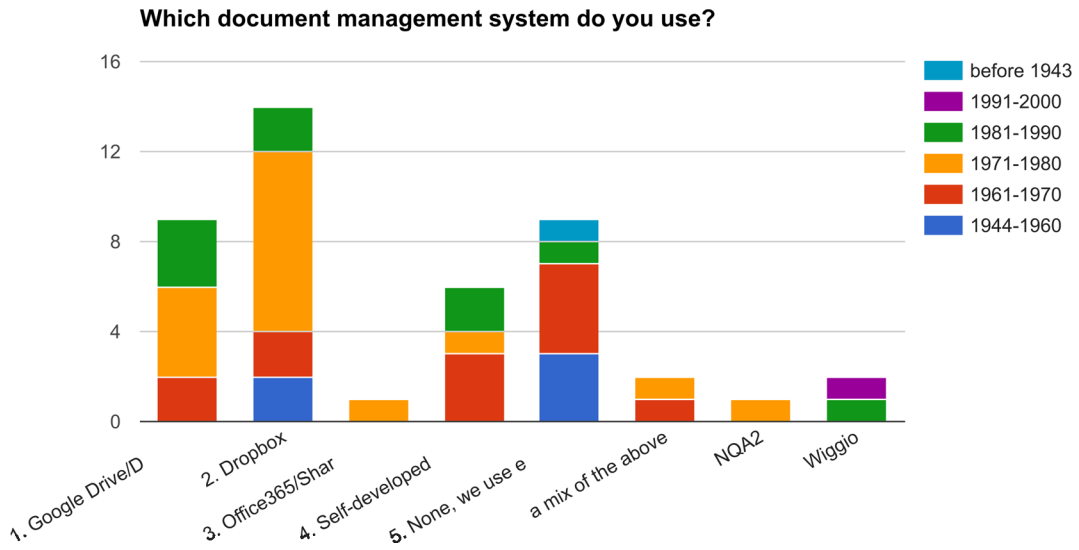
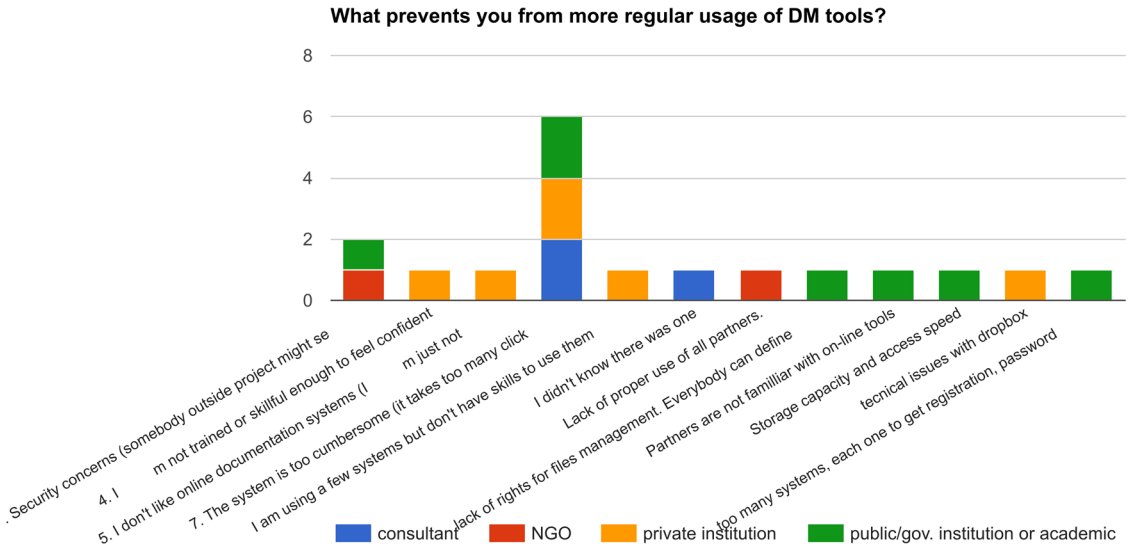


Figure 15. What prevents effective usage of document management tools



The results [Figure 16] show that most persons from the group of consultants consider themselves as self-starters, persons from the age groups 1981-1990 and before 1943 alike.

The majority of people from NGOs prefer to be part of a well-organized and led structure [Figure 17].

Persons who prefer leading others are mostly from private institutions and consultants [Figure 18]. An analysis by the age group shows the persons born before 1943 and between 1991 and 2000 prefer leading others. Persons born in 1971-1980 least prefer leading others, which is a very interesting result.

Most motivated to participate in recent project were persons from NGOs and private institutions [Figure 19].

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 16. Leadership attitude: self-starter

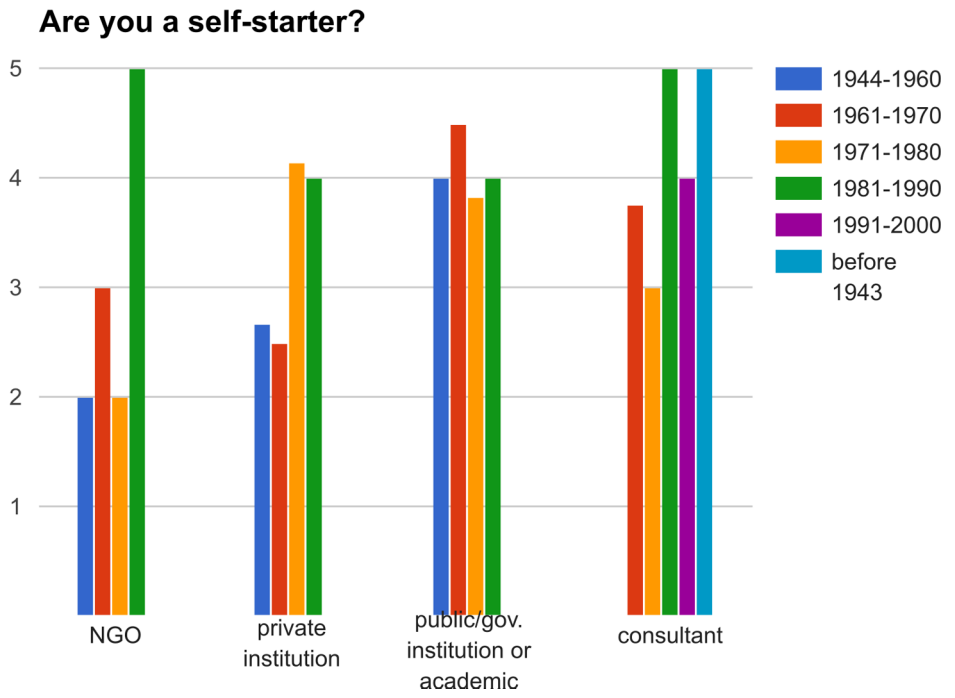
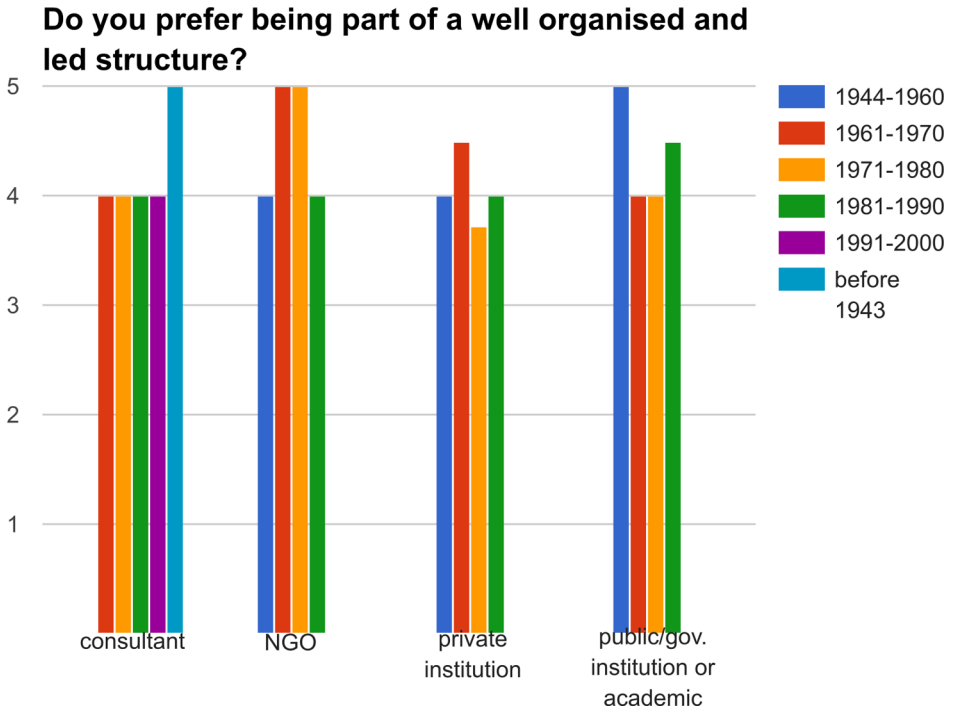
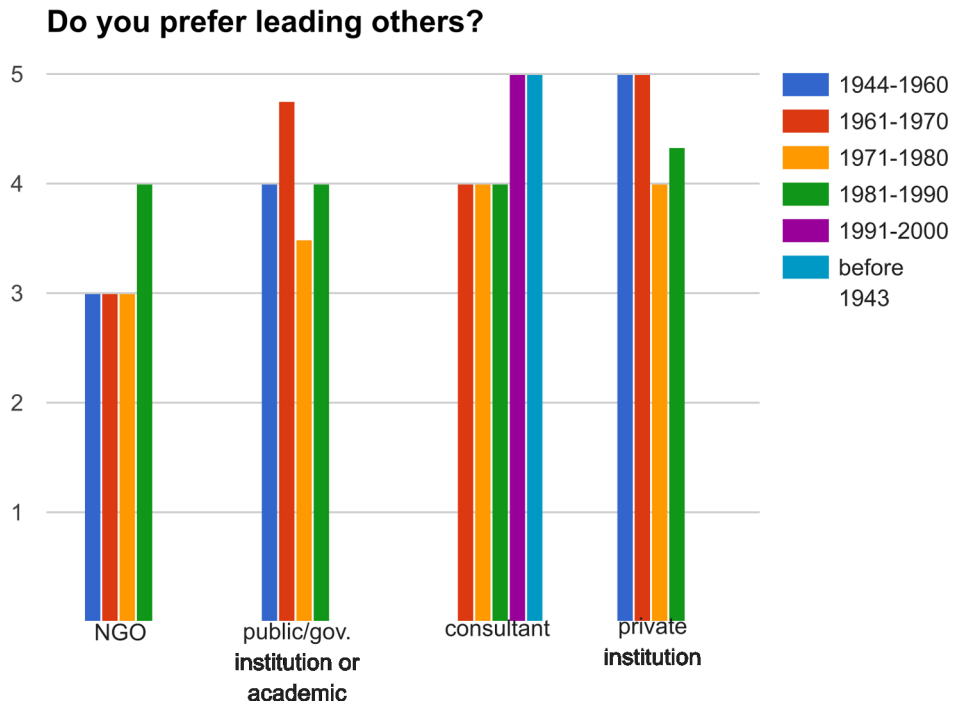


Figure 17. Leadership attitude: organization structure



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 18. Leadership attitude: leading others



An analysis of correlations between variables showed that project managers who consider themselves as self-starters were also motivated to participate in their most recent project (Pearson's coefficient 0,327* at 0.05 level, 2-tailed).

Open Comments from Participants

From the free-text answers we could extract and summarize the following useful information: 1. complex systems can cause problems in temporary project settings (e.g. people were unhappy with the introduction of Wigglio), 2. exchanging documents (only) via e-mail is not recommended because of poor version history tracking capabilities, and 3. training of project partners for efficient usage of DM tool is strongly advised.

RESULTS

Hypotheses

H1: The majority (>½) of projects performed by virtual teams uses some kind of IT supported documentation management system

The hypothesis is confirmed. We have found out that 64% of survey participants use some kind of cloud-based documentation system for project management.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

H2: Younger project managers from private companies prefer using cloud-based document management tools

The hypothesis is partially confirmed. We have found out that in generations 1971 and younger, the share of participants which do not use any of the cloud DM systems is almost zero. In generation 1944-1961-, almost half of the participants do not use any DM system, and in generation 1961-1970 approximately a quarter of the participants do not use any of DM systems.

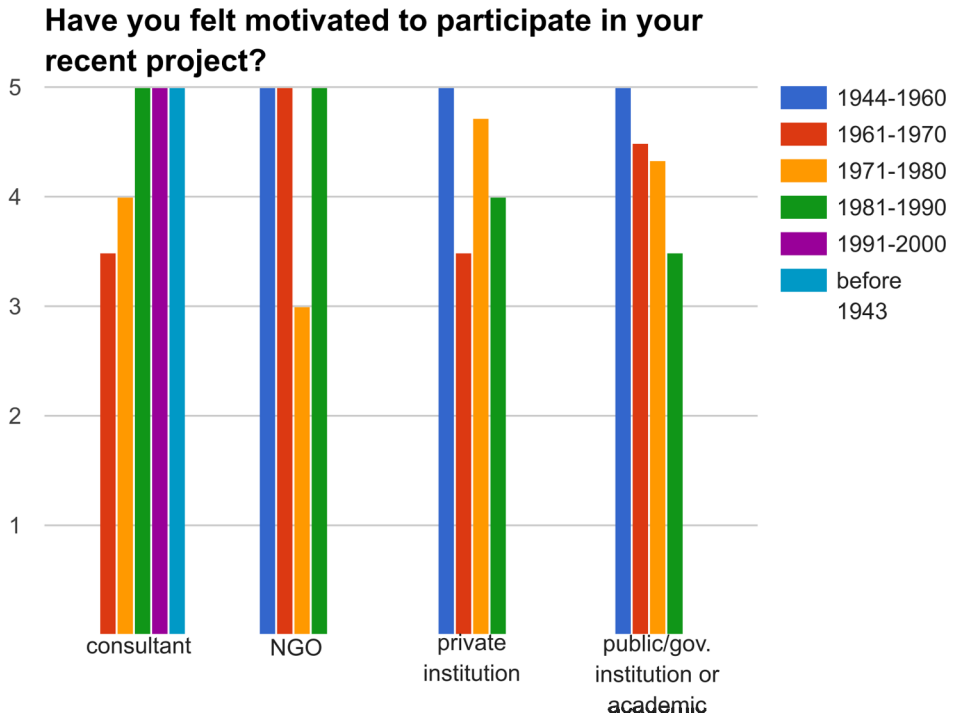
H3: The most effective communication channels for assigning and accepting project tasks are those with IT support

The hypothesis is not confirmed. We have found out that live communication (formal and informal) is still most effective for assigning and receiving project tasks.

Suggestions for Better Document and Communication Management

The results derived from our research are a set of reference processes, DM patterns and recommendations, which need to be in place to ensure effective project management of virtual teams. Figure 20 shows a high level of key process areas and processes which need to be established for effective document and communication management.

Figure 19. Leadership attitude: motivation to participate in a project



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 20. Reference process models for document and communication management within virtual project teams

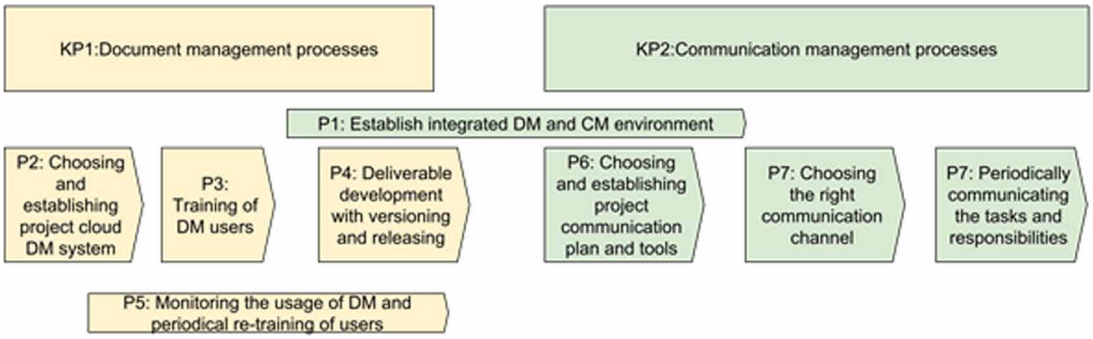


Table 1 shows suggestions for project managers which can be used for deployment of D&CM processes.

DISCUSSION AND FURTHER WORK

The results of our research are interesting: the biggest obstacles for more efficient usage of online communication tools are: bad web etiquette, security concerns and lack of skills. Results also show that live communication is still the most efficient method to delegate tasks, closely followed by e-mail or dedicated task assignment systems. Therefore, we suggest to project managers to use multiple channels for communication. Live meetings should be held at the major milestones (e.g. at project kick-off or intermediate reporting). E-mail (or other type of asynchronous) communication should be used for delegating packages of tasks to team members. Synchronous communication should be used for daily operation, micro- management and quick resolving of issues, which need immediate feedback. The communication system should be used simultaneously with online documentation system.

The biggest obstacle for more efficient usage of online document management systems is user (un-) friendliness (the system is too cumbersome/it takes too many clicks). Before conducting the research, we speculated that security concerns will be the major obstacle for online document management systems. Interestingly, respondents evaluated security concerns with a relatively low score of importance.

We have also found out that there is no consensus about which obstacle prevents more efficient usage of DM and communication tools the most. But we gathered a set of possible obstacles, which can be studied by the project manager or configuration/documentation manager when choosing the DM system for a virtual project team.

Despite the drawbacks detected in DM usage, we believe that cloud-based DM systems for project management provide many advantages: transparency of work, easy insight into history of changes, easier version management and, most importantly, simpler collaboration. These advantages can be seen as drawbacks by some: insight in document changes can be understood as breach into a person's privacy. Moreover, when collaborating in real time, a person's incompetence can be spotted more easily. Is this the issue most of us are afraid of?

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Suggestions for process deployment

Process	Suggestions for process deployment
P1: Establish integrated DM and CM environment	If the team is well trained, has cooperated and used integrated D&CM system before, introduction of an integrated system could be a good solution. If not, introduction of a new integrated system can be a burden (e.g. see results from our research chapter *Open comments from participants*). Sometimes less is more (e.g. combining simple DM with e-mail task delegation).
P2: Choosing and establishing project cloud DM system	Choose the DM system for a project team considering patterns presented in Figure 1. For example, if the majority of project deliverables are in the form of files, a cloud based repository with local file synchronization is a good solution (e.g. Dropbox). If you expect that collaborative work on the same deliverables (e.g. documents, spreadsheets, presentations) will be performed, choose Google Drive or Office 365. Establish repository, grant access rights. Consider edit/read-only access for different members. Establish initial folder structure. Dedicate one person as a document manager.
P3: Training of DM users	Allocate some time at the project kick-off meeting to perform initial training of project team members. Then, train core team members using video-conference and screen sharing. Perform individual trainings (one-on-one) if necessary. Employ social learning (e.g. learning from most IT literate in the partner groups)
P4: Versioning and releasing	Develop deliverables using versioning and releasing rules. Team members who have no background in software development, usually have difficulties managing versions. Standardize and set up rules (within configuration management plan) for file naming, classifying, versioning and releasing. Train users, explain how automatic history preservation of files works (if used). Avoid branching of deliverables development, because it takes a lot of effort to merge them. Instead, introduce shared files to develop (e.g. shared training content presentation or shared spreadsheet for status tracking).
P5: Monitoring the usage of DM and periodical re-training of users	A dedicated person must periodically track what is happening in the documentation system. This includes: monitoring of activity (e.g. Google Drive Activity stream), monitoring of file naming, classification, content, duplicates. Without regular monitoring, your DM repository will quickly become a mess. Use the insights of DM monitoring for re-training of users.
P6: Choosing and establishing project communication plan and tools	Establish a communication plan which includes: events, source, destination, frequency of communication and communication channels. Consider the findings from our research (see chapter Receiving and assigning tasks efficiency). Choose appropriate tools, e.g. Skype for virtual meetings, Doodle for planning communication events, GoToMeeting for webinars, e-mail or task assignment system for task distribution etc.
P7: Choosing the right communication channel	For each communication event, choose the appropriate communication channel. Consider the findings from our research (see chapter Receiving and assigning tasks efficiency). For the most important events (e.g. kick-off meeting), use live communication. Combine formal and informal communication. Example: Perform a formal project kick-off meeting in the morning and plan socializing activities for the afternoon and evening. For regular task distribution, use e-mail or task assignment system. Avoid using phone and chat tools for distributing tasks. People do not consider them effective, the message can get lost easier than in an e-mail. Synchronous channels (e.g. phones) are effective for resolving issues and getting quick feedback and less for distributing tasks.
P7: Periodically communicating the tasks and responsibilities	If no task management system is used, project manager should periodically communicate the status of the tasks (open, closed, cancelled …). Also, a simple shared spreadsheet – a list of tasks with statuses will work if updated regularly. Keep it simple, but don't oversimplify.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Ale Ebrahim, N., Ahmed, S., & Taha, Z. (2009). Virtual Teams: A Literature Review. *Australian Journal of Basic and Applied Sciences*, *3*(3), 2653–2669. doi:10.2139srn.1501443

Ayoko, O. B., Konrad, A. M., & Boyle, M. V. (2012). Online work: Managing conflict and emotions for performance in virtual teams. *European Management Journal*, *30*(2), 156–174. doi:10.1016/j.emj.2011.10.001

Blau, I., & Caspi, A. (2009). What Type of Collaboration Helps? Psychological Ownership, Perceived Learning and Outcome Quality of Collaboration Using Google Docs. In *Quality* (pp. 48–55). Retrieved from http://telem-pub.openu.ac.il/users/chais/2009/noon/1_1.pdf

Colomo-Palacios, R., Casado-Lumbreras, C., Soto-Acosta, P., García-Peñalvo, F., & Tovar, E. (2014). Project managers in global software development teams: a study of the effects on productivity and performance. *Software Quality Journal*, 22(1), 3–19. Doi:10.100711219-012-9191-x\n

Colomo-Palacios, R., Soto-Acosta, P., García-Peñalvo, F. J., & García-Crespo, Á. (2012). A Study of the Impact of Global Software Development in Packaged Software Release Planning. *Journal of Universal Computer Science*, *18*(19), 2646–2668. doi:10.3217/jucs-018-19-2646

Cummings, J., & Pletcher, C. (2011). Why Project Networks Beat Project Teams. *MIT Sloan Management Review*, 52(3), 75 – 83. http://doi.org/-

Draghici, A., & Draghici, G. (2013). Lessons Learned for ECQA LLP-LdV Projects' Management. *Procedia Technology*, 9, 876–885.

Ebrahim, N. A. (2015). Virtual R&D Teams: A New Model for Product Development. *International Journal of Innovation*, 3(2), 01–27. Doi:10.5585/iji.v3i2.43

EU Commission. (2014). *Draft General Budget of the European Commission for the financial year 2015*. Retrieved from http://ec.europa.eu/budget/annual/lib/documents/2015/DB/DB2015_WDI_en.pdf

EU Commission. (2014). Multiannual financial framework 2014-2020 and EU budget 2014 - Directorate-General for the Budget. Doi:10.2761/9592

EU Commission. (2015). H2020 Calls. Retrieved from https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/master_calls.html

Gilson, L. L., Maynard, M. T., Young, N. C. J., Vartiainen, M., & Hakonen, M. (2015). Virtual Teams Research: 10 Years, 10 Themes, and 10 Opportunities. *Journal of Management*, *41*(5), 1313–1337. doi:10.1177/0149206314559946

Guzmán, J. G., Ramos, J. S., Seco, A. A., & Esteban, A. S. (2010). How to get mature global virtual teams: A framework to improve team process management in distributed software teams. *Software Quality Journal*, *18*(4), 409–435. doi:10.100711219-010-9096-5

Harej, K., & Horvat, R. V. (2007). Project Management Principles and Virtual Teams for Information Systems Development: Preliminary Proposal. *Proceedings of the 2007 29th International Conference on Information Technology Interfaces* (pp. 483–487). Doi:10.1109/ITI.2007.4283819

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hertel, G., Geister, S., & Konradt, U. (2005). Managing virtual teams: A review of current empirical research. *Human Resource Management Review*, *15*(1), 69–95. doi:10.1016/j.hrmr.2005.01.002

Hoch, J. E., & Kozlowski, S. W. J. (2014). Leading virtual teams: Hierarchical leadership, structural supports, and shared team leadership. *The Journal of Applied Psychology*, *99*(3), 390–403. doi:10.1037/a0030264 PMID:23205494

Horvat, R. V., Harej, K., & Rozman, T. (2006). Skill card and certification system for certified EU project manager, 28th International Conference on Information Technology Interfaces 2006. Doi:10.1109/ITI.2006.1708518

Huls, C., Piggott, J., & Zwiers, T. (2014). Influence of cultural factors on establishing trust within Global Virtual Teams. *Scifiempire.net*. Retrieved from http://scifiempire.net/wordpress/wp-content/uploads/2011/12/Influence-of-cultural-factors-on-establishing-trust-within-Global-Virtual-Teams.pdf

Joinson, C. (2002). Managing virtual teams. *HRMagazine*, (June), 69–73. doi:10.1002/ert.20205

Katz, R., & Tushman, M. (1979). Communication patterns, project performance, and task characteristics: An empirical evaluation and integration in an R&D setting. *Organizational Behavior and Human Performance*, *23*(2), 139–162. doi:10.1016/0030-5073(79)90053-9

Kimble, C. (2011). Building effective virtual teams: How to overcome the problems of trust and identity in virtual teams. *Global Business & Organizational Excellence*, *30*(2), 6–15. doi:10.1002/joe.20364

Mansor, A. Z. (2012). Google Docs as a Collaborating Tool for Academicians. *Procedia: Social and Behavioral Sciences*, *59*, 411–419. doi:10.1016/j.sbspro.2012.09.295

Misra, S., Colomo-Palacios, R., Pusatli, T., & Soto-Acosta, P. (2013). A Discussion on the Role of People in Global Software Development. *Tehnicki Vjesnik-Technical Gazette*, *20*(3), 525–531.

Nicoletti, B. (2012). Project Management and Cloud Computing. *PM World Today*, 14(1), 1–11. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=74028642&site=ehost-live

O'Reilly, T. (2005). What Is Web 2.0 - O'Reilly Media. Retrieved from http://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html?page=1

Olariu, C., & Aldea, C. C. (2014). Managing Processes for Virtual Teams – A BPM Approach. *Procedia: Social and Behavioral Sciences*, *109*(0), 380–384. doi:10.1016/j.sbspro.2013.12.476

Salaheldin, S. I., Sharif, K., & Al Alami, M. (2010). Utilization of Project Management Software in Qatari Government Organizations. *International Journal of Human Capital and Information Technology Professionals*, *1*(1), 1–15. doi:10.4018/jhcitp.2010091101

Schwarz, B. B. (2005). Do EU funded projects enable collaboration between scientists? the case of R&D in web-based collaborative learning environments. *Computers & Education*, *45*(3), 375–382. doi:10.1016/j.compedu.2005.04.009

Shea, T. P., Sherer, P. D., Quilling, R. D., & Blewett, C. N. (2011). Managing Global Virtual Teams Across Classrooms, Students and Faculty. *Journal of Teaching in International Business*, *22*(4), 300–313. doi:10.1080/08975930.2011.653911

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Suwantarathip, O., & Wichadee, S. (2014). The Effects of Collaborative Writing Activity Using Google Docs on Students' Writing Abilities. *Turkish Online Journal of Educational Technology*, 13(2), 148–156. Retrieved from http://eric.ed.gov/?q=Google+Docs&ff1=dtySince_2010&id=EJ1022935

Tan, X., & Kim, Y. (2015). User acceptance of SaaS-based collaboration tools: A case of Google Docs. *Journal of Enterprise Information Management*, *28*(3), 423–442. doi:10.1108/JEIM-04-2014-0039

Watkins, M. (2013). Making Virtual Teams Work: Ten Basic Principles. Retrieved from https://hbr.org/2013/06/making-virtual-teams-work-ten/

Watson, R. (2006). Extending Google Docs to Collaborate on Research Papers. Toowoomba Queensland AU The University of Southern Queensland Australia. Retrieved from http://www.sci.usq.edu.au/staff/dekeyser/googledocs.pdf

Woolley, D. R. (1994). PLATO: The Emergence of Online Community. *Matrix News*. Retrieved from http://www.thinkofit.com/plato/dwplato.htm

Zhou, W., Simpson, E., & Domizi, D. P. (2012). Google Docs in an Out-of-Class Collaborative Writing Activity. *International Journal of Teaching and Learning in Higher Education*, *24*(3), 359–375. Retrieved from http://www.isetl.org/ijtlhe/

Zulch, B. (2014). ScienceDirect Communication: The foundation of project management. *Procedia Technology*, *16*(16), 1000–1009. doi:10.1016/j.protcy.2014.10.054

ENDNOTES

1 Logos of Google Drive, Dropbox and Office365 are property of their respective owners

2 http://www.1stwebdesigner.com/project-management-collaboration-tools/

3 https://www.linkedin.com/pulse/20141014102142-12084826-why-do-people-resist-to-use-shared-cloud-based-document-management-systems-such-as-google-drive-dropbox-office365?trk=mp-reader-card

This research was previously published in the International Journal of Human Capital and Information Technology Professionals (IJHCITP), 8(1); pages 1-24, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 34
Evaluating Wireless Network Accessibility Performance via Clustering-Based Model: An Analytic Methodology

Yan Wang
Xidian University, China

Zhensen Wu
Xidian University, China

ABSTRACT

Using the large amount of data collected by mobile operators to evaluate network performance and capacity is a promising approach developed in the recent last years. One of the challenge is to study network accessibility, based on statistical models and analytics. In particular, one aim is to identify when mobile network becomes congested, reducing accessibility performance for users. In this paper, a new analytic methodology to evaluate wireless network accessibility performance through traffic measurements is provided. The procedure is based on ensemble clustering of network cells and on regression models. It leads to identification of zones where the accessibility remains high. Numerical results show efficiency and relevance of the suggested methodology.

INTRODUCTION

The last few years have witnessed a quick development of wireless connections, together with a growth of smart devices consumers. Those induced a huge increase in the network flow of data. However, the network capacity is limited by infrastructure deployment. An heavy consumption leads to a deterioration of the network accessibility for users. Mobile operators have then to size correctly the network capacity. This capacity cannot be over-sized dues to infrastructure high price, but must be sufficiently large to avoid overloading.

DOI: 10.4018/978-1-7998-7297-9.ch034

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Data collected by mobile operators can be managed and understood to evaluate wireless network accessibility performance. In the traditional method, accessibility is only related to the number of subscribers. Nowadays, this method fails to render the high diversity of traffic patterns and user behaviors. Indeed, consumption of the services becomes more versatile: In addition with classic phone use, there are data-based services such as web browsing, video communication or streaming. Therefore, a critical needs is to dedicate novel methodologies to evaluate accessibility performance. This is done by understanding when the network begins to degrade and to be less accessible.

Relationships between accessibility, capacity management and network performance have been studied, mainly throug h simulations, both for 3G UMTS (Universal Mobile Telecommunications System) and LTE networks.

About network design, heuristic algorithms (Tsao & Lin, 2002; Szlovencsak, Godor, Harmatos, & Cinkler, 2002) are developed to provide network topologies which ensure a low traffic loss. Also, an analysis of capacity through uplink and downlink is performed in Navaie and Sharafat (2003), resulting in new approaches for network sizing. In Amzallag, Bar-Yehuda, Raz, and Scalosub (2013), an optimization for choosing cells maximizing their use in LTE networks leads to a better usage of network's capacity.

About accessibility, quality of experience prediction models is presented in Khan, Sun and Ifeachor (2012), based on encoded videos. They introduce an adaptation scheme when the accessibility begins to degrade. In Engels et al., (2013), autonomous adjustment of some optimization parameters through time are performed for LTE networks, depending of the network resources. In Ouyang and Fallah (2010) and Ouyang et al., (2014), traffic behavior are simulated through different scenarios to understand the throughput behavior, for both UMTS and LTE networks. In Ouyang, Yan, and Wang (2015), and Ouyang and Yan (2015), this methodology is used again through crowdsourcing-based analytics to evaluate voice or app accessibility. Finally, in Hu, Ouyang, Yao, Fallah and Lu (2014), a relational algorithm between LTE network resources and an wireless network KPI (Key Performance Indicator) is introduced to forecast network resource consumptions.

In this paper, we introduce a new wireless analytic methodology to evaluate accessibility performance. This methodology links network accessibility with traffic measurements performed by the mobile carrier. As in Hu et al., (2014), the network accessibility is depicted with a wireless network KPI, and traffic measurements by network resources. A challenge is then to detect when network starts to deteriorate and to be less accessible.

The first innovation of our procedure is to take into account the non-homogeneous behavior of cells of the network. Cells are not considered individually nor agglutinate, but clustered into groups. This allows to bring out cells which behave similarly. For example, some cells may be constrained to an higher pressure than others, or to a different consumption of the services.

The second innovation is to get an automatic procedure, where each step can be monitored. After selecting features of interest, the whole process is driven by data through machine learning algorithms. It is intended to provide robust and adaptive predictions. For this purpose, an ensemble clustering method is used and an appropriate regression algorithm to predict the KPI is selected.

Then, from selected clusters and obtained prediction functions, we infer when the network begins to degrade. A comfortable zone is deduced as a function of the network resources. This zone indicates when the accessibility performance remains sufficiently high.

This methodology is therefore tested, using data provided by China Mobile.

The paper is organized as follows. The section titled: Methodology to Evaluate Accessibility defines KPI and network resources retrieved and necessary to conduct our methodology. Then, the whole procedure

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is introduced in the section titled: Detailed Methodology Description. Specifically, we deduce from data a comfortable zone when accessibility remains high. In Section IV, major steps of the methodology are detailed. The results section focuses on numerical results, validation of each step of the procedure and discussion of those results, from the China Mobile data set. Finally, the last section draws conclusion.

DATA

Data are collected for different network cells on a fixed area. For each cell, recordings of various traffic measurement features are obtained. First, network features data are retrieved. They describe for each cell different variables of the network, such as the congestion ratio or mean time to establish connection. Those features are directly accessible by the network and will be used as predictor variables. Then, a sample data of a KPI related to wireless network accessibility performance is available. This KPI has to be deduced and is our target objective to evaluate accessibility. Therefore, we want to derive predictive functions of this KPI from network resources. For example, this KPI can be the RAB (Radio Access Bearer) Setup Success Ratio of all PS (Packet Switch) services. A third element is necessary to conduct the procedure: The knowledge of number of times the cell causes PS domain failed to establish the number of RAB (called later FailEstab).

Numerical results detailed in Section IV are based on data collected by China Mobile Communications Corporation. Those data have been obtained for analysis by co-operation with this company. They are retrieved on cells located at Xuanwu, a district of Nanjing (China), from July to November 2014. This area is divided in 1668 separated cells. For each cell, every 30 minutes, there is a record of network resources features, the KPI of interest and FailEstab. As a result, the number of recordings for each cell is usually about 5610, but many cells contain missing values. Here, the number of network resources features is 40. As an example, we show on Table 1 a sketch of retrieved data for a particular cell.

Table 1. Data retrieved to conduct our methodology

date	FailEstab	KPI	Net. R. 1[a]	…	Net. R. 40[a]
7/29 0:00	0	99.9	1022		3.5
7/29 0:30	2	96.1	1025		3.4
…	…	…	…		…
11/26 10:00	0	99.8	1019		3.8

[a]Network resource

METHODOLOGY TO EVALUATE ACCESSIBILITY

A general description of model and methodology is done in this section. Given each network resource feature, the aim is to identify a zone where the considered KPI remains sufficiently high. Paragraph A describes an initial model which links network resource feature and KPI. This model is set as a reference, but one may keep in mind that data can differ from this initial model and fits have to adjust accordingly. Paragraph B deals with separation of the data set to obtain homogenous components. Two elements

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

modifying shape of the relationship are identified. First, change of the discrete FailEstab value leads to distinct curves. Then, different cells can be related to different behaviors and separation of cells have to be considered. Paragraph C formulates the global methodology to deal with data and evaluate accessibility.

1. Model of the Relationship

Behavior of the KPI as a function of the network features follows a specific curve. Basically, we assume that the value of the KPI follows a power law when a network resource x increase. This relationship is shown on (1), for scale parameter a, power parameter b, and constant parameter c. A graphical example of this shape is shown on Figure 2 (b).

$$KPI(x) = a / x^b + c \quad (1)$$

An interest of (1) is to deduce a linear link taking the logarithm. For example, a linear relation between log(x) and log(c – KPI(x)) can be exhibited (ensuring that those quantities exist). As mentioned before, the true relationship can differ from (1), therefore some non-linear regressions are used in our methodology to predict the KPI, instead of using linear regressions only.

2. Separation of the Data Set

Collected raw data are related to a combination of different behaviors. Then, it is initially difficult to distinguish curves described in (1). To get a functional relationship, separation of the data set into homogenous components is needed.

The first element to take into consideration is the FailEstab network feature. It takes discrete non-negative values, each of them being related to a specific shape. In the following, data restricted to each value is used to perform computations. On Figure 1 (a), the whole data set is plotted to show a KPI as a function of a network resource. The output looks like a mixture of different power law curves. On Figure 1 (b), this set is restricted to FailEstab = 2, exhibiting a curve closer to equation (1).

The second element is cell id. Each cell has its own behavior and can be related to a particular curve shape. Consequently, to agglutinate all cells together will make difficult the prediction of the KPI. However, to perform computations for each cell is also problematic, since cell may have been accessible for the whole measurement duration. An example of those behaviors is depicted on Figure 2, for data restricted to FailEstab = 2. On Figure 2 (a), all cells are plotted together. On Figure 2 (c), only one specific cell is plotted, but this cell only takes high accessibility values. Therefore, we need to collect a sufficient amount of data for each behavior. Introduced solution will be to cluster cells together into homogeneous groups, as shown on Figure 2 (b).

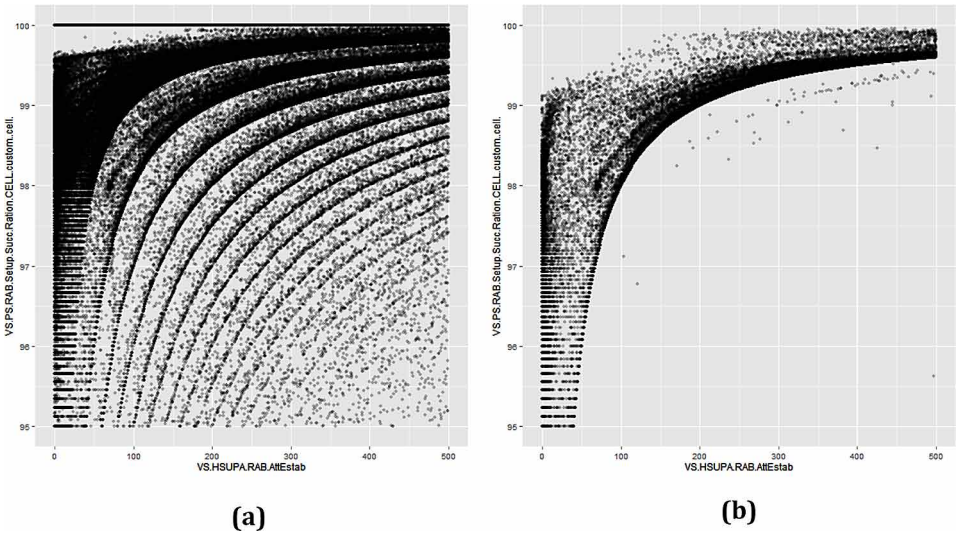
3. Whole Process Methodology

This paragraph intends to describe the global methodology. Further description of each step is available in the Section IV.

The first step is data retrieving and preparation. In this step, data is collected for each cell. Data set is separated into a training (60%), a cross-validation (20%) and a test set (20%). Then, each set is separated

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. A KPI as a function of a network resource. On (a), the whole data set is plotted. On (b), the set is restricted to FailEstab = 2.



according to each value of FailEstab. Also, selection of features allowing to predict the KPI value is done in this step (manually, or by exhaustive search with linear regression (Miller, 2002)).

The second step is to group cells together into homogeneous groups. A clustering process is used for this purpose. The number of groups is not defined in advance. Consequently, at this step, the clustering process is performed for a number of clusters K varying from 1 to 20. Note that for each value of K, the defined groups of cells are identical for all values of FailEstab.

The third step has three parts. First, for each value of K, for each value of FailEstab, for each cluster from 1 to K, a regression process is applied to fit data (on the training set). Then, a summarizing value is defined for each K, taking into account prediction accuracies and difference of behavior of clusters (on the cross-validation set). Those summarizing values allow to select a best number of cluster K. Afterwards, prediction functions are retrieved for this K, for each value of FailEstab and each cluster from 1 to K.

The fourth step is to deduce a comfortable zone from those prediction functions for each cell and each value of FailEstab. The comfortable zone is defined such that the accessibility remains high.

DETAILED METHODOLOGY DESCRIPTION

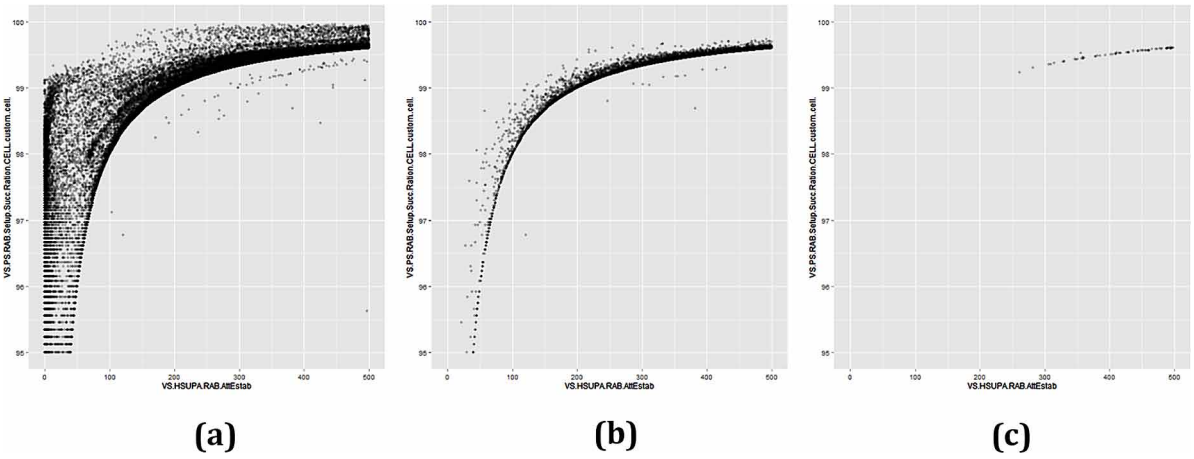
In section III, the whole methodology has been introduced. In the current section, major steps of the methodology are described. First, clustering process is carried out with an ensemble clustering algorithm. Then, regression process combines different regression computations to fit data. Finally, deduction of a comfortable zone is explained.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1. Clustering Process of Cells

Through a clustering process, similar cells are let into groups. For now, computations are performed for a number of clusters K varying from 1 to 20. Three steps are necessary: First, for each cell, extraction of summarizing values are deduced from the data set; Then, each cell being summarized, cells are set together using different statistical clustering algorithms; Finally, clustering results are put together into a final clustering, involving an ensemble clustering algorithm.

Figure 2. A KPI as a function of a network resources for data restricted to FailEstab = 2, plotted for the indicated cells. (a) all cells; (b) clustered cells; (c) one cell



In the first step, values are extracted from training data set to summarize each cell. We expect a relation as shown on (1) when plotting the KPI values as a function of each selected feature. Therefore, taking the logarithm, a slightly linear relationship exists. Performing a linear regression, we extract intercept and slope for each selected feature, for the first values of FailEstab (limiting to 99% of the data points). Those intercept and slope values summarizes the cell, but may contain redundant information. Then, a principal component analysis is done to retrieve 99% of the information from those extracted values. Resulting values contain relevant information of the cell behavior.

In the second step, multiple clustering algorithms are performed. The choice to compute more than one clustering arises from the fact that each particular clustering algorithms have some limitations and are usually specialized to a single task. Consequently, to overcome those limitations, 6 clustering algorithms are carried out. They are chosen to cover a broad spectrum of clustering methods. Those are: k-means (MacQueen, 1967), k-medoids (Kaufman & Rousseeuw, 1987), fuzzy C-means (Bexdek, 2013), CLARA clustering (Kaufman & Rousseeuw, 2009), Gaussian mixture model (GMM) (McLachlan & Basford, 1988) and agglomerative hierarchical clustering.

In the third step, an ensemble clustering is deduced from those six clustering methods. This ensemble clustering tries to find a single consensus from different clusterings. The algorithm used is the co-association matrix based method defined in (Fred, 2001), detailed as follows. First, for each clustering method, computation of the co-association matrix is performed. This matrix is a square matrix and the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

number of rows is the number of cells. It is defined such that (i, j) is let with 1 if i and j belong to the same cluster, and 0 otherwise. Then, from those matrices, a consensus matrix is deduced. This consensus matrix is defined as the mean of all seven matrices. The final consensus partition is generated by taking a threshold of 0.5 on the consensus matrix. In other words, i and j belong to the same final consensus cluster if the value (i, j) on the consensus matrix is greater than 0.5. It should be mentioned that this ensemble clustering algorithm can result in a greater number of cluster than K, especially when the clustering methods give quite different results.

2. Regression Process

The aim of this step is to fit KPI values from selected network features. At this point, computations are done for each choice K of clusters' number, each value v of FailEstab and each cluster i. Values of cells belonging to the same cluster are aggregated. Then, different regression algorithms of the KPI feature as a function of network resource features are executed. Those algorithms are computed after taking the logarithm, on the training set. They are defined to handle linear and non-linear relationships between KPI and network resource features. Five of them are used: the linear regression, a generalized additive model (GAM, following Wood (2000) and Hastie and Tibshirani (1990)), a gradient boost method (GBM, following Burges (2010), a single-hidden-layer neural network (see Ripley (1996) for reference) and the multivariate adaptive regression splines method (MARS, see Friedman (1991)).

After obtaining predictions, the best regression algorithm is deduced for each cluster. For this purpose, the error rate (ER) shown on (2) is computed. On (2), (y_l) stands for KPI data and $\left(\hat{y}_l\right)$ for fitted values, obtained on the cross-validation set.

$$ER\left(\left(y_l\right),\left(\hat{y}_l\right)\right) := \sum\nolimits_l \left|y_l - \hat{y}_l\right| \tag{2}$$

Two quantities are used to deduce the best number of clusters K. The first one is ER(i, v, K), computed for the regression giving the lowest ER in (2). It measures error of fit. The other quantity is called cluster separation. It measures how distant are clusters each other, by checking if considering different clusters give better results instead of taking only one cluster. In other words, it sees if each cluster describes a specific consumer behavior. This quantity is defined in (3). To compute it, for all clusters $i,j \in \{1,\ldots,K\}$, $\left(y_l^i\right)$ are KPI values for the cross-validation set for cluster i, and $\left(\hat{y}_l^{i,j}\right)$ are fitted values of $\left(y_l^i\right)$ using the best prediction function obtained for cluster j.

$$Sep\left(i,v,K\right) := Sep\left(\left(y_l^i\right)\right) := \left(K-1\right)\frac{\sum_l \left|y_l^i - \hat{y}_l^{i,i}\right|}{\sum_{j\neq i}\sum_l \left|y_l^i - \hat{y}_l^{i,j}\right|} \tag{3}$$

To understand (3), one can look at the case where the prediction is not dependent of the cluster. Then, terms in each sum of both numerator and denominator are equal, and lead to a final value of 1. If however all predictions are well fitted and lead to different predictions, we can expect to have Sep(i, v, K) smaller than 1 for all clusters i.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To combine the different clusters and FailEstab values, those two quantities are weighted. Clusters are weighted with w(i | v, K), the proportion of values in cluster i among all clusters when FailEstab is v. FailEstab values are weighted with w(v) the proportion of values with FailEstab = v. Two summarizing values are deduced for each number of cluster K: one related to ER and the other to cluster separation. They are computed similarly, as shown on (4).

$$F\left(K\right) = \sum_{v}\sum_{i} F\left(i, v, K\right) w(i \mid v, K) w\left(v\right), F \in \left\{ER, Sep\right\} \tag{4}$$

Finally, the selection of the best cluster K is deduced with a combination of ER values and Sep values. This summarizing value is computed following (5). Number of clusters K with the lowest Summ value is selected.

$$Summ\left(K\right) = \log\left(ER\left(K\right)\right) + \log\left(Sep\left(K\right)\right) \tag{5}$$

This paragraph explains the choice to consider Summ value. If a small number of clusters K is selected, a large amount of data is available for each cluster but the clusters are not specific and can lead to an high bias in predictions. Therefore, ER and Sep values are first expected to decrease when increasing the number of cluster K (while the data training set is sufficiently large). But if a larger number of clusters K is selected, each cluster is specific to a behavior but few data are available and predictions suffer a high variance. Then, ER will begin to increase and in addition, the separation values will also increase when there is no more separation between clusters. On the whole, to choose K with the lowest Summ value is a compromise between those two extremes.

The last step is to retrieve the best regression predictions for this K, for each value of FailEstab and each cluster.

3. Deduction of a Comfortable Zone

For each value of FailEstab and each cluster, a comfortable zone is deduced. From prediction functions obtained with the selected number of clusters K, this zone is where KPI is greater than a fixed value, for example 99%. In this zone, accessibility will remain high. Therefore, for a new record, we will be able to predict if this record takes place in the low performance or the high performance zone.

RESULTS

The global methodology is applied on collected data introduced in Section II. In the following, the studied KPI is the RAB Setup Success Ratio of all PS services (written VS.PS.RAB.Setup.Succ.Ration.CELL. custom.cell in plots). From resources features, four of them have been selected: number of HSUPA (High-Speed Uplink Packet Access) RAB Establishment Attempts in a cell (written VS.HSUPA.RAB. AttEstab), average Number of HSUPA UEs (user equipment) in a cell, average of upload link connection credit used and average of download link connection credit used.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In the following, ensemble clustering is first applied. Then, selection of the number of clusters K is obtained from ER and separation computations. Finally, comfortable zones are deduced from prediction functions.

1. Clustering Accuracy

Following our methodology, an ensemble clustering is obtained for each K from 1 to 20. An example of clustering visualization is shown on Figure 3 for K = 7, clusters 3 and 5 and for the selected feature VS.HSUPA.RAB.AttEstab. On this figure, data are restricted to FailEstab = 2 and plots are shown after taking logarithm. A good separation between clusters is observed, with a specific behavior in each cluster. On Figure 3 (a), the points are constrained into a linear zone, and the residual variance is almost homogeneous while network resource varies. On Figure 3 (b), the KPI is not a linear function of the network resource. Furthermore, points are noisy, especially for low values of the network resource. This latter behavior is due to inner variance in some cells rather than clustering performance, and is difficult to reduce here.

2. Number of Clusters Selection

Afterwards, the different regressions are computed. Error rate (ER) and clustering separation (Sep) are retrieved for each K, leading to the summarizing value (Summ). On Figure 4, the evolution of those three values is plotted as a function of the number of clusters K. On Figure 4 (a), the ER has a general decreasing trend while the number of clusters increases. The trend is also fluctuating. The lowest ER value corresponds to the highest number of clusters. On Figure 4 (b), the Sep value first follows a decreasing trend and then stabilizes with a slight increase (as expected in Section IV-B). The trend is similar on Figure 4 (c), showing more pronounced fluctuations. Taking the minimal Summ value from this figure, choice of K = 7 is done.

3. Comfortable Zone Identification

Finally, after choosing K = 7, regression predictions are used to fit data and deduce a comfortable zone for each cluster and each value of FailEstab. On Figure 5, obtained zone is plotted for two clusters, FailEstab = 2 and feature VS.HSUPA.RAB.AttEstab. On Figure 5 (a), the KPI steadily increases while the number of establishment attempts grows, to finally reach 99% value. Points related to each cell of the cluster have a limited variance, and the fitted line follows the scatter plot. On Figure 5 (b), accessibility reaches 99% more quickly on the fitted line. Then, a lower value of the network feature is necessary to reach accessibility. Contrary to the previous figure, some cells of this cluster have higher residuals around the fitted line.

DISCUSSION

The main implication of the work is to help mobile operators to elaborate a strategy of development of their network. They can have objective to achieve about accessibility, for example to reach 99% for some KPIs. Therefore, they have to determine where they should invest precisely and to elaborate net-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

work planning. Results deduced with the presented methodology can point out which network features mobile operators should increase to improve network accessibility. Also, the amount of resource can be quantified and is specific to each cluster. For comparison, on Figure 2 (a) and Figure 2 (c), to get a 99% accessibility value is difficult, whereas on Figure 5, a specific and accurate value is obtained. Consequently, mobile operators can optimize resources to allocate for each type of cell. In this way, efficient and customized networks may be built.

Figure 3. From data set, ensemble clustering obtained with K = 7, FailEstab = 2, for two clusters i, after taking logarithm. The plot represents aggregated cells with KPI as a function of a network resource. (a) i = 3; (b) i = 5

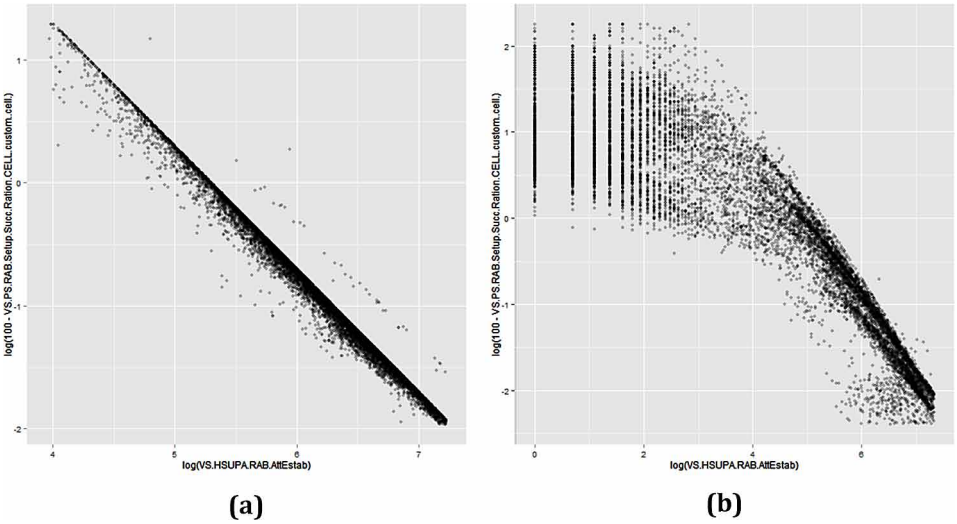
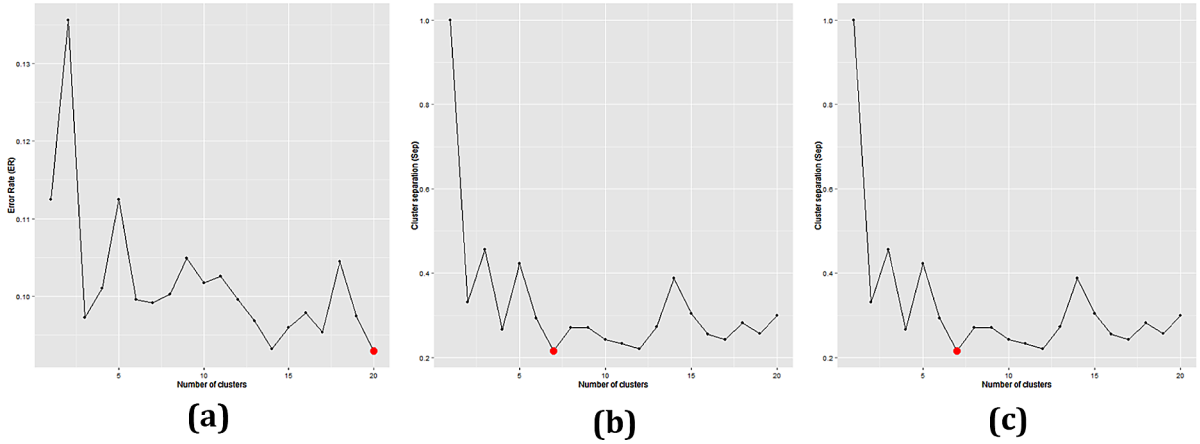
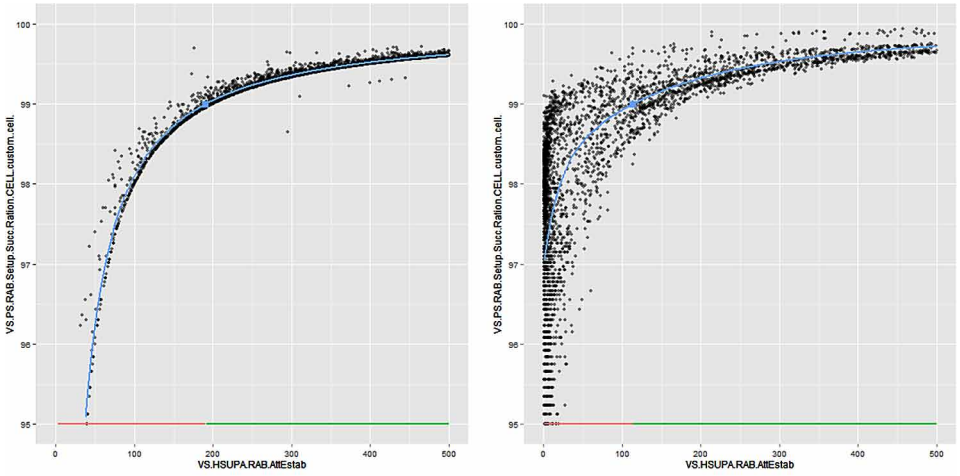


Figure 4. From data set, evolution of a value as a function of number of clusters K. The red point indicates the minimal value. From (c), the selected K is 7. (a) ER value; (b) Sep value; (c) Summ value



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. From data set, KPI as a function of a network resource for K = 7, FailEstab = 2 and two clusters i. The blue line corresponds to the best regression fit for the cluster. The square is the 99% limit for accessibility evaluation. On the bottom, a lack of accessibility is shown in red and the comfortable zone in green, as a function of the current selected feature. (a) i = 3; (b) i = 5



(a) **(b)**

CONCLUSION

A new wireless analytic methodology to evaluate wireless network accessibility performance is performed in this paper. The purpose is to detect when the network starts to become less accessible. The methodology is based on relationship between accessibility and network resource measurements. The non-homogeneous behavior of cells of the network is taken into consideration by clustering them into related sets. Also, the procedure is automatic and focus on robust computations. Finally, comfortable zones are identified and indicate when accessibility begins to degrade. A numerical study is performed to support our methodology, using data coming from China Mobile Communications Corporation.

The clustering processing scheme is a promising approach to improve accessibility predictions of wireless networks, paired with the combination of different regressions. Thereafter, new insights could be carried out to understand "in cell" variance, which remains important for some cells.

REFERENCES

Amzallag, D., Bar-Yehuda, R., Raz, D., & Scalosub, G. (2013). Cell selection in 4G cellular networks. *IEEE Transactions on Mobile Computing*, *12*(7), 1443–1455. doi:10.1109/TMC.2012.83

Bezdek, J. C. (2013). *Pattern recognition with fuzzy objective function algorithms*. Berlin, Germany: Springer Science & Business Media.

Burges, C. J. C. (2010). From ranknet to lambdarank to lambdamart: An overview. *Learning*, *11*, 23–581.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Engels, A., Reyer, M., Xu, X., Mathar, R., Zhang, J., & Zhuang, H. (2013). Autonomous self-optimization of coverage and capacity in LTE cellular networks. *IEEE Transactions on Vehicular Technology*, *62*(5), 1989–2004. doi:10.1109/TVT.2013.2256441

Fred, A. (2001). Finding consistent clusters in data partitions. In *MCS'01 Proceedings of the Second International Workshop on Multiple classifier systems* (pp. 309-318). London, UK: Springer. 10.1007/3-540-48219-9_31

Friedman, J. H. (1991). Multivariate adaptive regression splines. *Annals of Statistics*, *19*(1), 1–67. doi:10.1214/aos/1176347963

Hastie, T. J., & Tibshirani, R. J. (1990). *Generalized additive models* (Vol. 43). CRC Press.

Hu, S., Ouyang, Y., Yao, Y., Fallah, M. H., & Lu, W. (2014). A study of LTE network performance based on data analytics and statistical modeling. In *2014 23rd Wireless and Optical Communication Conference (WOCC)* (pp. 1-6). IEEE.

Kaufman, L., & Rousseeuw, P. (1987). *Clustering by means of medoids*. Delft, The Netherlands: North-Holland.

Kaufman, L., & Rousseeuw, P. J. (2009). *Finding groups in data: an introduction to cluster analysis* (Vol. 344). New York: John Wiley & Sons.

Khan, A., Sun, L., & Ifeachor, E. (2012). QoE prediction model and its application in video quality adaptation over UMTS networks. *IEEE Transactions on Multimedia*, *14*(2), 431–442. doi:10.1109/TMM.2011.2176324

MacQueen, J. (1967). Some methods for classification and analysis of multivariate observations. In *Proceedings of the fifth Berkeley symposium on mathematical statistics and probability* (Vol. 1, pp. 281-297). Oakland, CA: University of California Press.

McLachlan, G. J., & Basford, K. E. (1988). *Mixture models: Inference and applications to clustering*. New York, US: Dekker.

Miller, A. (2002). *Subset selection in regression*. CRC Press. doi:10.1201/9781420035933

Navaie, K., & Sharafat, A. R. (2003). A framework for UMTS air interface analysis. *Canadian Journal of Electrical and Computer Engineering*, *28*(3/4), 113–129. doi:10.1109/CJECE.2003.1425098

Ouyang, Y., & Fallah, M. H. (2010). A performance analysis for UMTS packet switched network based on multivariate KPIs. In *Wireless Telecommunications Symposium (WTS)*, 2010 (pp. 1-10). IEEE. 10.1109/WTS.2010.5479629

Ouyang, Y., Fallah, M. H., Hu, S., Yong, Y. R., Hu, Y., Lai, Z., ... Lu, W. D. (2014). A novel methodology of data analytics and modeling to evaluate LTE network performance. In *Wireless Telecommunications Symposium (WTS)*, 2014 (pp. 1-10). IEEE.

Ouyang, Y., & Yan, T. (2015). Profiling wireless resource usage for mobile apps via crowdsourcing-based network analytics. *IEEE Internet of Things Journal*, *2*(5), 391–398. doi:10.1109/JIOT.2015.2415522

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ouyang, Y., Yan, T., & Wang, G. (2015). CrowdMi: Scalable and diagnosable mobile voice quality assessment through wireless analytics. *IEEE Internet of Things Journal*, *2*(4), 287–294. doi:10.1109/JIOT.2014.2387771

Ripley, B. D. (1996). *Pattern recognition and neural networks*. Cambridge, UK: Cambridge University Press. doi:10.1017/CBO9780511812651

Szlovencsak, A., Godor, I., Harmatos, J., & Cinkler, T. (2002). Planning reliable UMTS terrestrial access networks. *Communications Magazine, IEEE*, *40*(1), 66–72. doi:10.1109/35.978051

Tsao, S., & Lin, C. (2002). Design and evaluation of UMTS-WLAN interworking strategies. In *Vehicular Technology Conference, 2002. Proceedings. VTC 2002-Fall. 2002 IEEE 56th* (Vol. 2, pp. 777-781). IEEE. 10.1109/VETECF.2002.1040705

Wood, S. N. (2000). Modelling and smoothing parameter estimation with multiple quadratic penalties. *Journal of the Royal Statistical Society. Series B, Statistical Methodology*, *62*(2), 413–428. doi:10.1111/1467-9868.00240

This research was previously published in Big Data Applications in the Telecommunications Industry; pages 15-30, copyright year 2017 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 35
Digitization and Sustainability: Threats, Opportunities, and Trade-Offs

Marlen Gabriele Arnold
https://orcid.org/0000-0002-6536-0301
Chemnitz University of Technology, Germany

Anne Fischer
Chemnitz University of Technology, Germany

ABSTRACT

Digitization and sustainability are two mega-trends. There are a lot of opportunities and threats discussed. However, a compiled and industry-wide analysis of SWOTs is missing. After a review of the literature on digitization and sustainability and compiling a SWOT table, a concept map is developed for visualizing key topics in light of digitization and sustainability. In addition, for illustrating unconscious knowledge, two exemplifying systemic structural constellations are presented in this context as well. The results show immense tensions between sustainability and digitization, but also offer progressive patterns. In light of a development towards sustainability, digitization is both boon and bane and often needs a clear analysis of all relevant issues and a careful handling in order to be progressive. Digital transformation requires a precise and honest value basis and sustainability added value. Therefore, societal progress and strict law regulation will be needed.

INTRODUCTION

According to Krys (2017), in particular seven megatrends will play a major role over the next 15 years: (1) demographic change, (2) globalisation and the markets of the future, (3) scarcity of resources, (4) climate change, (5) technology dynamics and innovation, (6) global science, and (7) sustainability and global responsibility. These profound changes can be grasped by specific aspects. Demographic change is particularly marked by a further increase in the world's population (United Nations, Department of Economic and Social Affairs, Population Division, 2017), a rising average age (Contis, Bennett, Mathers, Li, Foreman, & Ezzati, 2017) as well as migratory movements and migration to cities. Trend 2 captures

DOI: 10.4018/978-1-7998-7297-9.ch035

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the shift in global economic equilibria towards specific countries that have tended to play a subordinate role until now. The increasing scarcity of resources and the associated rise in prices and possible supply bottlenecks will continue to impact the company's activities in the future. Climate change and the associated threat to ecosystems (due to droughts, extreme storms, floods, etc.) will also continue to progress in the next 20 years. Trend 5 is especially characterised by a globally faster spread of technologies, which means that innovative companies in particular can benefit. Less developed countries will follow suit, especially in terms of innovation capacity. Digitisation and life sciences are crucial key technologies. In connection with the Global Knowledge Society, three changes need to be emphasized in particular: Increased dissemination of knowledge, slight improvement in gender equality and increased competition for qualified employees. On the one hand, trend 7 indicates an increased significance of sustainability due to limited resources, and on the other hand, the relevance of cooperation by governments at a global level. A growing influence on increasing sustainability is attributed to both the individual and the impact of NGOs (Krys, 2017).

Digitisation, digitalisation or digital transformation as well as sustainability belong to the main global megatrends today. However, there are lots of positive developments, but also negative consequences in terms of sustainability. In order to create holistic sustainable concepts, attention to fundamental developments is essential. In addition to a wide range of positive developments, potential risks and challenges have already been, but still must be identified, analysed and implemented in order to prevent exponential technology adaptations from leading to a complete lack of transparency of the overall system. So, how is a responsible and sustainable management possible taking all relevant values and opportunities and threats into account? The main questions of positive and negative impacts of digitisation concerning sustainability impacts will be discussed based on given conceptual and theoretical reflections as well as gained by results used systemic structural constellations. Systemic structural constellations are able to spatially map patterns, connections, structures and relationships within a system and can thus be used in a variety of ways, like depicting complex challenges spatially and visually in order to point out new possibilities as well as revealing and closing the gaps between knowledge and lack of action or to open up paths to more sustainable action (Arnold, 2018, 2016). Systemic structural constellations address the unconsciousness and are based on unconscious thinking and processes; they provide an excellent supplement to conventional research designs. After a review of the literature on digitisation and sustainability and compiling a SWOT table, a concept map is developed for visualising key topics in light of digitisation and sustainability. In addition, two exemplifying systemic structural constellations are presented for illustrating unconscious knowledge in this context, too.

BACKGROUND

The digital ecosystem describes an open information landscape (Dini, 2007) with particular emphasis on the adaptability, dynamics and self-organizing mechanisms of inter-organizational information systems and encompasses a holistic perspective on the inter-organizational system of action (Müller-Mielitz & Lux, 2016). Actors and innovations can develop competitively, independently and co-evolutionarily. If it is possible to generate and maintain a critical mass of users, success can be achieved in terms of economic and social sustainability (Müller-Mielitz & Lux, 2016). Platforms, exposed to network effects can lead to dysfunctional social distribution and participation processes, will become central (BKA, 2015). Furthermore, network effects, information asymmetries, opportune behaviour and negative assessments

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

can have an impact on citizens' decisions and voting behaviour as well as on effectiveness and sustainability. Moreover, increasing digitisation may reduce the range of information and equal opportunities between technology-affine and technology-averse citizens. Technology-affine refers to the assumption that these users have a high degree of technological affinity and, for example, are more familiar with installation processes, because they have a strong connection to technology (Geisler, Zelazny, Christmann, & Hagenhoff, 2011). In contrast, technology-averse users show a high degree of technological repugnance and have a less experienced handling with technologies.

Prisecaru (2016) provides an overview of the main characteristics (energy resource, main technical achievement, main developed industries, transport means) of the fourth industrial revolution: Green Energies; Internet, Genetic Engineering, 3D Printer; High Tech Industries and Electric Car, Fast Train. All these points have a major impact on both industrial production and social relations as well as on people's relationship to production and its results. It is questionable, for example, whether strong productivity growth and technological progress lead to an improvement in wealth or increase social inequalities and unemployment (Prisecaru, 2016), thus strengthening the integration of socially sustainable criteria. There is also considerable potential in the area of environmental sustainability. For example, technological progress enables a reduction in industrial waste and more efficient processes for the use of resources (Prisecaru, 2016), but can lead to increased resource consumption as a result (rebound).

In addition, the ongoing digitisation process is raising expectations for achieving the Sustainable Development Goals. For example, changes are emerging in a wide variety of sectors that can make a contribution to sustainability (Osburg & Lohrmann, 2017): In the healthcare sector for instance, people are benefiting from new technologies that make medical solutions more affordable, accessible and of higher quality. In the automotive sector, networked applications can save several hundred thousand lives and reduce traffic accidents considerably. In this context, digitisation supports a healthy life in accordance with SDG 3 (GeSI Report, 2015). The demand for a fair, integrative and qualitative high-quality education can be achieved by solutions in the sense of an open education such as MOOCs. (SDG 4). Likewise, specific adaptations can help to reduce greenhouse gas emissions and promote a market transformation towards renewable energies, thus complying with the SDG 13. Significant opportunities and challenges can be identified in the markets and their players. SDG 9 aims to build a resilient infrastructure, promote innovation and sustainable, inclusive industrialisation. The market perspective is also included in SDG 12 and aims at sustainable production and consumption patterns. However, this is only an excerpt of aspects that need to be included in the context of digitisation with a focus on sustainable design (Osburg & Lohrmann, 2017).

Such effects and possible rebound effects have not been sufficiently researched in the context of sustainability. Rebound effects can occur at both the micro and macro level. According to Greening, Greene, & Difiglio (2000), a four-part typology can be used to identify these effects. The direct rebound effect (1) can be assigned to the micro level and is characterized in particular by increased demand due to price reductions. These in turn are the result of technological improvements in the area of fuel consumption, which can reduce the necessary use of raw materials. Secondary effects (2) can also be observed (Greening et al., 2000), which are characterised by an increase in demand for alternative services and goods. An aggregation of behaviour at the micro level, which may still be moderate, could be significant at the macro level due to economy-wide effects (3), especially for fuel supply markets (Greening et al., 2000.). Finally, transformational effects (4), such as changes in social institutions or consumer preferences due to technological change may also occur (Greening et al., 2000). In order to grasp the variety of digitisation and digital transformation a comprehensive literature review follows resulting in a SWOT analysis.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

LITERATURE REVIEW

Leonard & Graf von Kospoth (2017) emphasize this rapid development with linear humanity and point out that society needs ways to ensure the preservation of what makes us human. Hyper-innovations should therefore be made humanely sustainable. A complete lack of transparency must be exerted by pressure from governments, organisations and officials on the companies behind this trend. Furthermore, it is relevant to anchor the addictive potential (e. g. specific platform designs) of technological innovations in a collective understanding and to develop rules in order to establish a human balance. Drivers that endanger addiction must be identified and transparency ensured. While there are fears that the technological innovations could be turned against the whole world, there are also weakened opinions. According to Kissinger, the instructions by humans could be misinterpreted due to a lack of context (Sturgeon, 2018). It can have catastrophic consequences if the artificial intelligence does not meet human expectations. The first applications in which people were not able to keep up with the computer also became apparent and it is questionable whether the human brain is able to adapt identical abilities (Sturgeon, 2018).

Digital human rights and ethics must be anchored in the form of central rules for conducting business within the digital market (Leonard & Graf von Kospoth 2017). The German Ethics Council also concludes in a recent statement focusing on specific health-related areas of application that the traditional data protection law is no longer sufficient to meet the challenges of Big Data in the sectors examined by means of existing protection mechanisms and forms of action. It calls for a design and regulatory concept with the aim of protecting and respecting values such as sovereignty, justice, privacy, freedom, responsibility and solidity. The concept should be oriented towards data sovereignty in the sense of an extension of informational self-determination according to an interactive personality development while preserving privacy in a networked world (Deutscher Ethikrat, 2017, p. 27). The social sustainability aspect should be emphasised.

Osburg & Lohrmann (2017) provide an overview of different perspectives on aspects of sustainability within the digital world. The focus here is on leadership, mobility, working life and corporate responsibility, mainly addressing change and new models of digitisation. While the high relevance of digitisation is being discussed in all areas of life, the extent to which this is happening is slowly coming to light. Every change and new innovation can have far-reaching consequences for other areas and thus disrupt beneficial balances between society, the environment and the economy (Osburg & Lohrmann, 2017). In a workshop on the subject of "sustainable digitisation", the Ministry of the Environment was able to uncover both significant opportunities and risks as well as potential opportunities that digitisation could achieve. The focus was on resource efficiency through digitisation, intelligent energy systems, sustainable digitisation in society and digital education for sustainable development (MUKEBW, 2018). Both a promotion and a counteraction of resource efficiency can be caused by the digital change in the area of production (MUKEBW, 2018). While digitisation and digitalisation will be able to achieve considerable efficiency gains on one hand, it can also lead to immense negative effects on the other one. Santaris (2017) points out that digitisation and digital transformation seem to shift the demand for energy and resources on a global scale. Increased consumption would lead to a destruction of efficiency gains due to rebound effects (Erdmann & Hilty, 2010). Sustainability-focused concepts must always be integrated into the development of innovations by beginning - well aware that rebound effects will always be effective in the use phase.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Due to the implementation of the shared economy concept, the shift from product to service orientation can be observed in many sectors, which leads to the questioning of existing business models. Building on service-dominant logic and interorganisational governance models, Aksin-Sivrikaya & Bhattacharya (2017) establish a conceptual framework for a digital ecosystem integrating multi-stakeholder and value-co-creation. They also identify potential emerging sustainable governance models within a proposed ecosystem. Future challenges are transferred into three categories: (1) the design of business models in a digital environment, (2) interruptions of existing businesses, and (3) environmental and social problems due to digitisation. If we learn how to deal with these challenges correctly, sustainable governance models can lead to a reduction of costs and frictions associated with management, manufacturing, processing, energy use, logistics, production and information collection (Aksin-Sivrikaya & Bhattacharya, 2017). Strictly centred views will be eliminated and integrated business ecosystems and value creation activities within multi-stakeholder networks will increase. Fixed boundaries will therefore fade (Aksin-Sivrikaya & Bhattacharya, 2017). The following table summarises current literature-based SWOTs.

In total, on the one hand, digitisation implies the risk of the non-transparency of the overall system, on the other hand it can serve to make specific areas more transparent - for example, by creating trust and transparency through digital dialogue and symbolizing complexity. In the financial sector, the use of digital media can thus lead to an intensified customer relationship and the integration of topics such as environmental awareness, social responsibility and economic activity; in the social media sector can thus contribute to increased sustainability in the sense of increasing efficiency and holistic consulting (Behringer, 2017). Zinnöcker (2017) also uses digital measures to create transparency. Accordingly, digital measurements support and activate the visualisation and billing of individual energy consumption as well as the actors and their energy savings.

METHODS

Beside analysing relevant literature in the topic sustainability and digitisation (both, English and German papers and literature) addressing challenges, opportunities and risks, and compiling a SWOT analysis, a concept map generated by content analysis of English papers was generated in order to analyse current linkages between sustainability and digitisation and digitalisation. Final, results of systemic structural constellations were integrated to combine conscious-based and unconscious-based knowledge.

A total number of 112 texts (scientific articles and summaries; e.g. Bondarouka & Brewster (2016); of acknowledged scientific journals; e.g. The International Journal of Human Resource Management, Human Geographies – Journal of Studies and Research in Human Geography, Journal of Security and Sustainability Issues, Journal of Urban Regeneration and Renewal) relating to the period 2015-2018 and accessible in the Ebsco and Scopus databases were included in the analysis. Within the Ebsco and Scopus databases, the keywords “digitisations” and “sustainability” were used as filters.

Content analysis can help to explore specific concepts from text-based information and uncover their structures and interdependencies. From a given amount of data, it filters out the most frequently occurring topics (Zawacki-Richter & Latchem, 2018). The computer-aided content analysis which is used under the purpose of this study may serve to map a specific area of research (Zawacki-Richter & Latchem, 2018). Smith & Humphreys (2006) highlight the advantages of such automated processes. Human analysis requires considerable financial and time resources to avoid the subjectivity associated with the method. For example, coders must be trained in advance, dictionaries and codebooks validated and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. SWOTs in the context of digitisation and sustainability

Strengths	**Weaknesses**
• digital ecosystems describe an open information landscape • digital ecosystems encompass a holistic perspective on the inter-organizational system of action	• lack of transparency • digitisation seems to shift the demand for energy and resources on a global scale • addictive potential (e. g. specific platform designs) of specific technological innovations • the traditional data protection law is no longer sufficient to meet the challenges of Big Data in the sectors examined by means of existing protection mechanisms and forms of action • environmental and social problems due to digitisation
Strengths and Weaknesses	
• complexity	
Opportunities	**Threats**
• **healthcare sector:** people are benefiting from new technologies that make medical solutions more affordable, accessible and of higher quality • **automotive sector:** networked applications can save several hundred thousand lives and reduce traffic accidents considerably • **education sector:** fair, integrative and qualitative high-quality education can be achieved by solutions in the sense of an open education such as MOOCs • **financial sector:** use of digital media can lead to an intensified customer relationship and the integration of topics such as environmental awareness, social responsibility and economic activity • **social media sector:** can contribute to increased sustainability in the sense of increasing efficiency and holistic consulting • **production sector:** • Material Flow Cost Accounting as a simulation and optimization tool for small and medium-sized enterprises in the manufacturing sector and control instrument in companies (e.g. by integration into existing Enterprise Resource Planning (ERP) environments • Learning networks for companies & integration of employees and their training and further education to increase resource efficiency • Environmental services 4.0: Digitisation opens up completely new possibilities and improved information for recycling companies. • Efficient production: Optimisation of internal material/energy efficiency, e.g. "One-piece-flow": no set-up times and production is started without any losses as well as a digital image of production can reveal optimization potentials • value chain 4.0: increasing modularization of companies → more interfaces between companies; transport of information along the value chain; the recyclability of production should already be taken into account at the design stage; definition of interfaces for resource efficiency and industry 4.0 • **decreased resource consumption in production due to** • Production is closer to the customer, is more demand-oriented → resulting in lower inventory levels and less overproduction • Product to Performance: product becomes less important, the benefit of the product becomes more important • Digitisation enables transparency of the by-product streams and better information across the value chain → optimizes the value chain • Losses in value added can be better evaluated through digitization and inefficient production can be avoided • digital measurements support and activate the visualisation and billing of individual energy consumption as well as the actors and their energy savings • specific adaptations can help to reduce greenhouse gas emissions and promote a market transformation towards renewable energies (SDG 13) • resilient infrastructure • promote innovation and sustainable, inclusive industrialisation • establish a human balance • sustainable governance models can lead to a reduction of costs and frictions associated with management, manufacturing, processing, energy use, logistics, production and information collection • by creating trust and transparency through digital dialogue and symbolizing complexity specific areas can become more transparent	• network effects can lead to dysfunctional social distribution and participation processes • information asymmetries, opportune behaviour and negative assessments can have an impact on citizens' decisions and voting behaviour as well as on effectiveness and sustainability • reduced range of information (lack transparency) and equal opportunities between technology-affine and technology-averse citizens • immense energy consumption • further rebound effects • every change and new innovation can have far-reaching consequences for other areas and thus disrupt beneficial balances between society, the environment and the economy • interruptions of existing businesses • Increased resource consumption in production due to: • Increasing complexity in the world of production, consumption and communication • Increasing technical and social innovation • Acceleration of processes in the areas of planning, production and logistics • a shortening of product lifetimes (not because of reduced shelf life, but because of faster product innovations • Extension of possibilities (product features, services...) & product offers • Increasing the specificity of customer requirements • Increase or shift in demand for products and services • a constantly growing individualisation of consumer wishes and products
Opportunities and Threats	
• opportunity to reduce the use of resources concerning an increasing scarcity of resources • far-reaching changes in processes, products, processes and business models • considerable efficiency gains on one hand, that can also lead to a negative effect (rebound) on the other one • digital human rights and ethics must be anchored in the form of central rules for conducting business within the digital market • the design of business models in a digital environment • rapid development of technologies • sector-specific requirements • new designs and regulatory concepts • shift from product to service orientation • integrated business ecosystems and value creation activities within multi-stakeholder networks	

Sources: Aksin-Sivrikaya & Bhattacharya, 2017; Behringer, 2017; BKA, 2015; Deutscher Ethikrat, 2017; Dini, 2007; Erdmann & Hilty, 2010; GeSI Report, 2015; Greening at al., 2000; Müller-Mielitz & Lux, 2016; MUKEBW, 2018; Leonard & Graf von Kospoth, 2017; Osburg & Lohrmann, 2017; Santaris, 2017; Sturgeon, 2018; Zinnöcker, 2017

(Source: Own representation)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

intercoder reliability tested (Smith & Humphreys, 2006, p. 262). In addition to cost savings, automation can shorten the analysis process. At the same time, it is a simplification when very large amounts of data are to be examined (Smith & Humphreys, 2006). In the context of this investigation the content analysis software Leximancer^{LM} (2017) was used for this research. This includes a two-stage process of simultaneous information extraction. For each of these levels (semantic and relational) a different algorithm is used (Smith & Humphreys, 2006). In the context of our analysis it produced a concept map which represents key concepts and the semantic structure of topics for the articles examined. Leximancer^{LM} has already been used for several content analyses of academic journals (Zawacki-Richter & Latchem, 2018). Analyses up to now relate amongst others to the Journal of Communication (Lin & Lee, 2012), Journal of International Business Studies (Liesch, Håkanson, McGaughey, Middleton, & Cretchley, 2011), Distance Education (Zawacki-Richter & Naidu, 2016) and the Journal of Cross-Cultural Psychology (Cretchley, Rooney, & Gallois, 2010).

The software generates a visual map whereby similar concepts are bundled (Zawacki-Richeer & Latchem, 2018). According to Smith and Humphreys (2006, p. 264) "The map is an indicative visualization that presents concept frequency (brightness), total concept connectedness (hierarchical order of appearance), direct interconcept relative co-occurrence frequency (ray intensity), and total (direct and indirect) interconcept co-occurrence (proximity)". Harwood, Gapp, & Stewart (2015) were able to demonstrate stable results using Leximancer^{LM} and a manual grounded theory approach. Nevertheless, it is of great importance always to pay attention to expert judgment and analytical sensitivity with regard to interpretation (Zawacki-Richeer & Latchem, 2018). In addition, the interpretation requires both knowledge and a thorough understanding of the context and theme of the study (Zawacki-Richeer & Latchem, 2018).

Moreover, facing this variety and complexity in the context of digital change, new approaches, methods and models are increasingly relevant for generating holistic sustainable concepts identifying strengths and challenges in organisations, institutions and companies. Meeting the requirements of current and future reality, e.g. complex strategic decision-taking, environmental behaviours and the maintenance or preserving of resilience of systems, scientific tools and practices often lack in complete mapping (Walker et al., 2002). According to Wade (2004, p. 194), constellations are a method meeting the mentioned challenges, because they "provide powerful and creative ways to clarify and resolving complex, possibly intractable issues associated with organisations." In addition, they offer the opportunity to experiment with specific solutions in a secure environment and thus support decision making (Wade, 2004). Intuition and unconscious knowledge play a major role in the area of relevant decision-making processes (Rosselet, 2013), therefore, unconsciousness should be integrated beside conscious-based methods.

In particular, top managers are often confronted with a variety of tasks, information and decisions that have to be taken in a very short time. Agor (1986) was able to show that the majority of the executives he examined trusted their intuition in particularly important decisions. A significant advantage of the systemic structural constellations over many other methods is that they allow the integration of both unconscious and hidden knowledge in the area of decision-making processes (Arnold 2018, Arnold 2016). Accordingly, a wider range of knowledge on a topic can be skimmed off. Systemic structural constellations can be used to train a careful handling of digitised systems and as an instrument for mapping relationship structures within a system for the analysis and creation of possible changes to these structures (Kopp, 2013). Depending on the system under consideration, specific constellations can be used. The common feature of the constellations is that they aim to show the correlation between the individual system elements (Kopp, 2013). According to Arnold (2016, p. 22), the three central components of this method

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

are a group of people who participate on a voluntary basis as representatives (1), an issue-holder (2) and a facilitator or process manager (3). An important component is also the so-called representative perception. This means that the representatives serve as resonators for the hidden and implicit knowledge (Arnold 2016, Rosselet, 2013). According to Schlötter (2005) representative perception is a basic ability of all humans. High-quality constellations are rule-guided and follow main structures.

There are five key phases in systemic structural constellation work (Arnold, 2018): (1) Starting with clarifying the context the constellator and the issue-holder clear up the concern and issues by figuring out the goal and key involved elements. In scientific contexts, beside practitioners researchers or professors (educated as a constellator) can take the part of the issue-holder. (2) The selection of representatives for representing the core elements (agreed on in step 1) of the specific system is taken by the issue-holder by intuition or based on unconscious decision. (3) Initial constellation and first pattern are formed by the issue-holder as he or she positions all representatives/elements in the room. That special positioning and grouping is called structural constellation. It enables the recognition of spatial perspectives, arrangements, distances, and directions. So, underlying dynamics of the represented and focused situation can become more visible and conscious (Arnold, 2018). The selected representatives can also position in the room themselves – following their impressions where to position best in the given systemic constellation. (3) Process work enables diverse interventions facilitating solutions, testing simulations or gaining new hypotheses, etc. Finding a solution, forming a final constellation setting or the issue-holder is satisfied with the current patterns, the constellation process will be finished. (4) In the Closure the representatives are released from their work and will be thanked for their service and assistance (Arnold, 2018). (5) A final reflexion on new insights and strategic options follows. Systemic structural constellation processes take 20 minutes up to two hours.

Within the scope of the chapter tangible examples of applications with students, carried out at the Chemnitz University of Technology, will be presented. Table 2 gives an overview of the methodical design. One of the constellations figures out tensions between technology-avers and -affine people in the context of sustainability and digitisation. The other focussed on health care and consisted the following elements *Sustainability*, *Digitisation*, *Company*, *Organisational Members*, *Health Care Effects* and *Competition*.

Table 2. Methodical design of the Application of Systemic Structural Constellation

Topic	Digitisation and Sustainability: Threats, Opportunities and Non-Conformity
Question/Goal	Which possibilities and threats dominate in the context of digital change and its sustainable development? Are there any overlaps in the results of the methods used? • Content-based: new hypotheses and theory development concerning Digitisation and Sustainability
Participants	Issue-holders: professors, researchers, students Representatives: experienced researchers and students from Chemnitz University of Technology
Year	Autumn 2017 and Spring 2018
Duration	Up two hours including reflexion
Research design	Exploratory case study
Data collection	Observation, interviewing, testing as well as heuristics
Data preparation	Video, protocol, joint reflexion
Data interpretation	Interpretative-hermeneutic methods, reference analysis

(own source)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Limitations

It should be noted that the study has covered a period from 2015 to 2018. Digitisation is subject to constant change, which makes it virtually impossible to fix it in time. It only seems feasible to show a trend that reflects prevailing topics. The articles were accessed through the two databases: Ebsco and Scopus, but not limited to specific journals. It should be noted, however, that only accessible articles could be included. Only English articles and books were used. However, it may also be of interest to include literature in other languages and other types of sources. As already mentioned, Leximancer^{LM} can be used to create concept maps. Algorithms serve to find the most frequently occurring terms (Zawacki-Richter & Latchem, 2018). However, the co-word analysis should be viewed critically. According to Leydesdorff (1997, p. 418) "words change both in terms of frequencies of relations with other words, and in terms of positional meaning from one text to another." It should be noted that "the fluidity of networks in which nodes and links may change positions is expected to destabilize representations of developments of the sciences on the basis of co-occurrences and co-absences of word" (Leydesdorff, 1997, p. 418). Some authors point out that the words within a co-word analysis are only to be seen as indicators for the links between individual concepts (Courtial, 1998). Others see particular possibilities to carry out a narrative investigation concerning a specific subject in the co-occurrence of words (Liesch et al., 2011; Sowa, 2000). With regard to the maps created with Leximancer^{LM}, a careful interpretation and knowledge of the overall topic is indispensable (Zawacki-Richter & Latchem, 2018).

This is comparable to the systemic structural constellations. They have a high objectivity and reliability (Schlötter, 2005), but also face the reliability-validity dilemma (Lamnek, 1988). Meeting external validity a joint discussion and reflexion for balancing different perspectives and points of view is essential in scientific contexts (Arnold, 2018). As the main focus, here, is set on unconscious knowledge, the main quality criteria should assess how useful a constellation is to address new questions, formulate promising hypotheses and widening the context and understandings. However, in order to produce high quality in constellation settings, the frame-set of the constellator, how open-minded and respectful and how experienced she or he is, have strong impact on the outcome. In addition, the representatives can also manipulate the results when not being open-minded, but having strict frames or expectations. Therefore, hidden work, e.g. using tags, t-shirts, etc. for differentiation, is most successful – as it focuses on representation fundamentally. In addition, when repeating constellations, there might never be identical positioning, but always comparable patterns. So, the results of the constellation work was not interpreted as absolute truth, but as helpful patterns and indicators for challenges in complex settings addressing sustainability and digitisation. However, this method sensitises students to the topic and on the other hand, completely new impulses for reflexions, progress and changed frames can be generated, which can be used by the companies themselves.

SOLUTIONS AND RECOMMENDATIONS

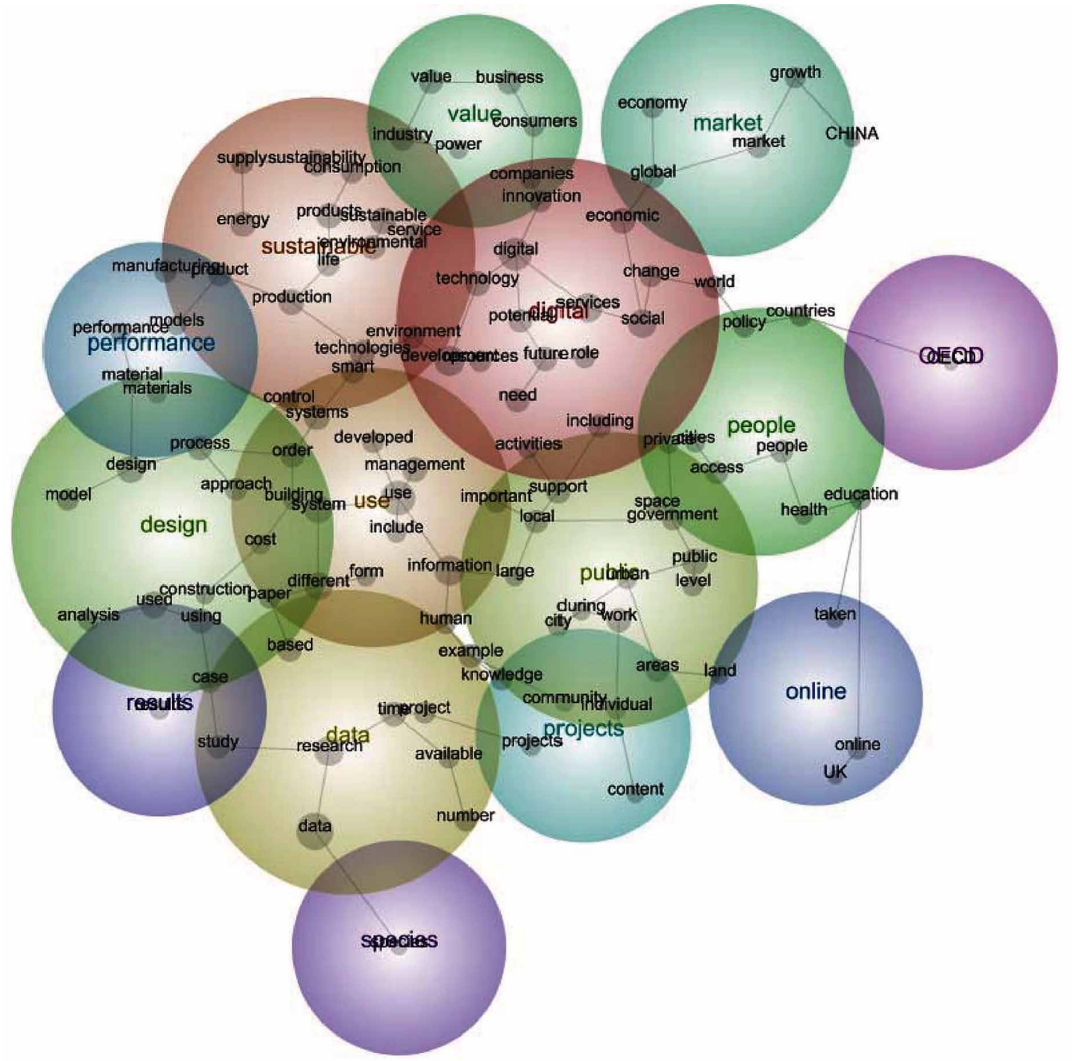
In this section, our results of the concept maps and systemic structural constellations will be discussed on the background and literature review.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Concepts Maps

The following fifteen topics are associated with the literature studied: *Data*, *Design, Digital*, *Market*, *OECD*, *Online*, *People, Performance*, *Projects*, *Public*, *Results*, *Species*, *Sustainable*, *Use*, and *Value.* Figure 1 shows the concept map of the analysed texts.

Figure 1. Concept map for the analysed literature



The topics with the most common strokes are *digital* (13610), *sustainable* (11191), *use* (10396), *data* (9701), *design* (6166), the latter is already green. Warmer colours (of the other themes) show that these are the most frequently occurring themes within the texts studied. In particular, the interpretation will focus on the first three topics. Leximancer[LM] makes it possible to visualize the concepts related to the topics. "Digital" is associated with the following concepts for the texts used: *digital*, *development*,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

services, *social*, *economic*, *technology*, *future*, *need*, *potential*, *including*, *world*, *change*, *innovation*. The concepts *sustainable*, *sustainability*, *production*, *products*, *energy*, *technologies*, *environmental*, *product*, *smart*, *manufacturing*, *life*, *supply* and *consumption* are associated with "sustainability". *Use*, *information*, *system*, *different*, *systems*, *management*, *order*, *important* represent the concepts in connection with the theme bubble "use".

Linking the topics *digital* and *sustainable,* it has to be emphasised that the analysis merely shows one direct link path between the two thematic bubbles (*sustainable* and *digital*). The directly related concepts are: *sustainable*, *environmental*, *life*, *production*, *technologies*, *(smart)*, *environment*, *development (resources), technology*, *digital*. These topics reflect the analysed SWOTs (see table 1), as well. So, there is a high congruency. With regard to a sustainable design of digital change, the main focus seems to be on production. Extracts of the used literature with keywords such as manufacturing processes, production and production phase reflect this. An indirect connection between the two topics also becomes clear. The concept of technologies, which is linked to digital and sustainable through further concept points, is also included in the *use* area. In this sector, for example, the following problems may arise in connection with the use of digital technologies: According to Bondarouk & Brewster (2016), concrete case studies show that employees prefer to receive information from people rather than from a digital system. Incongruent frameworks can therefore result in divergent views and conflicting information. This in turn can be accompanied by losses in the area of processes, resistance and false expectations (Bondarouk & Brewster, 2016). According to this, it seems to be quite relevant on the part of social components to leave people in the function of superiors. In any case, it should be examined in advance what concrete problems a digital transformation can entail in such a case in order both to find a socially acceptable solution and to protect the company against possible losses. Another problem could be irreversible damage to data security if information systems are outsourced (Bergere, 2016). Even in connection with advanced metering infrastructure and the electronic storage of customer data, problems may arise in the area of data protection (Sooknanan, Bahadoorsingh, Joshi, & Sharma, 2016).

The first analysis of the literature used (without the help of the Leximancer^{LM} tool) shows *digitisation* presents a multitude of opportunities and risks that must be taken into account in order to achieve sustainable change in the overall system. But which areas are in focus and where could a sustainable design be particularly relevant? The following is a list of the main results in connection with the Leximancer^{LM} programme used. The structuring of the following sections is intended on setting the thematic focus of the analysis. Selected interrelationships have been integrated. In addition, the subheadings are used to illustrate the areas of topics that overlap and are bordering on the first analysis (SWOT). Since the use phase, especially in connection with potential rebound effects, is a major focus in connection with technological progress, opportunities and risks of this concept bubble are explained in a separate section.

Results concerning the specific topics and its concepts after analysis by the programme, which specify above listed points, complete or acknowledge them:

Global Development

Not only specific sectors (see table 1), but also global industries and specific groups of countries face new challenges. According to Alexander (2017), constant innovations in corporate technologies and an increase in the virtualisation of social spaces are key drivers of a transformation of the global retail industry. This could cause some difficulties, especially for emerging countries. According to Conschafter (2017), cities can also be made usable as respite from the digitised world. Thus, future urban planning

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

should reflect not only the advantageous and unobtrusive integration of technologies for people, but also the most appreciated places of the past. It should be emphasized that this integration must take place for all economic and social backgrounds and therefore a complete participation of all people should be striven for (Conschafter, 2017). He sees the risk of excluding certain groups, for example, in the decline in car traffic and car ownership. In addition to the exclusion of certain groups, according to Matser (2017), there is also the risk of an increased distance between customers and employees (business sector). Furthermore, there may be increased staff shortfalls if this problem is not counteracted in advance by means of increased attention (Matser, 2017). In specific sectors, such as services, fewer people are expected to be needed and unemployment is expected to rise. This can lead to output and quality increases (Matser, 2017), and suitable political measures are necessary to compensate an increased unemployment.

Demand for Sustainability and the Inclusion of Specific Groups

According to Lyons, Mokhtarian, Dijst, & Böcker (2018), it is necessary to understand how the basic social needs for the various approaches (to goods, people, services, opportunities) can be met sustainably. Uncertainties about future access depending on affordability and social preferences should also be taken into account. Scenario planning can play a decisive role here, for example by mapping divergent future perspectives and promoting group thinking (Lyons, Mokhtarian, Dijst, & Böcker, 2018.). Beside avoiding or reducing uncertainties as ways of including the various groups, Conschafter (2017) calls for the design of the built environment and addressing it through appropriate policies to counteract the exclusion of specific groups. He identifies great potential for artificial intelligence, increasing automation and the associated efficiency gains, and the use of renewable technologies to create environmentally friendly cities of the future. However, in order to achieve this and to create a resilience of the cities, it is relevant that the cities themselves push this forward, for example with the creation of green spaces (Conschafter, 2017). Lifelong learning can be seen as an essential way of promoting social inclusion. Both younger and adult groups of the labour market or the unemployed should be included (Dias, Alemdra, & Silva, 2017). For specific groups, such as the elderly, it is often a considerable challenge to face completely new challenges. A change is also increasingly expected on the consumer side to solve global environmental concerns. They must also assume responsibility in social, economic, ethical and ecological areas (Fuentes & Sörum, 2018). In order to meet this complex challenge, one should never start at just one point.

Company

In the future, it may be particularly relevant for companies to combine different types of innovation (organisational innovation, marketing, process, service and product innovation) in order to set themselves apart from other competitors (Luciana & Stan 2017). On the one hand, there are also clear effects on social factors in the field of digital, whose changes are also accompanied by market-economy transformations. On the other hand, the graphic shows no connection line between the theme bubbles *people* and the *market*. Thus, there should be greater importance regarding the inclusion of this concept (*people*) in the areas of *market* and *digital*.

In the automotive sector, green services can play a particularly important monitoring and control function for sustainable measures, such as in the area of raw material recycling (Opazo-Basáez, Vendrell-Herrero, & Bustinza, 2018). It is relevant to integrate these projects with digital skills in the case of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

implementation effectively, taking into account the respective performance and sustainability objectives of the company (Opazo-Basáez, Vendrell-Herrero, & Bustinza, 2018). In addition, intelligent materials can provide significant opportunities to contribute to the sustainability of digital measures. These can be activated, for example, by specific environmental impacts and thus transformed (Teoh, Chua, Liu, & An, 2017). This could lead to other energy sources being saved. An increased service life can be particularly useful for products whose production phase has a considerable negative impact on the environment. The associated increase in efficiency leads to a reduction in the energy required for recycling materials (Dominish et al., 2018). This has both positive environmental effects and cost savings on the company side. However, potential rebound effects should always be considered in the context of efficiency improvements (Greening, Greene, & Difiglio, 2000). It is useless to extend the service life of products by means of new technologies if this results in higher consumption, which in turn increases the resource usage. Informing consumers about potential risks should be done by both the state and the companies themselves.

A study of 100 Canadian companies in 2015 shows that both management commitment and stakeholder pressure will lead to environmentally friendly supply practices and waste-free production. In this way, more innovative products, new skills, environmental improvements and financial gains can be increased (Rajala, Hakanen, Mattila, Seppälä & Westerlund, 2018). Under the focus of a sustainable design of the manufacturing processes, economically effective processes and products should predominate. According to Da Silva et al. (2017), these contribute to optimising energy procurement and consumption, the environmental impact, the safety of employees and society and the use of natural resources. Industry 4.0 can make a significant contribution to minimise the environmental damage. Intelligent systems, in the area of production, can achieve a reduction of the following main areas: overproduction, production waste, goods movements and energy consumption (Kamble, Gunasekaran, & Gawankar, 2018). According to Kamble et al. (2018) products can be made clearly identifiable by means of intelligent systems. This can help to facilitate the challenge of increasing complexity in the area of manufacturing processes (Kamble et al., 2018). It is crucial to analyse the effects of such systems (products, factories) (Kamble et al., 2018). These smart technologies seem to play a decisive role, especially with regard to sustainable development.

Specific Challenges and Opportunities in Connection With the Theme Bubble Use

According to Gebhardt (2017), ecosystems are directly related to a high degree of complexity and constant change. Managers must be able to cope with these tasks and take irrational behavior and complex system logic into account (Gebhardt, 2017). A control of social systems should include both belief systems and emerging characteristics (Gebhardt, 2017). Here, systemic structural constellations could support respective development. In connection with a stable design of storage management, long-term strategies and intelligent filter systems represent a major challenge (Scholz, 2016). This problem relates in particular to the problem of digital preservation of information. While printed paper makes it possible for a very long time to preserve information, such as cultural heritage, less than 20% of the information transmitted globally (in relation to 2007) could be stored in the context of technical ageing (Scholz, 2016).

There is considerable potential for optimization in the automotive sector. For example, real-time access to the entire system can improve flowing and stationary traffic and its safety (Rammler, 2017) (see table 1). A combination of infotainment systems and standard communication technologies can contribute to an increase in well-being, especially in conurbations, where, for example, waiting times can

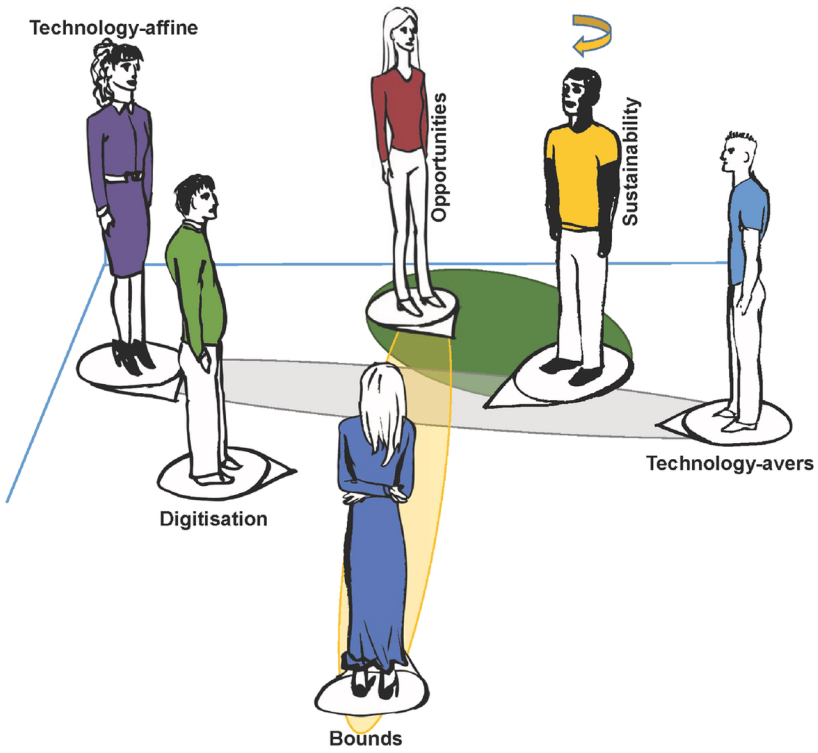
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

be bridged. Here entertainment, communication, information and work can play a major role (Rammler, 2017). The adaptation of e-government systems can contribute an increased benefit for municipalities in electronic transactions with stakeholders along the whole value chain (Khilji, Duan, Lewis, Bukoye, & Luton, 2017). According to Toonen & Bush (2018), fish attraction devices can help to get a more accurate picture of the shape of oceanic space using information and sensor technologies. It is relevant to make information and communication technology more environmentally friendly and energy efficient through appropriate measures, as they are used generously in the area of digital information over its entire life cycle (Chowdhury, 2016). In sum, according to the literature, central rebound effects can be: energy overconsumption, underestimation of human needs and ability to adapt, unlearn of diverse cap-/abilities, etc. (further see table 1). These rebounds might even get worse when differentiating technology-avers and technology-affine people.

Systemic Structural Constellations

Figuring out main challenges, a constellation was conducted containing the following (hidden) elements: Digitisation, Sustainability, Opportunities and Bounds, Technology-affine and Technology-avers (figure 2).

Figure 2. Initial constellation representing technology-avers versus -affine people
(own source, figures © Antonia Wetzel)



Sustainability. Good position, can see all elements, strongest relationship to *Digitisation*;
Strengthened by *Technology-avers* in the back, i.e. "no detached view of sustainability desired"
Digitisation. *Technology-affine* should be promoted;
at the same time, wants to deal with the *Bounds* and overcome them;
does not feel any tension, but a desire for cooperation with all other elements ("no cut")
Opportunities. *Sustainability* is becoming increasingly important, must be taken into account.
Bounds. Focus on *Sustainability* is good, desire for contact with other elements
Technology-affine. Focus on sustainability is good;
Transition ongoing (towards an extreme pole - in own perception and in external attribution; wants to step back from *Digitisation*; Suggestions: Using digitisation to get closer to sustainability or not)
Technology-avers. on the same level with *Technology-affine* (crystallization as pole)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

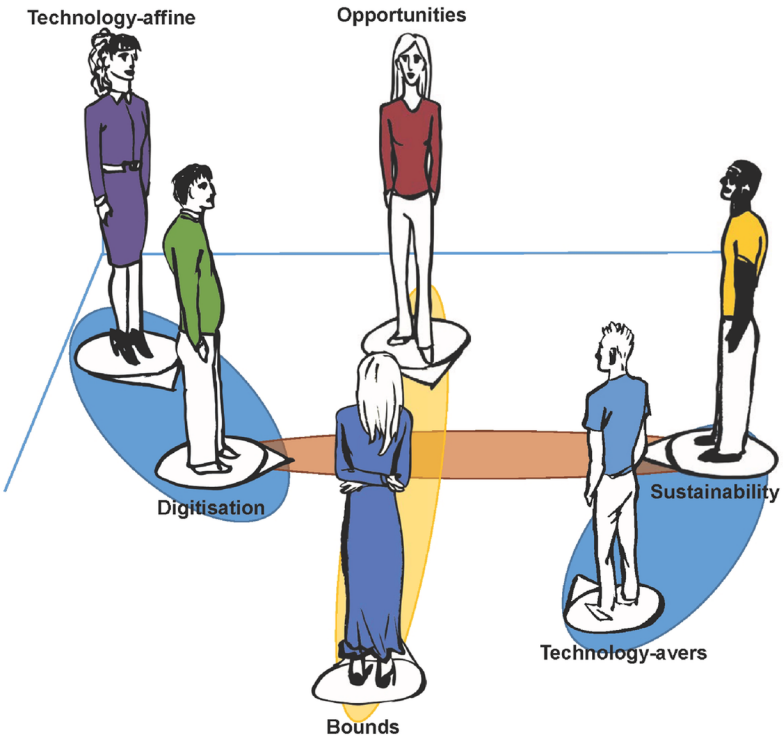
Issue-holder were a sustainability professor and a group of scientists and students in the field of sustainability management. The whole constellation work was conducted in a hidden way, meaning only the constellator knew what the respective representatives were representing. The single elements or respective representatives were asked to find a good place in the room related to the given system and searched their position themselves. The representatives were asked for their feelings, wishes to move and differences they can explain. After a first round of expressing their inner pictures and ideas, the representatives were allowed to move and interact further. This procedure was repeated until a final constellation was found as all representatives explicated a stable context. The figures convey pivotal expressions of the respective elements. The interpretation is based on the statements, the positions and systemic principles (Arnold, 2016).

In the beginning, it became quickly obvious technology-affine and technology-avers are in clear tensions and two different poles – as they positioned vis-à-vis (figure 2). During the constellation these two poles oriented towards digitisation and sustainability, but becoming more open for other positions and got more balanced. The element *Technology-affine* wanted to push digitisation without any constraint. In the beginning *Sustainability* mainly focussed on *Bounds* and *Technology-avers*, but changed to a more open-minded and balanced position stating *Opportunities* can operate as a mediating element; and a case-based analysis should be conducted in order to figure out all opportunities and bounds or SWOTs for taking sustainable decisions (figure 3). This is in line with Santarius' (2017) argument digitisation and digital transformation should be analysed case-based as well as support and strengthen sufficiency and overall sustainability. Yet, he already observed severe rebounds, as overconsumption, immense energy consumption, etc. So, in terms of sustainability, digital transformation needs a clear value basis and sustainability added value. In terms of responsible management, digitisation and digital transformation has to be reflected before implementing assumed digital progress. A company should assess digital changes against a sustainability framework, including social, environmental and economic indicators, case-wise. Part of a responsible management is also lab-orientation, meaning first simulating complex transformational processes in selected corporate parts before implementing digital change and devices company-wide. Therefore, societal progress and strict law regulation will be needed, too.

Moreover, stressing health as a particular focus in the constellation work, the following figure presents the initial constellation of the second conduced constellation. Particularly for the element *Organisation*, a clear area of conflict between the elements *Competition* and *Organisational Members* emerged within the constellation (see figure 4). Companies must be able to withstand competition in the face of digital change, but they must not ignore their employees. The *Company* felt that it was consistently driven by *Competition*. For the *Employees*, direct health effects were of particular relevance, and *Sustainability* was of secondary importance for this element in the course of the installation process. However, strong tensions and various trade-offs occurred and were not easy to solve. The versatile connections, topics and linkages can also be seen in figure 1. The concept map shows various influences and connections concerning digitisation and sustainability, like people, public, market, value, performance, design and use, etc. So, companies have to consider diverse topics and challenges for managing digitisation, digitalisation and digital transformation successfully. The constellation makes obvious that organisations cannot focus on all aspects at the same time and often prioritise topics. Likewise, sustainability is not always on the top agenda.

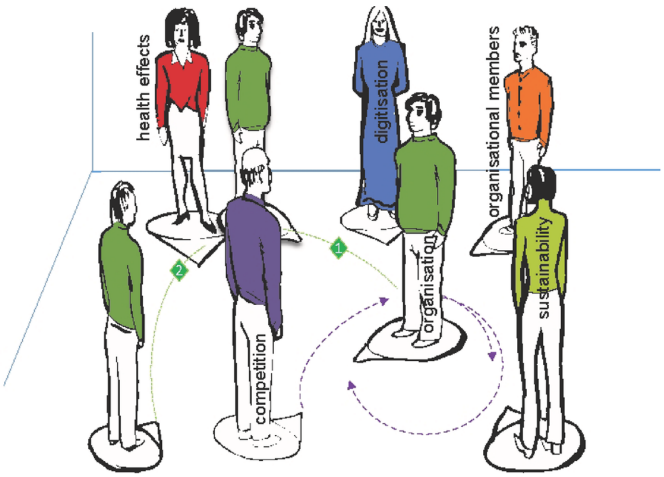
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Finial constellation representing technology-avers versus -affine people
(own source, figures © Antonia Wetzel)



Sustainability. strongest connection to *Digitization*; does not see *Opportunities* as a connecting element; Opportunities and risks are only seen in terms of digitisation, not in terms of sustainability - "there are connections, but not in every case or not at all levels" Proposal: "there should be separate opportunities and risks for sustainability";
In the process - after a change of position of Technology-avers: loss of reinforcements; distances itself from *Digitisation*, sees *Digitisation* as a danger, more disadvantages than advantages; at the same time more opportunities for *Digitisation* than for *Sustainability* are perceived
Digitization. Coherent positioning; desire for proximity to *Opportunities* - these should predominate as legitimation for own element
Opportunities. Bounds as connecting element; nevertheless desire to turn to both elements *Sustainability* and *Digitisation* (no two delimited topics)
Bounds. No special reference to elements; desire for distance to all elements; wish that all elements - except *Opportunities* - turn with the back ("show cold shoulder")
Technology-avers. with all connected, would like to have contact with all, at the same time proximity to the element *Sustainability* desired; *Technology-avers* does not necessarily mean sustainability-avers; Desire for constant connection to *Technology-affine*, so that a whole is created
Technology-affine. wants to be close to *Digitisation*, because progress is pivotal; would like to go even further away from *Bounds*, but *Digitisation* does not go along with; *Bounds* should not come closer; sees *Opportunities* as a link between *Sustainability* and *Digitisation*

Figure 4. Initial constellation representing sustainability and digitisation in health contexts
(own source, figures © Antonia Wetzel)



Health effects. Feels the urge to sit down and feels exhausted

Organisation. would like to focus on employees, but does not want to ignore competition; wants to be progressive for competition; wants to do everything right for organisational members

Sustainability. regards employees as central, the following 3 areas are relevant: organisation, digitisation, organisational members, neutral tendency towards others

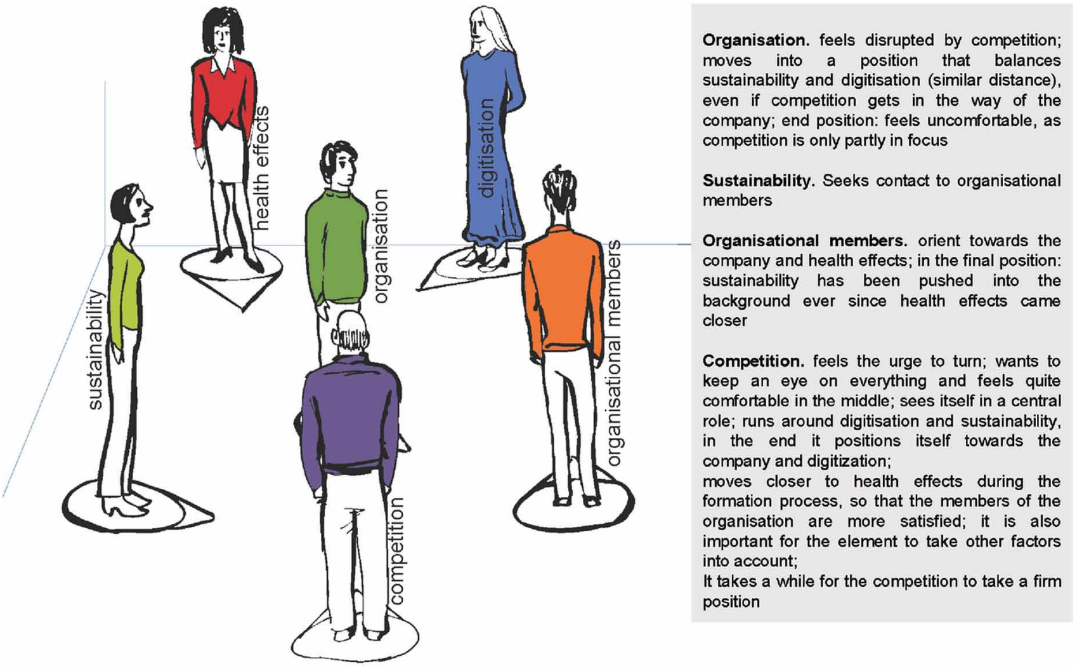
Digitisation. is focused on company, health does not matter

Organisational members. feel equally weakened and attracted by sustainability, because it stands for the success of the company; the element also wants to keep an eye on the competition; expresses its interest in other organisations; feels the impulse to focus on health; wants to take care of it, even if others may have to put back; neutral attitude to other elements.

Competition. wants to keep an eye on everyone; feels a strong urge to move; wants to be able to react quickly when health becomes worse

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Final constellation representing sustainability and digitisation in health contexts
(own source, figures © Antonia Wetzel)



The constellation also showed that the inputs for a sustainable development of corporate structures should be provided directly by the company itself (see figure 5).

So, as stated above, people are benefiting from new technologies that make corporate solutions more affordable, accessible and of higher quality and can support health at all. However, there are also strict limitations by human that have to be considered for digital transformation. These results are absolutely in line with Leonard & Graf von Kospoth's (2017) arguments that rapid digital transitions have to be aligned and balanced with humanity, and digital innovations should be made humanely sustainable. Sustainability can be a concept for reorientation towards humanity and human limits beside environmental boundaries.

CONCLUSION AND FUTURE RESEARCH DIRECTIONS

There are a lot of opportunities and risks concerning sustainability in the context of digitisation and a digital transformation. Increased affordability, accessibility, quality, speed, transparency, etc. could be opportunities in a digital transformation. Main rebound effects to be considered are: network effects, security lags, increasing information asymmetries, immense energy consumption, mass consumption, loss of sufficiency, lack of humanity, etc. This is in line with the results of the constellation work. Immense tensions between sustainability and digitisation occurred within the constellations, but there were also linked and progressive items. So, in light of a development towards sustainability, digitisation is both, boon and bane, and often needs a clear analysis of all relevant issues and a careful handling in order to be progressive. Digital transformation requires a precise and honest value basis and sustainability added value. In the context of sustainability and digital transformation, responsible and sustainable management

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

requires a holistic technology and environmental assessment, a clear emphasis of human values and a proactive orientation towards balanced concepts of planet, people and profit. Responsible management should assess digital changes against a sustainability framework, including social, environmental and economic indicators, case-wise. In addition, applying a lab-orientation, meaning first simulating complex transformational processes in selected corporate parts before implementing digital change and devices company-wide, is helpful to identify corporate and value-chain driven rebound effects or unstainable properties. So, a company can govern before deep (irreversible) transformational processes have happened. Therefore, societal progress, innovative incentives and strict law regulation will be needed.

Further research is need on real-effect rebounds for estimating environmental harm, social stress and economic losses on micro-, meso- and macro-levels. Protected or regional separated real labs could indicate possible changes and rebounds and indicate sustainable solutions, incentives and restrictions before implementing digital systems on a large scale. Moreover, generalisable trade-offs and rebounds should be figured out more intensively. Therefore, a cross-industry study should be conducted, both cross section and longitudinal section. Final, patterns should be investigated how digitisation, digitalisation and digital transformation can serve developments towards sustainability and not thwart sustainability goals in a big way. Here, pivotal digitised limitations have to be discussed, too.

REFERENCES

Agor, W. H. (1986). The logic of intuition: How top executives make important decisions. *Organizational Dynamics*, *14*(3), 5–18. doi:10.1016/0090-2616(86)90028-8

Aksin-Sivrikaya, S., & Bhattacharya, C. B. (2017). Where Digitalization Meets Sustainability: Opportunities and Challenges. In T. Osburg & C. Lohrmann (Eds.), *Sustainability in a Digital World. CSR, Sustainability, Ethics & Governance*. Cham: Springer. doi:10.1007/978-3-319-54603-2_3

Alexander, B. (2017). Disruption of the Retail Ecosystem: The South African e-Retail Imperative. *Proceedings Of The European Conference On Management, Leadership & Governance*, 32-39.

Arnold, M. (2016). *Systemic Structural Constellations and Sustainability in Academia: A New Method for Sustainable Higher Education*. Taylor & Francis. doi:10.4324/9781315403465

Arnold, M. G. (2018). Combining conscious and unconscious knowledge within human-machine-interfaces to foster sustainability with decision-making concerning production processes. *Journal of Cleaner Production*, *179*, 581–592. doi:10.1016/j.jclepro.2018.01.070

Behringer, C. (2017). Digitalisierung und CSR in der Finanzberatung. In A. Hildebrandt & W. Landhäußer (Eds.), *CSR und Digitalisierung. Management-Reihe Corporate Social Responsibility*. Berlin: Springer Gabler. doi:10.1007/978-3-662-53202-7_54

Bergere, F. (2016). Ten years of PPP: An initial assessment. *OECD Journal on Budgeting*, *15*(1), 31–123. doi:10.1787/budget-15-5jm3rx2qbxbq

Bondarouk, T., & Brewster, C. (2016). Conceptualising the future of HRM and technology research. *International Journal of Human Resource Management*, *27*(21), 2652–2671. doi:10.1080/09585192.2016.1232296

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bundeskartellamt (BKA). (2015). *Digitale Ökonomie – Internetplattformen zwischen Wettbewerbsrecht, Privatsphäre und Verbraucherschutz*. Tagung des Arbeitskreises Kartell-recht. Retrieved July 13, 2018, from https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Diskussions_Hintergrundpapier/AK_Kartellrecht_2015_Digitale_Oekonomie.pdf?__blob=publicationFile&v=2

Chowdhury, G. G. (2016). How to improve the sustainability of digital libraries and information Services? *Journal of the Association for Information Science and Technology*, *67*(10), 2379–2391. doi:10.1002/asi.23599

Conschafter, S. J. (2017). Charting a path for cities in the Second Machine Age with or without the car: A focus on the human experience. *Journal of Urban Regeneration and Renewal*, *10*(2), 116–127.

Courtial, J. P. (1998). Comments on Leydesdorff's article. *Journal of the American Society for Information Science*, *49*(1), 98–98. doi:10.1002/(SICI)1097-4571(199801)49:1<98::AID-ASI14>3.0.CO;2-1

Cretchley, J., Rooney, D., & Gallois, C. (2010). Mapping a 40-year history with Leximancer: Themes and concepts in the Journal of Cross-Cultural Psychology. *Journal of Cross-Cultural Psychology*, *41*(3), 318–328. doi:10.1177/0022022110366105

Da Silva, F. M., Bártolo, H. M., Bártolo, P., Almendra, R., Roseta, F., Almeida, H. A., & Lemos, A. C. (2017). Challenges for Technology Innovation: An Agenda for the Future. In *Proceedings of the International Conference on Sustainable Smart Manufacturing*. Lisbon, Portugal: CRC Press.

Dias, A. C., Almendra, R., & Silva, F. (2017). Design education facing Europe 2020—a reflection on demands: FAULisbon as the case study. In Challenges for Technology Innovation (Vol. 287, No. 292, pp. 287-292). Routledge in association with GSE Research.

Dini, P. (2007). A Scientific Foundation for Digital Ecosystems. In F. Nachira, A. Nicloai, & ... (Eds.), *Digital Business Ecosystems, Information Society and Media* (pp. 24–47). Luxembourg: Office for Official Publications of the European Communities.

Dominish, E., Retamal, M., Sharpe, S., Lane, R., Rhamdhani, M., Corder, G., ... Florin, N. (2018). "Slowing" and "Narrowing" the Flow of Metals for Consumer Goods: Evaluating Opportunities and Barriers. *Sustainability*, *10*(4), 1096. doi:10.3390u10041096

Erdmann, L., & Hilty, L. M. (2010). Scenario analysis. *Journal of Industrial Ecology*, *14*(5), 826–843. doi:10.1111/j.1530-9290.2010.00277.x

Ethikrat, D. (2017). Big Data und Gesundheit–Datensouveränität als informationelle Freiheitsgestaltung. *Vorabfassung vom, 30*.

Fuentes, C., & Sörum, N. (2018). Agencing ethical consumers: Smartphone apps and the socio-material reconfiguration of everyday life. *Consumption Markets & Culture*, 1–26.

Gebhardt, C. (2017). Humans in the Loop: The Clash of Concepts in Digital Sustainability in Smart Cities. In T. Osburg & C. Lohrmann (Eds.), *Sustainability in a Digital World. CSR, Sustainability, Ethics & Governance* (pp. 85–93). Cham: Springer. doi:10.1007/978-3-319-54603-2_7

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Geisler, S., Zelazny, M., Christmann, S., & Hagenhoff, S. (2011, June). Empirical analysis of usage and acceptance of software distribution methods on mobile devices. In *Mobile Business (ICMB), 2011 Tenth International Conference on* (pp. 210-218). IEEE.

GeSI Report. (2015). *System Transformation: how digital solutions will drive progress towards the sustainable development goals*. Accenture Strategy. Retrieved March 14, 2018, from www.systemtransformation-sdg.gesi.org

Greening, L. A., Greene, D. L., & Difiglio, C. (2000). Energy efficiency and consumption—the rebound effect—a survey. *Energy Policy*, *28*(6-7), 389–401. doi:10.1016/S0301-4215(00)00021-5

Harwood, I., Gapp, R. P., & Stewart, H. J. (2015). Cross-check for completeness: Exploring a novel use of Leximancer in a grounded theory study. *Qualitative Report*, *20*(7), 1029–1045.

Kamble, S. S., Gunasekaran, A., & Gawankar, S. A. (2018). Sustainable Industry 4.0 framework: A systematic literature review identifying the current trends and future perspectives. *Process Safety and Environmental Protection*, *117*, 408–425. doi:10.1016/j.psep.2018.05.009

Khilji, N., Duan, Y., Lewis, R., Bukoye, T., & Luton, U. K. (2017, July). Incorporating Knowledge Management Tools in the UK Local Government towards Improved Planning Support Services. In *ICICKM 2017 14th International Conference on Intellectual Capital Knowledge Management & Organisational Learning: ICICKM 2017* (p. 122). Academic Conferences and Publishing Limited.

Kontis, V., Bennett, J. E., Mathers, C. D., Li, G., Foreman, K., & Ezzati, M. (2017). Future life expectancy in 35 industrialised countries: Projections with a Bayesian model ensemble. *Lancet*, *389*(10076), 1323–1335. doi:10.1016/S0140-6736(16)32381-9 PMID:28236464

Kopp, U. (2013). Systemische Nachhaltigkeitskompetenzen für Führungskräfte–Erfahrungen mit Aufstellungsarbeit in der Managementaus- und weiterbildung. *Die Unternehmung*, *67*(2), 126–151. doi:10.5771/0042-059X-2013-2-126

Krys, C. (2017). Megatrends–Rahmenbedingungen für unternehmerische Nachhaltigkeit. In CSR und Strategisches Management (pp. 45-65). Springer Gabler. doi:10.1007/978-3-662-49457-8_2

Lamnek, S. (1988). Qualitative Social Science. In Methodology. Beltz PVU.

Leonhard, G., & von Kospoth, C. A. G. (2017). Exponential technology versus linear humanity: Designing a sustainable future. In T. Osburg & C. Lohrmann (Eds.), *Sustainability in a Digital World. CSR, Sustainability, Ethics & Governance* (pp. 77–83). Cham: Springer. doi:10.1007/978-3-319-54603-2_6

Leydesdorff, L. (1997). Why words and co-words cannot map the development of the sciences. *Journal of the American Society for Information Science*, *48*(5), 418–427. doi:10.1002/(SICI)1097-4571(199705)48:5<418::AID-ASI4>3.0.CO;2-Y

Liesch, P. W., Håkanson, L., McGaughey, S. L., Middleton, S., & Cretchley, J. (2011). The evolution of the international business field: A scientometric investigation of articles published in its premier journal. *Scientometrics*, *88*(1), 17–42. doi:10.100711192-011-0372-3

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lin, J., & Lee, S. T. (2012, November). Mapping 12 years of communication scholarship: themes and concepts in the Journal of Communication. In *International Conference on Asian Digital Libraries* (pp. 359-360). Springer. 10.1007/978-3-642-34752-8_53

Lyons, G., Mokhtarian, P., Dijst, M., & Böcker, L. (2018). The dynamics of urban metabolism in the face of digitalization and changing lifestyles: Understanding and influencing our cities. *Resources, Conservation and Recycling*, *132*, 246–257. doi:10.1016/j.resconrec.2017.07.032

Matser, I. (2017). Leading Change in Ongoing Technological Developments: An Essay. In Sustainability in a Digital World. Springer International.

Ministerium für Umwelt, Klima und Energiewirtschaft Baden-Württemberg (MUKEBW). (2018). *Digitalisierung als Motor für mehr Nachhaltigkeit. Runder Tisch "Nachhaltige Digitalisierung" des Umweltministeriums*. Retrieved from https://www.nachhaltigkeitsstrategie.de/erleben/rueckblick/nachhaltige-digitalisierung.html

Müller-Mielitz, S., & Lux, T. (Eds.). (2016). *E-Health-Ökonomie*. Springer-Verlag.

Opazo-Basáez, M., Vendrell-Herrero, F., & Bustinza, O. F. (2018). Uncovering Productivity Gains of Digital and Green Servitization: Implications from the Automotive Industry. *Sustainability*, *10*(5).

Osburg, T., & Lohrmann, C. (Eds.). (2017). *Sustainability in a Digital World. CSR, Sustainability, Ethics & Governance*. Cham: Springer. doi:10.1007/978-3-319-54603-2

Prisecaru, P. (2016). Challenges of the fourth industrial revolution. *Knowledge Horizons. Economics*, *8*(1), 57.

Rajala, R., Hakanen, E., Mattila, J., Seppälä, T., & Westerlund, M. (2018). How Do Intelligent Goods Shape Closed-Loop Systems? *California Management Review*, *60*(3), 20–44. doi:10.1177/0008125618759685

Rammler, S. (2017). Digital Fuel for the Mobility Revolution: The Opportunities and Risks of Applying Digital Technologies to the Mobility Sector. In T. Osburg & C. Lohrmann (Eds.), *Sustainability in a Digital World. CSR, Sustainability, Ethics & Governance* (pp. 159–171). Cham: Springer. doi:10.1007/978-3-319-54603-2_13

Rosselet, C. (2013). *Andersherum zur Lösung; Die Organisationsaufstellung als Verfahren der intuitiven Entscheidungsfindung*. Zürich: Versus. doi:10.24096/9783039097371

Santarius, T. (2017). Die dunkle Seite des „smart everything" – Gesellschaft revolutionieren statt Wachstum generieren. Agora, 42(2), 70-74.

Schlötter, P. (2005). Familiar language and its discovery. System constellations are not random - the empirical evidence [Vertraute Sprache und ihre Entdeckung. Systemaufstellungen sind kein Zufallsprodukt - der empirische Nachweis, in German]. Carl-Auer-Verlag.

Scholz, R. W. (2016). Sustainable digital environments: What major challenges is humankind facing? *Sustainability*, *8*(8), 726. doi:10.3390u8080726

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Smith, A. E., & Humphreys, M. S. (2006). Evaluation of unsupervised semantic mapping of natural language with Leximancer concept mapping. *Behavior Research Methods*, *38*(2), 262–279. doi:10.3758/BF03192778 PMID:16956103

Sooknanan, D., Bahadoorsingh, S., Joshi, A., & Sharma, D. P. (2016). Smart Grid Analysis for the Caribbean Region. *West Indian Journal of Engineering*, *38*(2).

Sowa, J. F. (2000). *Knowledge representation: logical, philosophical, and computational foundations* (Vol. 13). Pacific Grove, CA: Brooks/Cole.

Stan, L. (2017). The management of innovation in the context of structural funds. *Manager*, 25.

Sturgeon, N. (2018, July 10). Henry Kissinger pens ominous warning on dangers of artificial intelligence. *RT Question More*. Retrieved July 13, 2018, from https://www.rt.com/news/432425-henry-kissinger-artificial-intelligence/

Teoh, J. E. M., Chua, C. K., Liu, Y., & An, J. (2017). 4D printing of customised smart sunshade. In Challenges for Technology Innovation (Vol. 105, No. 108, pp. 105-108). Routledge in association with GSE Research.

Toonen, H. M., & Bush, S. R. (2018). The digital frontiers of fisheries governance: Fish attraction devices, drones and satellites. *Journal of Environmental Policy and Planning*, 1–13. doi:10.1080/1523908X.2018.1461084

United Nations, Department of Economic and Social Affairs, Population Division. (2017). *World Population Prospects: The 2017 Revision, Key Findings and Advance Tables*. Working Paper No. ESA/P/WP/248.

Walker, B., Carpenter, S., Anderies, J., Abel, N., Cumming, G., Janssen, M., ... Pritchard, R. (2002). Resilience management in social-ecological systems: A working hypothesis for a participatory approach. *Conservation Ecology*, *6*(1), 14. doi:10.5751/ES-00356-060114

Zawacki-Richter, O., & Latchem, C. (2018). Exploring four decades of research in Computers & Education. *Computers & Education*, *122*, 136–152. doi:10.1016/j.compedu.2018.04.001

Zawacki-Richter, O., & Naidu, S. (2016). Mapping research trends from 35 years of publications in Distance Education. *Distance Education*, *37*(3), 245–269. doi:10.1080/01587919.2016.1185079

Zinnöcker, T. (2017). Nachhaltigkeit, Energiewende und Digitalisierung. In A. Hildebrandt & W. Landhäußer (Eds.), *CSR und Digitalisierung. Management-Reihe Corporate Social Responsibility*. Berlin: Springer Gabler. doi:10.1007/978-3-662-53202-7_15

This research was previously published in Responsible, Sustainable, and Globally Aware Management in the Fourth Industrial Revolution; pages 1-28, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 4
Utilization and Applications

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 36
Organizational Learning and Change:
Strategic Interventions to Deal with Resistance

Jieun You
Ohio State University, USA

Junghwan Kim
University of Oklahoma, USA

Doo Hun Lim
University of Oklahoma, USA

ABSTRACT

This chapter discusses organizational learning as a strategic approach for organizational change. In the face of turbulent and uncertain environments, continuous involvement in organizational change is necessary. However, most organizations encounter resistance to change, thus fail to accomplish organizational change despite change efforts. Previous literature explains that resistance to change results from cognitive and psychological processes, social and power relationships, and organizational structural inertia. Given the findings from the previous research, organizational learning theories can provide strategic interventions to effectively deal with resistance and to achieve organizational change goals. The learning organization embrace learning activities – unlearning, experimentation, exploration, double-loop learning, and action learning - to develop the adaptability to environmental changes. This chapter suggests that HR/HRD should play a role in building the learning organization and facilitating organizational learning for change as a change agent.

DOI: 10.4018/978-1-7998-7297-9.ch036

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

In contemporary society, rapidly changing environments and technologies in the local and global context of competition have required business organizations to cope with unpredictable situations through ongoing changes for their sustainable development (Burke, 2014). In order to smoothly ride this global wave of change, organizational learning has been essential to ensure the organizations' change and growth (Argote, 2012). Organizational learning enables members to lead changes to overcome several challenges whinin and outside of an organization and eventually, to accomplish organizational performance and objectives (Gilley & Maycunich, 2000; López, Peón, & Ordás, 2005). Given the usefulness of organizational learning in addressing various organizational issues, many organizations continue to encounter difficulties in effectively managing organizational changes. According to the Mckinsey Global Survey conducted in 2008, only about 30 percent of companies successfully achieve organizational change despite their extensive efforts (Isern & Pung, 2007). Research suggests that many organizations fail to accomplish successful organizational change primarily because most organizations and employees have a natural tendency to resist both organizational learning and change and thus, merely adapt to environments (Agocs, 1997; Beer, Eisenstat, & Spector, 1990; Burke, 2014; Kotter, 1995; Kotter & Schleginer, 1979; Walsh & Ungson, 1991). Namely, the organizational change process may involve an uncomfortable situation that denotes the organizations' and employees' needs to depart from routinized work practices and systems that are sociocultural in nature and have been accumulated over a long period of time (Piderit, 2000). In the face of these challenges, Human Resource (HR) and Human Resource Development (HRD) functions have become more vital in developing and implementing strategies of organizational learning that are well-aligned with business (Beer, Voelpel, Leibold, & Tekie, 2005; Buyens & De Vos, 2001; Gilley, Eggland, & Maycunich, 2002; Gilley & Maycunich, 2000). In the studies on organizations, scholars put emphasis on organizational learning as a strategic initiative for organizational change (Eggland & Maycunich, 2002; Hendry, 1996; Siebenhűner & Arnold, 2007; Sugarmen, 2001). Organizational learning, on the other hand, may inhibit successful organizational changes when it focuses on exploiting existing knowledge and competencies and reproducing the current norms, system, and culture (Hendry, 1996; Levinthal & March, 1993; Walsh & Ungson, 1991). This suggests that as a change agent, a key task of HR is to understand the nature and perspective of resistance within organizational learning. Doing so will facilitate a change process in order to timely achieve the organizational goals of improving individual and organizational performance. In this context, research on organizational learning should view HR/HRD professionals as change agents and provide them with critical implications so they can facilitate and manage organizational learning with strategic considerations and effectively deal with the resistance to organizational change (Crossan & Berdrow, 2003; Garvin, 1993; Kontoghiorghes, Awbre, & Feurig, 2005; Lawrence, Mauws, Dyck, & Kleysen, 2005; March, 1991; Tucker, Edmondson, & Spear, 2002).

Previous studies have provided extensive understandings regarding factors influencing the resistance to change (Baum, 1990; Bovey & Hede, 2001; Kelly & Amburgey, 1991; Reicher, 2004; Szabla, 2007; Thomas & Hardy, 2011) and how to effectively handle the resistance (Brucknman, 2008; Dass & Parker, 1999; Dent, 1999; Fosfuri, 2008; Thomas & Hardy, 2011; Waddell & Sohal, 1998). However, existing studies have paid little attention to how organizational learning can be effectively used for organizational change under the strategic functions of HR/HRD even though roles of organizational learning is repeatedly highlighted in a change process. In particular, there is limited research on the resistance to organizational change in organizational learning studies although organizational learning theories have provided po-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tential strategies to effectively handle the resistance to change issues (Akgün, Byrne, Lynn, & Keskin, 2007; Feldman & Pentland, 2003; Fosfuri & Ronde, 2009; van der Bent, Paauwe, & Williams, 1999).

This chapter aims to investigate how resistance can be compromised through organizational learning and lead to successful organizational change. To that end, we review a wide range of literature on organizational learning and change to identify how organizational learning through HR interventions could be an effective strategy for organizational change by overcoming resistance. This chapter starts with a review of the concept and process of organizational change and factors of resistance to organizational change. We then describe strategies to effectively deal with resistance while discussing organizational learning as a strategic intervention for organizational change. Finally the chapter concludes with suggestions on the specific roles of HR/HRD as a change agent that leads organizational change by overcoming resistances to change, as well as discussions and implications for future research and practice.

ORGANIZATIONAL CHANGE

Since Kurt Lewin (1947) proposed the concept of organizational change as a social nature, there have been various arguments and discussions on organizational change in social science fields (Armenakis & Bedeian, 1999; Armenakis & Harris, 2009; Pettigrew, Woodman, & Cameron, 2001; Woodman, 1989). In the management field, organizational change theories have been developed as one of the core themes embracing two contrasting perspectives. Particularly, these different perspectives have created different analytic frameworks and intervention theories in the management field. While one view assumes that organizational change is episodic, discontinuous, and intentional, the other view perceives that change is constant, continuous, and cumulative. In episodic change, organizations are inertial to change, thus organizational change is driven by external factors.

Organizational change is also a process to overcome organizational inertia and replace the currently existing organizational structure and practice. In episodic change, an organizational change process is based on Lewin's 3-step model of unfreezing, transition, and refreezing. Organizational change begins with recognizing disequilibrium in organization and ends with institutionalizing new behaviors and standards. However, it is difficult for organizations to 'refreeze' new behaviors in episodic change because organizations and their members can relapse into the previous state because of organizational inertia. Accordingly, episodic change interventions place emphasis on cognitive redefinition and restructuring through learning. Change agents play a role as a first mover to create change intentions and to leverage changes in episodic change.

On the other hand, in continuous change, organizations are in the ongoing change state, thus change is a process of ceaseless modifications and adjustments in work processes and organizational practices. In continuous change, images of organization are represented by three concepts, improvisation, translation, and learning. In an ongoing change system, organizations encounter a time gap between change planning and implementation. Improvisation reduces the time gap between planning and implementation so that organizations systematically respond to environmental changes. Translation is an act to adopt and edit change ideas to match with different situations. Organizations enhance and strengthen their knowledge and skills through learning, which includes creating an organizational repertoire for continuous change. In continuous change, a change agent is a sense maker to redirect a change through communication. Although Weick and Quinn (1999) distinguish episodic change and continuous change and provide dif-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ferent processes and interventions, it is certain that organizations should, in both perspectives, improve the continuous adaptability in turbulent environments.

Given that organizational change is critical for organizational performance and survival (Haveman, 1992), it is important for organizations to strategically cope with environmental changes. Thus, organizational change, particularly in the management field, is often regarded as planned and intentional change effort efficiently dealing with the external influencers (Nadler, 1981; Porras & Silvers, 1991; Weick & Quinn, 1999). In line with the viewpoint, scholars have been interested in understanding how and why organizational change occurs so that they can produce interventions to accomplish successful and ongoing organizational change. Kotter (1995) suggested the process for organizational transformation, regarded as one as of the representative perspectives.

Specifically, Kotter (1995) presents eight steps for organizational transformation claiming that people often skip one or more steps, which sets firms to fail at accomplishing their changing goals. First, organizational change process begins with establishing a sense of urgency for motivating people to commit to change. The second step is to build a powerful leading coalition. Their change efforts and successes become a vehicle of major change for the whole organization. Third, a guiding group creates a vision to clarify and direct the change efforts. Next, companies should communicate with their members about their vision and strategies. The fifth step is to empower others to act for change, which helps remove obstacles to change. Sixth, organizations should systematically plan and create short-term achievements. It makes change outcomes visible and employees commit to long-term change process. Seventh, organizations should consolidate improvement and produce a long-term improvement. Lastly, organizations institutionalize new changes into their organizational structure and culture. Kotter's model suggests that organizational change is not achieved in a short-time and by just a few people. Organizations can accomplish their change goals by carefully planning each step and engaging people in the whole change process.

Meanwhile, Armenakis and Harris (2009) propose six themes for successful organizational change in their change model. First, organizations should be aware of the importance of the five change beliefs – discrepancy, appropriateness, efficacy, principal support, and valence - and identify them to motivate people's commitment. Second, the change recipient's involvement and participation are critical for organizational change. Third, organizational diagnosis on change should be conducted effectively and accurately, and the accurate diagnosis pinpoints discrepancy, that is, urgency of organizational change. Fourth, change agents should create readiness for change. Readiness for change is referred to as antecedents of supportive or negative reaction to organizational change. Fifth, it is important to establish and implement strategies to persuade change recipients to recognize urgency of change and to participate in the change process. These strategies include participation, communication, management of information, human resource management practices, formal activities, diffusion practices, and rites and ceremonies. Sixth, assessment of change is important for both readiness for change and institutionalization of change.

Similarly to Kotter (1995), Armenakis and Harris (2005) also highlight that people's participation and involvement in change process are critical for achieving organizational change. Both suggest that communication with change recipients can help them support organizational change and commit to change efforts. However, only a few firms are successful in accomplishing their changing goals despite many change efforts (Beer, Eisenstat & Spector, 1990; Isern & Pung, 2007; Kotter, 1995). In organization studies, resistance to change is widely accepted as a main constraint why organizations fail to successfully accomplish organizational change.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

RESISTANCE TO ORGANIZATIONAL CHANGE

Resistance to organizational change is traditionally regarded as an obstruction to organizational change. In several previous studies, resistance to change is mentioned as something to be "overcome." However, there is a growing perspective that resistance to change can be used as a facilitator of the organizational change process (Agboola, & Salawu, 2011; Ford & Ford, 2010; Fosfuri & Ronde, 2008; Mabin, Forgeson, & Green, 2001; Piderit, 2000; Thomas & Hardy, 2011; Waddell & Sohal, 1998). In this regard, it is important to understand factors influencing resistance to change in order to effectively deal with resistance so that it can contribute to successful organizational change.

Factors of Resistance to Change

Discussions on resistance to change focus on identifying factors of resistance to organizational change, thus proposing strategies to effectively deal with resistance to change. Some scholars explain resistance to change with a cognitive and psychological process (Bovey & Hede, 2001; Kotter & Schleginer, 1979; Szabla, 2007; Vince & Broussine, 1996). Kotter and Schleginer (1979) found reasons why firms fail to accomplish organizational change for people's psychological fears. They claim that change efforts fail because people feel threatened with change and learning, thus change agents or managers need to diagnose resistance to change in organizations and appropriately deal with the resistance. Generally, there are four reasons people resist change. First, people are afraid of losing their own values and privileges due to organizational change. Key stakeholders, such as decision-makers, want to keep their status and power, which makes them resist change so as not to lose their political power. Next, resistance occurs when people do not understand the importance of the expected outcomes of change. Third, people resist change when they believe the cost is higher than the benefit of the change. Fourth, people resist change when they are afraid that they cannot learn and master the new skills and knowledge that the organizational change requires. It often takes a long time for individuals to master new skills and knowledge, but organizational change requires them to adapt to the change quickly. For successful organizational change, change agents and organizational leaders need to predict the reason of the resistance and take action to address the resistance.

Bovey and Hede (2001) also claim that resistance results from an individual's cognitive and emotional process. First, individuals' perception affects resistance to change. As individuals perceive the impact of change on themselves increasing, their resistance to change also increases. Additionally, as the individual's perception of the degree of change control increases, the resistance decreases. Second, irrational ideas or cognitive distortion that individuals hold bring about resistance. A lack of adequate information or compromised relationships between individuals and organizations can reinforce irrational ideas and cognitive distortion. Individuals misestimate the impacts of change, which consequently increases the resistance to change. Third, individuals experience emotions and feelings such as loss, anger, frustration, and grief when they face changes in their job and roles. Failure of emotional adaptation causes resistance during organizational change.

Some scholars pay attention to social aspects as a factor influencing resistance to change. Strebel (1996) explains that employees resist organizational change because of personal compacts with individual employees in organizations. A personal compact means an agreement on "reciprocal obligations and mutual commitments" between employees and organizations. Personal compacts include three dimensions: formal, psychological, and social dimensions. Social dimensions of personal compacts are related

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to building the contexts for organizational change. Unless personal compacts of organizations are revised, the personal compacts can obstruct organizational change and increase the resistance.

Lawrence (1953, 1969) also focuses on the social factors of organizational change and argues that the resistance to change is a reaction to social change. According to Lawrence (1953, 1969), people do not resist a technical change itself. They resist a social change with which a technical change is accompanied. Generally, organizational change is initiated by staff specialists and unless people have a close relationship with staff specialists, they are often excluded. This change process brings about changes in their social and power relationships. Thus, people feel threatened and resistant to change.

On the other hand, Hannan and Freeman (1984) insist that an organization is a "unitary actor" of change (p.155), and organizations have a structural inertia to maintain the current state. It suggests that resistance to change occurs not just as a function of individual cognitive or psychological process but in the organizational system and structure (Agocs, 1997; Dent & Goldberg, 1999; Hannan & Freeman, 1984; Kotter, 1995). When Lewin (1947) introduced the term of resistance, it indicated that an organization itself – system and structure – tends to maintain the current state and resist change. Organizations have a structure that accomplishes the goals or purposes through the individual members' collective actions. Individual actors in organizations agree with building their organizational structure for the common goals even though each individual has his/her own private goals. However, building the organizational structure often requires the organizations and their members to pay expensive costs, which makes it difficult to transform or change (Hannan & Freeman, 1984).

Agocs (1997) also claims that an organization's tendency to resist is institutionalized in their behaviors and structures. She defines institutionalized resistance as "the pattern of organizational behavior that decision makers in organizations employ to actively deny, reject, and refuse to implement, repress, or even dismantle change proposals and initiatives" (p. 918). Resistance to organizational change can occur throughout the whole change process, which is strongly related to political and power issues of relationship among organizational members. Individuals or groups with different power relationships perceive the needs of organizational change and their responsibilities for implementing the change process differently, depending on their status and power. Therefore, it is not easy for all participants or stakeholders to agree in leading and managing organizational change.

Dealing with Resistance to Change

Kotter and Schlesinger (1979) describe several traditional methods that are helpful for overcoming resistance and leading organizational change. First, educating people before change and communicating change ideas with them help people overcome resistance. Through communication, people can share a vision and purpose of organizational change as well as understand urgency of change. Also, communications help organizations overcome the resistance that comes from lack of information or asymmetric information (Armenakis & Harris, 2005; Ford & Ford, 2009; Kotter, 1995). Second, employee participation and involvement inhibit resistance to change. Lawrence (1954; 1969) also mentions that participation is critical for dealing with resistance. This participation facilitates social interaction between managers and employees and helps to lead change agreements between them (Agocs, 1997). The third method is facilitation and support. This method includes providing training programs for new skills and knowledge, listening to employees, and emotionally supporting employees. The fourth method is negotiation and agreement. For example, providing incentives or benefits to potential participants and converting resistors can prevent resistance to change. Fifth, manipulation and co-optation are important for overcoming

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

resistance. Manipulation means "selective use of information and the conscious structuring of events," and co-optation is "giving individuals a desirable role in the design or implementation of the change" (Kotter & Schlesinger, 1979, pp. 110-111). Sixth, managers and change agents push employees to engage in the change process by explicit and implicit coercion. This approach could be useful when a fast change is needed. These methods dealing with resistance are quite familiar and usually inexpensive, but can result in negative effects on organizational change and make organizations pay expensive costs. Hence, it is important to deliberately choose and apply these methods after analyzing an organizational situation and defining organizational change goals and business strategies.

Lawrence (1954; 1969) shows that participation is a key factor influencing resistance to the change. The more employees that participate in the change process, the less organizations face resistance to organizational change. This means that organizational leaders and change agents try to encourage employees to be more involved in an organizational change process. Employee participation in the change process is based on social relationship and interaction among organizational members, which means that resistance to learning and change is affected by social factors. Lawrence (1954) claims that "what employees resist is usually not technical change but social change – the change in their human relationships that generally accompanies technical change" (p. 49). Change has both aspects, technical and social aspects. In particular, the social aspect of change means "the way those affected by it think it will alter their established relationship in the organization" (Lawrence, 1954, p. 52). In other words, social relationship and interaction critically affect the presence of resistance. Organizational change requires employees' collaborative involvement in the change process. In order to facilitate employee participation in the change process and collaboration with each other, leaders should make efforts to facilitate social interaction such as communication with employees. That is why Lawrence (1969) emphasizes that effective communications and collaboration among groups are necessary for implementing organizational change.

Ford and Ford (2009) also suggest that appropriate and sufficient conversations can encourage individuals to engage in the change process and reduce their resistance to change. According to Ford and Ford (2009), there are four types of conversations to encourage employees to participate in an organizational change process: initiative conversation, understanding conversation, performing conversation, and closure conversation. Appropriate and complete conversations encourage employees to understand the change goals and create action for implementation of the change process. In order to accomplish successful organizational change, organizational leaders or change agents need to let employees know detailed and specific information, such as, what they want, when they should do it, how they should do it, and why they should do it. It is not enough to have a plethora of conversations between employees and change agents and leaders; if the conversation is incomplete and inappropriate, it will be unproductive.

Meanwhile, Bruckman (2008) suggests several strategies to overcome resistance to change and to effectively manage organizational change process. First, working with the group provides clues for change success from the previous experiences and behaviors of the group. Second, understanding and confronting people's fear of change are important, because leaders often underestimate people's fear and resistance. Third, it is necessary to consider the group's perspective of change so that the group supports organizational change. Fourth, leaders should build trust through open and honest communication. Fifth, leaders should be honest about their change process and outcomes even though they are not sometimes positive. Sixth, leaders should be willing to compromise with employees for the change plan, because when employees participate in the change process their support also increases. Seventh, the group members should be allowed to take ownership in the change process. Eighth, leaders need to enhance their credibility by keeping their words. Ninth, leaders should reinforce changes by reward-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ing new behaviors. Tenth, leaders often think that financial rewards are the most effective reward, but financial rewards, in fact, have little effect on behavioral change. Eleventh, leaders need to manage both myths and realities within their organization.

Lastly, Bruckman (2008) highlights that leader's integrity is most critical in the change process. Previous research also illustrates that the leader's credibility and integrity is important in order to manage resistance and change (Erhard, Jenson, & Zaffron, 2010; Kouzes & Posner, 1990). The credibility and integrity of organizational leaders and change agents facilitate trust-building between them and employees. High trust between managers and employees reduce employees' fear of change and increase employees' expectation of change benefits (Kotter & Schleginer, 1979). Communication with employees and leader's efforts to stay true to what they say to employees can increase the leader's credibility and integrity and build a trustful relationship between leaders and employees (Erhard et al, 2010; Kouzes & Posner, 1990).

In sum, to overcome resistance to change, most scholars highlight the importance of co-participation/involvement, trust-based dialogue/communication, and strategic supports/interventions from leaders, managers, and each organization wide. Those factors are closely related to the process of facilitating organizational learning and building learning organizations. In the next sections, we discuss how organizational learning could be a strategic approach to organizational change by compromising resistance to change.

ORGANIZATIONAL LEARNING AND CHANGE

Given that changes in knowledge and technologies are more unpredictable and competition is increasingly serious, it is more valuable for firms to be continuously involved in organizational learning and change (Dodgson, 1993; Watkins & Marsick, 1993). However, it is also true that organizational learning contributes to establishing an organization's own structure, routines, norms, and culture, which enables organizations to maintain their identity and to survive from environmental changes (Lave & Wenger, 1991; Levitt & March, 1988; van der Bent, Paauwe, & Willliams, 1999; Walsh & Ungson, 1991).

Organizational Learning and Resistance to Change

Although organizations try to engage their members in organizational learning, organizations and individuals focus on learning and reproducing organizational routines. In this respect, organizational learning is based on past experiences and organizational history. Under the uncertainty of environmental change, organizations try to maintain their identity, structure, and culture through the organizational learning process in order to survive competition (Levitt & March, 1988). This means that organizations and individuals are conservative and resistant to the change believing that it can be a potential threat to the survival of organizations. Organizational learning that reinforces the organizational structure and culture contributes to keeping an organizational identity despite the high turnover of organizational members.

Lave and Wenger (1991) mention that it is hard to change the organizational structure and culture because organizations have a tendency to maintain their structure including norms, rules, and routines. Even though new members with different perspectives or knowledge enter an organization, it is difficult to determine whether an organization changes their behavior or goals because they become accustomed to the organization's norms, rules, and routine. Organizations, thus, can maintain their identity and goals by resisting the change and keeping their current state despite constant replacement of individual members.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Organizational learning theories argue that organizations build their own memory throughout the organizational learning process to store and accumulate the organizational structure, culture, rules, and beliefs from organizational history and experiences (Levitt & March, 1988; Walsh & Ungson, 1991). Walsh and Ungson (1991) define organizational memory as "stored information from an organization's history that can be brought to bear on present decisions (p. 61)." Organizational memory can often be a barrier of organizational change even though it is useful for effective and efficient decision making in organizations. For decision making, organizations can automatically retrieve information from organizational memory, but automatic retrieval of information can prevent organizations from discarding existing knowledge and learning new knowledge for organizational change. Organizational leaders tend to follow the organizational routines as well because of a fear of wrong decision making when organizations face a new situation that requires organizational change (Walsh & Ungson, 1991).

As mentioned above, research on organizational learning suggests that organizational learning can be a barrier to organizational change even though it can play a positive role in leading and managing organizational change. Organizations and their members are forced to follow organizational routines but avoid unfamiliar and strange experiences that may pose potential threats to them. Organizations, hence, are afraid of "unlearning" the past routines and "learning" new experiences and knowledge, even though "unlearning" is necessary for organizational change and innovation (Hedberg, 1981). Furthermore, it suggests that if organizations and their members successfully unlearn, the resistance to change can be overcome. Similarly, Bain (1998) explains the resistance to organizational learning using a psychological term, "social defense". Organizations have social defenses against organizational learning and change because they are anxious about breaking their "system domain". A system domain includes organizational primary task, organizational structure and culture, policies and procedures, training, technology, knowledge, and environment. Organizations and individuals unconsciously tend to deny giving up their system domain because organizational change often results in stress and anxiety.

Meanwhile, organizational learning research focuses on learning outcomes such as organizational structure and culture embedded in organizations and their members in order to explain the resistance to learning and change. Individuals share organizational knowledge, beliefs, and norms with other organizational members through organizational learning processes, which contribute to building distinguished organizational system, culture, and structure. Such learning process and outcomes are important for stability and survival of organizations, even though it makes organizations and individuals fearful of organizational change.

In contrast, organizational routines and memory can be a source of change (Feldman & Pentland, 2003; van der Bent, Paauwe, & Williams, 1999). In a traditional perspective, organizational routines, and memory enhance organizational efficiency by reproducing a fixed structure and system. Thus, organizational routines and memory are considered unchangeable despite environmental change. However, in a new perspective, organizational routines and memory are flexible, which suggests that organizational routines and memory are continuously adjusted and modified to specific situational change (Feldman & Pentland, 2003). Endogenous and gradual changes in organizational routines and memory help people reduce their fear to change and balance between organizational stability and change under the uncertainty that consequences of organizational change are unpredictable (Feldman & Pentland, 2003; van der Bent, Paauwe, & Williams, 1999; Waddell & Sohal, 1998). Resistance to change can also play a role in revealing potential problems or conflicts which may occur during the change process and consequently result in a failure to achieve organizational change (Ford & Ford, 2009; Thomas & Hardy, 2011; Waddell & Sohal, 1998). Given that organizational change is an ongoing process, the resistance to change needs to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

be prioritized as the first matter in order to continuously identify and fix situations and problems that may inhibit organizational change and bring about unexpected outcomes (Waddell & Sohal, 1998). It indicates that resistance to change can be considered part of the organizational learning process (Agyris, 1997; Rerul & Feldman, 2011).

Accordingly, given that organizational learning is an adjustment process between the existing organizational structure and culture and new changes and possibilities (Agyris, 1977; Crossan et al., 1999; Lave & Wenger, 1991; March, 1991), organizational learning can provide effective interventions for change. Appropriate learning interventions enable change agents use the resistance to change as a strategic tool to cope with environmental changes (Feldman & Pentland, 2003; Fosfuri & Ronde, 2009; Piderit, 2000).

Organizational Learning: Strategic Intervention for Organizational Change

It is not doubtful that organizational learning is critical for change despite arguments on organizational learning and change. In learning perspective, organizational change is an "iterative process," where organizations continuously engage in learning and change process in order to adapt to environmental change and enhance their competitiveness (Sackmann, Eggenhoger-Rehart, & Friesl, 2009). And, such processes encompass both organization's internal structures, systems, and culture and external environmental and technological changes. Organizational learning theories suggests that organizational learning can provide strategic interventions to effectively deal with resistance to change and to successfully accomplish organizational change.

According to organizational learning and related literature from management field, organizations can create sustainable and successful organizational change by building a learning organization (Akgün, et al., 2007; Alas & Sharifi, 2002; Garvin, 1993; Hendry, 1996; Rowden, 2001; Sibenhüner & Arnold, 2007; Sugarmen, 2001). Garvin (1993) defines a learning organization as "an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights (p. 80)." A learning organization is involved in five main learning activities: 1) systematic problem solving, 2) experimentation, 3) learning from past experience, 4) learning from others, and 5) knowledge transfer. Such learning activities begin with new ideas and insights, which stimulate organizational change and improvement. A learning organization can engage in an organizational change process by incorporating these learning activities into their daily work and routines (Garvin, 1993).

Hendry (1996) expanded the concept of learning organization into communities-of-practices, where organizational learning theories converge towards strategies for organizational change. Communities-of-practice are learning places, which integrates learning and work activities. Communities-of-practices enable experimentation and action learning (Hendry, 1996). In communities-of-practice, members learn organizational policies, norms, and cultures which the organization has accumulated from other members. At the same time, they accept new knowledge, rules, and culture from new members. Through such activities, communities-of-practice engages in a continuous organizational change process (Lave & Wenger, 1991). Communities-of-practice highlights learning as a social process, thus communication and social relationship play a critical role for strategic learning and change (Hendry, 1996).

Meanwhile, March (1991) claims that organizations should explore new possibilities and alternatives in order to adapt to environmental changes. Organizations tend to increase exploitation of the existing capabilities and decrease exploration of the new ones in organizational learning because it is time- and -cost efficient and requires less efforts. However, learning organizations explore new knowledge and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

possibilities through continuous experimentation activities, which contributes to improving organizational performance and competitiveness.

Agyris (1977) also suggests that learning organizations can participate in a change process through double-loop learning, where organizations review and question their existing structure, norms, and policies and create new alternatives. Contrary to single-loop learning, which focuses on detecting and correcting organizational errors, double-loop learning helps overcome resistance to change and contributes to a long-term success of organizational change. Double-loop learning is "questioning the underlying organization policies and objectives (Agyris, 1977, p. 116)." Single-loop learning contributes to maintaining the organization's current state or to achieving short-term change goals. Single-loop learning enables people to reduce their resistance to change by achieving short-term and little gains (Agyris, 1977; Kotter, 1995). Organizational norms embedded within the organization inhibit double-loop learning and reinforce the existing policies and norms. Thus, organizations are relatively unfamiliar with double-loop learning. However, it is important for organizations to establish the learning system to facilitate double-loop learning in order to respond to the uncertain environmental change and accomplish the sustainable and fundamental change (Agyris, 1977).

In the learning organization, given that organizational memory can bring about resistance to change, unlearning is critical for organizational change (Akgün et al., 2007; Becker, 2008; Rampersad, 2004; Tsang & Zahra, 2008). Huber (1981) argues that when organizations do not "unlearn," the organizational learning process is incomplete. Tsang and Zahra (2008) refers to unlearning as "the discarding of old routines to make way for new ones, if any (p.1437)." Recognition of organizational problems initiates urgency of organizational change, which causes resistance to change. Resistance to change is an expression to conflicts between the existing organizational policies and rules and the new ones. Thus, organizational unlearning enables organizations and individuals to overcome resistance to change by eliminating organizational memory.

According to Akgün et al. (2007), organizational unlearning is a catalyst of organizational learning and change process and promotes double-loop learning in learning organizations. Organizations can be involved in the continuous organizational change by participating in four types of unlearning: reinventive unlearning, formative unlearning, adjusting unlearning, and operative unlearning depending upon conditions of environmental changes (Akgün et al., 2007). First, reinventive unlearning is the fundamental changes in organizational routines and beliefs, which occurs as a response to uncertain environmental changes. Second, formative unlearning indicates the creation of new belief system and incremental changes in organizational routines. Third, adjusting unlearning is defined as incremental changes in organizational belief systems and fundamental changes in organizational routines. Fourth, operative unlearning indicates the incremental changes in organizational beliefs and routines. In this context, organizational change is less unpredictable and uncertain, thus organizations relatively maintain stability.

During the organizational change process, organizational learning and unlearning are interrelated, and organizational learning often requires unlearning. When organizations are forced to build new beliefs, norms, or routines, organizational inertia refuses organizational changes, which are perceived as threats or fear for organizations. Organizational unlearning helps organizations to reduce organizational inertia and resistance to change by discarding the existing beliefs and routines (Tsang & Zahra, 2008). Rowden (2001) claims that learning organization-focused planning for strategic change aims to integrate constant change readiness, continuous planning, improvised implementation, and action learning. Rowden (2001)'s learning organization-focused model of strategic change planning suggests that the learning organization can be used as a strategic intervention to effectively handle resistance to change and to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

accomplish organizational change. Four components in Rowden (2001)'s model embrace strategies for organizational change that previous research suggests as follows.

1. **Constant Readiness:** The learning organization is in a constant state of readiness for change (Rowden, 2001). Armenakis et al. (1993) define readiness as "the cognitive precursor to the behaviors of either resistance to, or support for, a change effort (p. 682)." A process to create readiness for organizational change is an integrative and system model including individual and organizational factors, and contextual factors, rather than simply a strategic approach to overcome resistance (Armenakis et al., 1993; Armenakis & Harris, 2009).
2. **Continuous Planning:** In the learning organization, people are involved in change planning and continuously revise change plans. Change plans are not created by senior management, but should be shared throughout the whole organization (Rowden, 2001). Senior management is willing to revise and adjust change plans when needed (Bruckman, 2008). When organizational members participate in change planning and share vision and goals of change through communication, resistance to change can be reduced (Kotter, 1995; Lawrence, 1953, 1969).
3. **Improvised Implementation:** The learning organization improvises changes. That is, every member can improvise changes with his or her own spontaneous and creative ways (Rowden, 2001). The senior management encourages people to seek creative and innovative ways through experimentation and explorative learning (Garvin, 1993; March, 1991), and rewards their small and short-term wins (Bruckman, 2008; Kotter, 1995). Accumulation of small wins motivates continuous change efforts and reinforces institutionalization of organizational change (Kotter, 1995). In the learning organizations, people collaborate with each other for exploration and experimentation. Teamwork and collaboration promote experimentation and exploration for change (Bruckman, 2008).
4. **Action Learning:** Organizational change is an ongoing process, where the learning organization takes action, reflects, and modifies the change efforts. Through continuous reevaluation, the leaning organization can accomplish fundamental and transformative changes in organizational routines (Rowden, 2001).

The learning organization integrates concepts of organizational learning for strategic change and strategic interventions to deal with resistance to change. Accordingly, the strategies to promote a learning organization can encourage people to effectively handle resistance and to be involved in the continuous change process.

DISCUSSIONS AND IMPLICATIONS

This chapter reviews organizational learning and change literature focusing on a strategic approach to handle resistance to change. From comprehensive literature review, the chapter suggests that the organizational learning as a strategic intervention can contribute to effectively dealing with resistance to change and leading and managing organizational change. While organizations are forced to continuously engage in organizational change, they inevitably encounter resistance to change. Despite their change efforts, resistance to change may result in the failure of fundamental change of organizations. A traditional perspective regards resistance to change as negative and something to be overcome, but a recent perspective suggests that resistance to change can be used in a productive way for organizational change.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Organizational learning theories suggest that resistance to change plays a strategic role in a change process by helping maintain a balance between change and stability (Waddell & Soral, 1998). Namely, organizational learning is a process to identify and overcome the resistance to change in order to successfully accomplish organizational change. In particular, the learning organization provides strategic interventions for continuous organizational change. The learning organization expands organizational adaptive capability and reinforces creative and innovative changes. Accordingly, the management needs to nurture the learning organization for organizational performance and change. For the learning organization, the management supports employees' participation in organizational learning (Marsick & Volpe, 1999; Skule, 2004).

In addition, the management should allow employees to learn their mistakes and failures (Garvin, 1993). The management's rigid attitudes toward mistakes and failures make employees afraid of exploration and experimentation. That is, the management should not just blame the resistance, but use it strategically by facilitating communication and interaction among employees (Ford & Ford, 2009; Siebenhűner & Arnold, 2007). In order to foster the learning organization, the management needs to empower employees and allow them to enhance the autonomy and leadership (Yang, Watkins, & Marsick, 2004). Employees' voluntary and spontaneous participation in the learning and change process helps them overcome resistance and commit to learning and change (Kotter, 1995).

Furthermore, HR/HRD should align interventions of the learning organization with the whole organizational change goals and collaborate with other parts of organizations. The organizational change process is a complicated and long-term process. It is easy to lose direction and goals when organizations focus on providing change programs (Beer et al., 1990; Schaffer & Thomson, 1992). HR/HRD functions also need to repeatedly clarify their goals of change when providing learning interventions for organizational change. Strategic alignment with organizational goals and collaboration with the whole organization helps HR/HRD play a strategic role in organizational change and enhances their strategic importance in the organization.

Roles of Human Resources as a Change Agent

Concepts of organizational learning and appropriate application of the concepts to strategies for learning organization create alternatives to overcome resistance to change and to accomplish organizational change. For strategic organizational change, change agents play a central role in the learning and change process.

First, as a change agent, HR/HRD should build a learning organization and strategically integrate a learning organization with a change process (Hendry, 1996; Gilley & Maycunich, 2002). HR/HRD needs to understand the purpose of the change and the goals of the whole organization and plan and implement a learning process. Even though it is hard to predict the directions and pace of environmental change, HR/HRD should establish learning and change goals as a change agent. This approach provides motivations for change and leads learning and change efforts, which help organizations achieve improved results of change (Schaffer & Thomson, 1992). In addition, HR/HRD should redirect organizational change when facing specific situations and changes in a continuous change process (Weick, & Quinn, 1999).

Next, HR/HRD needs to diagnose organizational readiness for change and resistance to change. In learning organizations, resistance should be renamed as a response to a change, which can be a change initiative to diagnose readiness for change and to direct change efforts (Ford & Ford, 2010; Pidertit, 2000; Waddell & Sohal, 1998). Resistance identifies fallacies and errors in a change process, and HR/HRD can fix them and revise change strategies based on diagnosis of resistance (Rowden, 2001; Waddell

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

& Sohal, 1998). Resistance reveals conflict between stability and change, which help organizations and individuals recognize urgency of change. Resistance also enables people to balance between exploitation and exploration, and learning and unlearning (Akgün et al., 2007). Thus, HR/HRD should play a role in diagnosing readiness for change and persuade urgency of change to organizational members.

Moreover, HR/HRD should lead and facilitate communication among individuals. Scholars highlight the importance of communication in a change process (Armenakis & Harris, 2009; Bruckman, 2009; Ford & Ford, 2009, 2010; Kotter, 1995). As a change agent, HR/HRD can initiate organizational change and enhance people's participation through appropriate and effective conversations (Ford & Ford, 2009). Furthermore, HR/HRD needs to facilitate and guide communication between management and employees. Honest and open communication can reduce resistance to change and promote people's commitment to organizational change (Bruckman, 2009).

HR/HRD also needs to consider and integrate interests of all stakeholders in a change process. Different perspectives and interests of organizational changes among stakeholders can bring about conflicts and resistance to change within organizations (Buchanan & Badham, 1999; Feldman & Pentland, 2003; Lawrence, 1954, 1969). As Lawrence et al. (2006) suggest, organizational learning and change is a dynamic process of social psychological and political factors. Given that organizational learning and change is a collective action of individual learning and change, HR/HRD needs to interpret power-relations and lead cooperation and collaboration for learning and change (Gravenhorst, 2003; Lawrence et al., 2006). Furthermore, HR/HRD should not only promote integrity and credibility but also help the top management to enhance their integrity and credibility through education (Bruckman, 2009; Erhard et al., 2010; Kouzes & Posner, 1990). For the integrity and credibility, HR/HRD itself focuses on action rather than words as well as facilitates action learning among organizational members.

FUTURE RESEARCH DIRECTIONS

The chapter brings out several implications for future research. At first, even though there are numerous studies on organizational learning and change, there is a relative lack of empirical research on the change process in the learning organization. In particular, there is little empirical research to identify how resistance to change plays a role in organizational learning and change within the learning organization. Future research hence may conduct empirical research and identify evidences to show the strategic importance of learning organization for organizational change.

In addition, in the change process, most scholars highlight the importance of communication, trust, and social relationship. In order to explain the impact of social factors such as communication and trust on organizational learning and change, future research may adopt a social network approach (Burkhardt & Brass, 1990; Tenkasi & Chesmore, 2003).

Finally, although previous literature suggests that power or politics is critical for organizational learning and change, there is little empirical research on the role of power-relationship in organizational learning and change. Therefore, future research needs to have a positive approach to examine the impact of power-relationship on organizational learning and change and provide guidelines or evidences for political approach in organizational learning and change.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Agboola, A. A., & Salawu, R. O. (2011). Managing deviant behavior and resistance to change. *International Journal of Business and Management*, *6*(1), 235–242.

Agocs, C. (1997). Institutionalized resistance to organizational change: Denial, inaction, and repression. *Journal of Business Ethics*, *16*(9), 917–931. doi:10.1023/A:1017939404578

Akgün, A. E., Byrne, J. C., Lynn, G. S., & Keskin, H. (2007). Organizational unlearning as changes in beliefs and routines in organizations. *Journal of Organizational Change Management*, *20*(6), 794-812. doi:10.1108/09534810710831028

Alas, R., & Sharifi, S. (2002). Organizational learning and resistance to change in Estonian companies. *Human Resource Development International*, *5*(3), 313–331. doi:10.1080/13678860210143550

Argote, L. (2012). *Organizational learning: Creating, retaining and transferring knowledge* (2nd ed.). New York, NY: Springer.

Armenakis, A. A., & Bedeian, A. G. (1999). Organizational change: A review of theory and research in the 1990s. *Journal of Management*, *25*(3), 293–315. doi:10.1177/014920639902500303

Armenakis, A. A., & Harris, S. G. (2009). Reflections: Our journey in organizational change research and practice. *Journal of Change Management*, *9*(2), 127–142. doi:10.1080/14697010902879079

Bain, A. (1998). Social defenses against organizational learning. *Human Relations*, *51*(3), 413–429. doi:10.1177/001872679805100309

Beer, M., Eisenstat, R., & Spector, B. (1990). Why change programs don't produce change. *Harvard Business Review*, *68*(6), 158–166. PMID:10107960

Beer, M., Voelpel, S. C., Leibold, M., & Tekie, E. B. (2005). Strategic management as organizational learning: Developing fit and alignment through a disciplined process. *Long Range Planning*, *38*(5), 445–465. doi:10.1016/j.lrp.2005.04.008

Bovey, W. H., & Hede, A. (2001). Resistance to organizational change: The role of cognitive and affective process. *Leadership and Organization Development Journal*, *22*(8), 372–382. doi:10.1108/01437730110410099

Bruckman, J. C. (2009). Overcoming resistance to change: Causal factors, interventions, and critical values. *The Psychologist Manager Journal*, *11*(2), 211–219. doi:10.1080/10887150802371708

Buchanan, D., & Badham, R. (1999). Politics and organizational change: The lived experience. *Human Relations*, *52*(5), 609–629. doi:10.1177/001872679905200503

Burke, W. W. (2014). *Organization change: Theory and practice*. Thousand Oaks, CA: Sage.

Burkhardt, M. E., & Brass, D. J. (1990). Changing patterns or patterns of change: The effects of a change in technology on social network structure and power. *Administrative Science Quarterly*, *35*(1), 104–127. doi:10.2307/2393552

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Buyens, D., & De Vos, A. (2001). Perception of the value of the HR function. *Human Resource Management Journal*, *11*(3), 70–89. doi:10.1111/j.1748-8583.2001.tb00046.x

Crossan, M. M., & Berdrow, I. (2003). Organizational learning and strategic renewal. *Strategic Management Journal*, *24*(11), 1087–1105. doi:10.1002mj.342

Dodgson, M. (1993). Organizational learning: A review of some literatures. *Organization Studies*, *14*(3), 375–394. doi:10.1177/017084069301400303

Erhard, W., Jensen, M., & Zaffron, S. (2010). *Integrity: A positive model that includes morality, ethics, legality, and sincerity.* Harvard Business School NOM Working Paper, no. 10-61.

Feldman, M. S., & Pentland, B. T. (2003). Reconceptualizing organizational routines as a source of flexibility and change. *Administrative Science Quarterly*, *48*(1), 94–118. doi:10.2307/3556620

Ford, J., & Ford, L. (2009). *The four conversations: Daily communication that gets results*. San Francisco: Berrett-Koehler.

Ford, J. D., & Ford, L. W. (2010). Stop blaming resistance to change and start using it. *Organizational Dynamics*, *39*(1), 24–36. doi:10.1016/j.orgdyn.2009.10.002

Fosfuri, A., & Rønde, T. (2008). Leveraging resistance to change and the skunk works model of innovation. *Journal of Economic Behavior & Organization*, *72*(1), 274–289. doi:10.1016/j.jebo.2009.05.008

Garvin, D. (1993). Building a learning organization. *Harvard Business Review*, *71*(4), 78–91. PMID:10127041

Gilley, J., Eggland, T., & Maycunich, A. (2002). *Principles of human resource development*. New York, NY: Perseus.

Gilley, J. W., & Maycunich, A. (2000). *Organizational learning, performance, and change: An introduction to strategic human resource development*. New York, NY: Perseus.

Hannan, M. T., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, *49*(2), 149–164. doi:10.2307/2095567

Haveman, H. A. (1992). Between a rock and a hard place: Organizational change and performance under conditions of fundamental environmental transformation. *Administrative Science Quarterly*, *37*(1), 48–75. doi:10.2307/2393533

Hendry, C. (1996). Understanding and creating whole organizational change through learning theory. *Human Relations*, *49*(5), 621–641. doi:10.1177/001872679604900505

Isern, J., & Pung, A. (2007). Harnessing energy to drive organizational change. *The McKinsey Quarterly*, *1*, 16–19.

Kontoghiorghes, C., Awbre, S. M., & Feurig, P. L. (2005). Examining the relationship between learning organization characteristics and change adaptation, innovation, and organizational performance. *Human Resource Development Quarterly*, *16*(2), 185–212. doi:10.1002/hrdq.1133

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kotter, J. P. (1995). Leading change: Why transformation efforts fail. *Harvard Business Review*, *73*(2), 59–67.

Kotter, J. P., & Schlesinger, L. A. (1979). Choosing strategies for change. *Harvard Business Review*, *57*(2), 106–114. PMID:10240501

Kouzes, J. M., & Posner, B. Z. (1990). The credibility factor: What followers expect from their leaders. *Management Review*, *79*(1), 29–33.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press. doi:10.1017/CBO9780511815355

Lawrence, P. (1954). How to deal with resistance to change. *Harvard Business Review*, *32*(3), 49–57.

Lawrence, P. R. (1969). How to deal with resistance to change. *Harvard Business Review*, *47*(1), 4–17.

Lawrence, T. B., Mauws, M. K., Dyck, B., & Kleysen, R. F. (2005). The politics of organizational learning: Integrating power into the 4I framework. *Academy of Management Review*, *30*(1), 180–191. doi:10.5465/AMR.2005.15281451

Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology*, *14*(1), 319–340. doi:10.1146/annurev.so.14.080188.001535

Lewin, K. (1947). Frontiers in group dynamics. *Human Relations*, *1*(1), 5–41. doi:10.1177/001872674700100103

López, S. P., Peón, J. M. M., & Ordás, C. J. V. (2005). Organizational learning as a determining factor in business performance. *The Learning Organization*, *12*(3), 227–245. doi:10.1108/09696470510592494

Mabin, V. J., Forgeson, S., & Green, L. (2001). Harnessing resistance: Using the theory of constraints to assist change management. *Journal of European Industrial Training*, *25*(2-4), 168–191. doi:10.1108/EUM0000000005446

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*(1), 71–87. doi:10.1287/orsc.2.1.71

Marsick, V. J., & Volpe, M. (1999). The nature and need for informal learning. In V. J. Marsick & M. Volpe (Eds.), *Informal learning on the job* (Vol. 3). San Francisco: Berrett-Koehler. doi:10.1177/152342239900100302

Nadler, D. A. (1981). Managing organizational change: An integrative perspective. *The Journal of Applied Behavioral Science*, *17*(2), 191–211. doi:10.1177/002188638101700205

Pettigrew, A. M., Woodman, R. W., & Cameron, K. S. (2001). Studying organizational change and development: Challenges for future research. *Academy of Management Journal*, *44*(4), 697–713. doi:10.2307/3069411

Piderit, S. K. (2000). Rethinking resistance and recognizing ambivalence: A multidimensional view of attitudes toward an organizational change. *Academy of Management Review*, *25*(4), 783–794.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Porras, J. I., & Silvers, R. C. (1991). Organization development and transformation. *Annual Review of Psychology*, *42*(1), 51–78. doi:10.1146/annurev.ps.42.020191.000411 PMID:18759634

Rowden, R. W. (2001). The learning organization and strategic change. *S.A.M. Advanced Management Journal*, *66*(3), 11–24.

Schaffer, R. H., & Thomson, H. A. (1992). Successful change programs begin with results. *Harvard Business Review*, *1992*(January-February), 80–89. PMID:10119715

Siebenhüner, B., & Arnold, M. (2007). Organizational learning to manage sustainable development. *Business Strategy and the Environment*, *16*(5), 339–353. doi:10.1002/bse.579

Skule, S. (2004). Learning conditions at work: A framework to understand and assess informal learning in the workplace. *International Journal of Training and Development*, *8*(1), 8–17. doi:10.1111/j.1360-3736.2004.00192.x

Strebel, P. (1996). Why do employees resist change? *Harvard Business Review*, *74*(3), 86–92.

Sugarmen, B. (2001). A learning-based approach to organizational change: Some results and guideline. *Organizational Dynamics*, *31*(1), 62–76. doi:10.1016/S0090-2616(01)00041-9

Szabla, D. B. (2007). A multidimensional view of resistance to organizational change: Exploring cognitive, emotional, and intentional responses to planned change across perceived change leadership strategies. *Human Resource Development Quarterly*, *18*(4), 525–558. doi:10.1002/hrdq.1218

Tenkasi, R. V., & Chesmore, M. C. (2003). Social networks and planned organizational change: The impact of strong network ties on effective change implementation and use. *The Journal of Applied Behavioral Science*, *39*(3), 281–300. doi:10.1177/0021886303258338

Thomas, R., & Hardy, C. (2011). Reframing resistance to organizational change. *Scandinavian Journal of Management*, *27*(3), 322–331. doi:10.1016/j.scaman.2011.05.004

Tucker, A. L., Edmondson, A. C., & Spear, S. (2002). When problem solving prevents organizational learning. *Journal of Organizational Change Management*, *15*(2), 122–137. doi:10.1108/09534810210423008

Van der Bent, J., Paauwe, J., & Williams, R. (1999). Organizational learning: An exploration of organizational memory and its role in organizational change processes. *Journal of Organizational Change Management*, *12*(5), 377–404. doi:10.1108/09534819910289084

Waddell, D., & Sohal, A. S. (1998). Resistance: A constructive tool for change management. *Management Decision*, *36*(8), 543–548. doi:10.1108/00251749810232628

Walsh, J. P., & Ungson, G. R. (1991). Organizational memory. *Academy of Management Review*, *16*(10), 57–91. doi:10.5465/AMR.1991.4278992

Watkins, K. E., & Marsick, V. J. (1993). *Sculpting the learning organization*. San Francisco: Jossey-Bass.

Weick, K. E., & Quinn, R. E. (1999). Organizational change and development. *Annual Review of Psychology*, *50*(1), 361–386. doi:10.1146/annurev.psych.50.1.361 PMID:15012461

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Woodman, R. W. (1989). Organizational change and development: New arenas for inquiry and action. *Journal of Management*, *15*(2), 205–228. doi:10.1177/014920638901500205

Yang, B., Watkins, K. E., & Marsick, V. J. (2004). The construct of the learning organization: Dimensions, measurement, and validation. *Human Resource Development Quarterly*, *15*(1), 31–55. doi:10.1002/hrdq.1086

KEY TERMS AND DEFINITIONS

Double-Loop Learning: A learning method to question and change organizational underlying policies, norms and assumptions.

Explorative Learning: A learning method to seek new possibilities and alternatives to adapt to environmental change through continuous experimental activities.

Learning Organization: An organization that continuously develops its competitiveness by creating and transferring new knowledge and insights.

Organizational Change: A planned change in organizational structure and culture to respond and adapt to environmental changes.

Organizational Learning: A constant process to create, acquiring, and sharing knowledge within the whole organization.

Resistance to Change: A reaction or response to a change. It can be either an initiative of change or inhibitor of change.

Unlearning: A process to discard the existing knowledge and routines to acquire new knowledge.

This research was previously published in the Handbook of Research on Human Resources Strategies for the New Millennial Workforce; pages 310-328, copyright year 2017 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 37
Facing Organizational Change:
An Italian Perspective on Six Challenges for Organizational Change Practitioners

Filippo Ferrari
https://orcid.org/0000-0002-7509-2320
University of Bologna, Italy

ABSTRACT

This chapter aims to present the obstacles both scholars and practitioners must overcome in facing organizational change. Indeed, too often practitioners lack any rigorous evidence-based background and rely on their previous experience and common sense. At the same time, scholars too often work in a very separated academic world, thus ignoring the actual problems that professionals face in actual firms. Being both a scholar and a practitioner, the author highlights the common challenges likely to be faced by change agents when facilitating organizational change: recognizing the readiness of the involved people to change, their skill mismatch, their previous change history, and the level of cynicism. A fully reflective change agent must consider these factors in designing and implementing an evidence-based organizational change and development (EBOCD) initiative and change agency process if he or she wishes to achieve positive outcomes both from the organizational and the involved people's point of view.

INTRODUCTION

EBOCD: The Training and Consulting Process and Change Resistance

As suggested by current literature (see for instance Hamlin in Chapter 1 of this book), the impact of organizational change (OC) pressures have resulted in several undesirable and unwanted outcomes at every organizational level, and not least increasing stress levels at work (see, for example, Hamlin, 2001; Gunnigle, Lavelle & Monaghan, 2013; Shook & Roth, 2011). Facing successfully the impact of OC and, more generally, working with managers of an organization during this change is the real current challenge of both HR managers and practitioners. In fact, continues Hamlin in this book, when

DOI: 10.4018/978-1-7998-7297-9.ch037

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

top managers initiate programs of organizational change and development (OCD) they tend to rely on lower level managers to facilitate and implement the change processes. Thus, in a very real sense, most managers in most organizations are agents of change (Axley, 2000); but regrettably many if not most are not skilled in OCD change agency. Consequently, there is an argument that they need the support of colleague HR functional specialists who happen to be skilled as change agents.

However, as Hamlin (2016) has discussed elsewhere, "one of the major challenges facing contemporary managers and HRD professionals is how best to help people through the transitions of change, and to survive or thrive in working environments that are in a constant state of flux" (p.121). Therefore, to make the organizational change easier to facilitate, management literature should (Hamlin, this book): (i) highlight certain obstacles to OCD; and (ii) describe/illustrate how these may be overcome based on change agents using 'best evidence' to inform, shape and critically evaluate their OCD initiatives, such as that resulting from collaborative 'professional partnership research' and empirical generalization 'replication research' (see Chapter 1).

Regarding the potential obstacles, Miller, Johnson, and Grau (1994) posit that while the failure to successfully implement planned change may be attributed to many factors, few issues are as critical as the employees' *attitudes toward change*. Rafferty and Restubog (2013) agree with this conclusion and argue that "change readiness is the most prevalent positive attitude toward change that has been studied in the organizational change literature" (p.111). Indeed, in a review of the literature, Bouckenooghe (2010) concluded that over 90% of conceptual work on change attitudes has been conducted on either 'change readiness' or 'resistance to change'. As suggested by several authors (Altman & Iles, 1998; By, 2005; Davidson & De Marco, 1999; Dunphy & Stace, 1999) an organizational change is a continuous learning process (see also Burnes, 1996; 2004). Following this approach, a firm's specific knowledge and the ability to transfer it is considered a key strategic asset for generating competitive advantage (Spender & Grant, 1996). Knowledge is viewed as the sum of expertise, skills, and abilities applied by individuals in the form of theoretical knowledge and actions taken to solve problems (Davenport & Prusak, 1998). Therefore, the field of *Organizational Learning Theories* offers a well-suited theoretical background to better understand the relevance of knowledge preservation during change processes in organizations. In fact, an organizational change can trigger a highly disruptive knowledge process that could in turn lead to skill obsolescence, skill shortage, and/or skill mismatch of the involved employees. However, empirical literature on change management has until now paid scarce attention to the role played by knowledge and skills in change processes (Reed & Vakola, 2006).

Beyond the role played by the training process in ensuring a proper level of skill-based readiness to change, the difficulty of accomplishing this task is highlighted in extensive and expanding literature devoted to the problems of change fatigue and cynicism among personnel (Wanous, Reichers, & Austin, 2000). Understanding negative employee reactions to change is important: change efforts often fail because organizations and their leaders underestimate the importance of employee reactions to the change process (Choi, 2011; Greenhalgh, Macfarlane, Bate, & Kyriakidou, 2004; Self, Armenakis, & Schraeder, 2007). As recently suggested by Brown, Kulik, Cregan, and Metz (2017) "Employee change cynicism represents a relatively malleable form of cynicism (i.e., an attitude rather than a trait)" (p.5). Thus, the organization's approach to change has the potential to influence the level of employee cynicism (Andersson & Bateman, 1997; Davis & Gardner, 2004; Wanous et al., 2000).

As suggested by Bordia, Hobman, Jones, Gallois, and Callan (2011), change research has largely focused on understanding employee reactions to one particular change episode and overlooked the fact that "past events play an important role in shaping employee reactions to current organizational events"(p.192).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In a review of the OCD literature, Pettigrew, Woodman, and Cameron (2001) noted that research had tended to ignore time and history as important contextual forces that influence the frequency of change in organizations. Thus, change agents should pay great attention to the role played by organizational history in the change process, that is the history of employees' experiences of previous OC initiatives which can influences their reaction to new OCD initiatives.

Given this scenario, this chapter aims to discuss the role played by training and consulting processes in the field of evidence-based organizational change and development (EBOCD), and the effect they have on the level of employee 'readiness to change' and particularly on the employees' confidence to change and personal valence, and on their perceptions of managerial support. Another purpose of this chapter is to shed light on the role played by cynicism in employee reactions to organizational change. Finally, the chapter aims to understand the role of change management history in shaping employee change-related beliefs, attitudes, and behaviour.

To achieve these aims the following questions will be addressed: How does the hard side of change (i.e. the business model, the job system) interact with the soft side of change (i.e. the skills and the knowledge) in successful (and unsuccessful) change initiatives? How can employee change cynicism be understood? How does organizational history help in understanding the contextual forces shaping employee reactions to change? What is the relationship between organizational change and undesired outcomes such as weak job satisfaction, low trust in the organization, and high turnover among employees?

A CRITICALLY REFLECTIVE CHANGE AGENT

The Strategic Management Approach

As argued in Chapter 1, engaging in 'critically reflective' as well as 'evidence-based' practice should become an essential feature of managing/facilitating OCD programs. Senior (2002) suggests that management of an organizational change should be *strategic*, that it ought to be based on the ability to identify the type of change (rate of occurrence: continuous/discontinuous), how it comes about (planned/emergent), and the scale (level of impact: fine-tuning/corporate transformation).

Researchers in the field of Strategic Human Resource Management (SHRM) have increasingly relied on the resource-based view of the firm to explain the role of human resource practices in firm performance (Collins & Clark, 2003; Wright, Dunford, & Snell, 2001). In the resource-based view (e.g. Grant, 1991; Barney & Wright, 1998; Boxall & Purcell, 2000) the emphasis is on gaining sustainable competitive advantage by means of effective and efficient utilisation of the resources of an organisation. Unfortunately, this efficient resource utilisation does not occur automatically (Martìn-Alcazar, Romero-Fernandez, & Sanchez-Gardey, 2005; Paauwe & Boselie, 2003): it is the outcome of human resource managerial practices carried out by human resource (HR) managers and executives, often with the help of trainers and consultants. Hence, to achieve the best strategic performance it is necessary that all HR professionals are guided by relevant evidence-based knowledge. According to Rousseau (2006), "evidence-based management means translating principles based on best evidence into organizational practices" (p. 256). For evidence-based management (EBMgt) to take root, it is at least necessary that managers be exposed to, and apply scientific evidence.

However, although literature provides robust evidence and suggests guidelines to carry out an EBOCD initiative, practitioners' experience suggests that there is no direct causal relationship between strategy,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

HRM practices and organizational performance, as suggested previously by some scholars (Boxall, 1993). This chapter highlights that several factors, both strictly HRM process-related (the research-beliefs gap) and external (firm size, managerial culture, entrepreneurial values), strongly influence this relationship. Hence, a *fully reflective* and *evidence-based* approach becomes necessary.

For instance, from a critically reflective point of view, a weakness has been to identify 'evidence-based knowledge' (i.e. 'best evidence') with knowledge derived only from empirical research. However, a more scientific approach posits that 'best evidence' has other sources of knowledge. More recent writers argue that to make the most effective organizational decisions it is necessary to consider at least four different sources of knowledge: empirical evidence, organizational evidence, personal experience-based evidence and finally stakeholders' experience-based evidence (Barends *et al*., 2014; Pfeffer & Sutton, 2006a; 2006b). Using a combination of these sources of 'best evidence' ensures a more appropriate and better context-situated decision-making process (Olivas-Luján, 2008), and in turn leads to a fuller application of a 'critically reflective' and 'evidence-based' approach to OCD.

Finally, as suggested by De Massis, Chua, and Chrisman (2008), "an approach to solve the access problem would be to collect data from or through consultants" (p. 193). Therefore, reflective practitioners (i.e. managers, trainers and OCD consultants) seem better suited than scholars in carrying out longitudinal research, thus playing a fundamental role as organizational change agents in the mid-long term.

MANAGING ORGANIZATIONAL CHANGE

Six Attention Points and Six Challenges for Scholars and Practitioners

Since the need for change is often unpredictable, it tends to be reactive, discontinuous, ad hoc, and often triggered by a situation of organisational crisis (Burnes, 2004; De Wit & Meyer, 2005; Luecke, 2003; Nelson, 2003). Although the successful management of change is accepted as a necessity to survive and succeed in today's highly competitive and continuously evolving environment (Luecke, 2003; Okumus & Hemmington, 1998), Balogun and Hope Hailey (2004) report a failure rate of around 70 percent of all change programmes initiated. Dunphy and Stace (1993) suggested that in a turbulent environment, organizations which face the change as an open learning system rather than using detailed plans are more likely to succeed. Therefore, in their everyday practice of designing, planning and implementing an organizational change strategy, change agents should take into consideration at least six different issues or attention points, as follows.

Attention Point 1: Readiness to Change

Readiness to change has been defined as an individual's "beliefs, attitudes, and intentions regarding the extent to which changes are needed and the organization's capacity to successfully undertake those changes" (Armenakis, Harris, & Mossholder, 1993, p. 681). However, literature offers several definitions of this construct, many of them underlining the role played by cognitive elements (e.g., ability, self-efficacy) in fostering the perception of being ready for a change. For instance, Cunningham et al. (2002) suggest that readiness involves "a demonstrable need for change, a sense of one's *ability* to successfully accomplish change (self-efficacy) and an opportunity to participate in the change process" (p. 377, *italics* added for emphasis). Holt et al. (2007) propose that readiness for change is "the extent to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

which an individual or individuals are *cognitively* and emotionally inclined to accept, embrace, and adopt a particular plan to purposefully alter the status quo" (p. 235, *italics* added for emphasis). This chapter adopts the well-validated 5-dimension model of readiness to change proposed originally by Armenakis, Harris and Mossholder (1993). (see also Armenakis, Harris, Cole, Fillmer & Self, 2007; Armenakis, Harris, & Field, 1999). This model was revised and improved by Holt et al. (2007), and posits that change management effectiveness depends on five different dimensions as follows:

i) Personal Valence, that is "the extent to which one feels that he or she will or will not benefit from the implementation of the prospective change" (p. 238)
ii) Organizational valence, that is "the extent to which one feels that the organization will or will not benefit from the implementation of the prospective change" (p.239)
iii) Change Confidence, that is "the extent to which one feels that he or she has or does not have the skills and is or is not able to execute the tasks and activities that are associated with the implementation of the prospective change" (p. 238)
iv)) Managerial Support, that is "the extent to which one feels that the organization's leadership and management are or are not committed to and support or do not support implementation of the prospective change" (p. 239)
v) Discrepancy, that is "the extent to which one feels that there are or are not legitimate reasons and need for the prospective change" (p. 238)

A wide range of personal characteristics, attitudes, and individual difference variables have also been identified as antecedents of individuals' change attitudes (see Holt et al., 2007). Regarding individual characteristics, evidence exists in organizational change literature supporting the importance of self-esteem, perceived control, and optimism in coping with change. For example, Ashford (1988) reported that self-esteem and personal control were negatively correlated with stress; furthermore, internal locus of control which is a concept closely related to perceived control, has been associated with increased openness to change (Lau & Woodman, 1995) and increased job satisfaction after the organizational change, (Nelson, Cooper, & Jackson, 1995). Wanberg and Banas (2000) found that resilience (i.e. self-esteem, optimism, and perceived control) was related to higher levels of change acceptance but was not predictive of a more positive view of the changes.

In summary, literature provides some evidence of the role played by *readiness to change* in making the achievement of positive outcomes in an organizational change process easier, and suggests how to assess it (Armenakis et al., 2007; Holt et al., 2007); it also shows the organizational elements which can support the change process (Andersen, 2008). It appears that all five sub-dimensions have a significant impact on the overall level of readiness to change.

Bearing in mind the research findings discussed above, fully reflective change agents (defined as being evidence-based) should pay attention to the empirically demonstrated relationship between each specific *readiness to change* dimension and the ease of achieving positive outcomes from an OCD initiative. The change agent does not limit itself to attributing meaning, it activates sense-making processes. Additionally, this dynamic imposes continuous reflection on the objective and subjective dimensions of the OCD in the change agent (and, more generally, at the OCD level). Change agents themselves can be sources of resistance to change, and this does not appear in the currently available OCD-related models (for example, Holt et al., 2007). Thus, the first phase of the EBOCD intervention (i.e. measuring the resistance to change) requires the change agent to also critically consider its role in triggering change

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

resistance. A critically reflective approach could be based on open process advice, not based on the so called 'doctor-patient model' (Schein, 1999). Therefore, the reflective Change Agent (CA) is not exposed in the first person as an 'official' agent of change but works in the background; the CA does not follow the approach of many organizations that push forward the consultant as a front-man (external, or internal in the case of an HR) 'because they are freer and perceived as neutral'.

Attention Point 2: The Perceived Skill Match

Going beyond Attention Point 1, differences in *readiness to change* could be due to other factors such as the level of skill (mis)-match. Although literature suggests that an *affective* dimension has a role in change readiness (Rafferty & Restibog, 2013), research should also focus on the impact that cognitive aspects (such as skills and knowledge) may have because until now scarce attention has been paid to these issues as possible antecedents of employee *readiness to change.* Furthermore, past researchers have seldom focused on the individual and organizational training/learning associated with OC processes, particularly those that can foster change readiness. Stata (1989) argues that "the rate at which individuals and organisations learn may become the only sustainable competitive advantage" (p. 64).

From a psychological point of view, *readiness to change* is considered at least partially grounded on the Person-Environment (P-E) fit model, and it has come to be viewed more as a set of cognitive beliefs (Cable & Parsons, 2001). Research has found that fit between individuals and their jobs has significant effects on job satisfaction, stress, organizational commitment, and turnover (Cable & DeRue, 2002; Kristof-Brown, Jansen, & Colbert, 2002; Saks & Ashforth, 1997). In this sense, preserving the P/E fit during and after an organizational change becomes a strategic goal for a firm to foster the individuals' change confidence/self-efficacy. Following Caldwell, Herold and Fedor (2004), research should focus on the most common dimension of individuals' P-E fit: the degree to which an individual's abilities match the demands of their job (person–job [P-J] fit). A good match between demanded and possessed skills enables the employee to develop a higher perceived level of control of the situation. However, within the field of change management studies, the relationship between skill mismatch and change confidence has not so far been formally investigated. The available literature suggests the overall perceived skill match level, as well as each area of the skill portfolio, are positively related to *change confidence* (see Ferrari, 2017). The *skill match* level also shows a significant but lower correlation with the overall level of *readiness to change*, thus suggesting that skill match has a specific impact on change confidence rather than more generally on the readiness to change. Thus, fully-reflective change agents should be mindful of 'best evidence' that has empirically demonstrated that: '*the higher the level of employee-perceived skill-match, the higher the change confidence level'.*

Moreover, the P/E fit and P/J fit are not only necessary for fostering the change confidence level, but they could also perhaps lead to further benefits. Literature shows that several job characteristics have a differential impact on the worker's utility derived from the job. This is important since higher perceived utility is likely to result in higher performance at work, and decreased absenteeism and tardiness (Borjas, 1979; Freeman,1978; Hamermesh, 1977; Lawler & Porter, 1967; Locke, 1969). In this view, each job is thought to have several aspects or facets from which utility is derived. This is similar to Lancaster's (1966, 1971) theory of consumption behaviour where the utility that is derived from consuming given goods depends on the utilities that are associated with its characteristics (see also Skalli, Theodossiou & Vasileiou, 2008). Thus, literature shows that the application of possessed skills is a highly desirable aim. Ferrari's (2017) recent research suggests the correlation between the current skill match (i.e.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

domain specific P/J fit) and *personal valence* is quite weak, though *domain-specific skill match* does have a strong impact. Furthermore, domain specific P/J fit shows no correlation with the other items of readiness to change, therefore suggesting a direct and independent effect on the level of *personal valence.* Thus, fully-reflective change agents should pay attention to the fact that '*the higher the level of employee-perceived skill-match, the higher the personal valence of a given change.*

In suggesting that change is better defined as learning, Schein (1999) states that "the involvement of the learner is crucial to any kind of planned change or, as we might better conceptualise it – 'managed learning'" (p. 71). Given this theoretical scenario, individual characteristics (skills especially) and the organizational capability to transform such skills into a shared value (*organizational learning*) become fundamental assets for the organization. A reflective change agent should also bear in mind that in the post-modern paradigm, training is in place to support knowledge management and organizational learning, not limited to providing skills. The need to overcome linear / mechanistic paradigms (see Chapter 2 of this book) emphasizes a different role of training and in general of the skills that the management of change is called on to preserve and develop. The reflexive professional (Schon, 1991) should follow a descriptive rather than a prescriptive logic (typical of linear models). A reflective CA should adhere to a contingency model that ensures the best fit with the situation rather than the application of 'good practice' as a supposed universal aspect. At the same time, following a post-modern paradigm imposes strategic choices on the training process and, more generally, to organizational learning. The need to face organizational and environmental complexity requires ad hoc support work that contrasts resistance to change at an individual level. People should be trained in learning (or rather, in deutero-learning: learning to learn (see Watzlawick et al., 1974) Likewise, organizations must focus on organizational learning rather than routinization, and therefore on developing knowledge management systems. The reflective change agent is called on to guide this dynamic balance between individual and organizational needs, with a logic of complexity and contingency.

Attention Point 3: Training Characteristic

Within a scenario focused on P/J fit, there is evidence that direct and personal consequences of the change for affected individuals is important, (Brockner & Wiesenfeld, 1996; Herold, Fedor, & Caldwell, 2007). That is, individuals' commitment to a change is a function, in part, of the degree to which the change impacts their own or their work team/department's day-to-day routine, (Caldwell et al., 2004; Fedor, Caldwell, & Herold, 2006). In such a scenario, managerial support should provide workers with the proper job-specific skills to reduce uncertainty and the perceived skill-mismatch at the job level. Furthermore, workplace stress literature has suggested that being fair and providing adequate resources are key aspects of manager behaviour that can positively influence individuals' responses to significant workplace events (Spector, 2002). Training processes should provide workers with specific, intangible resources such as skills and knowledge, thus fostering the perception of received support from the organization. Furthermore, regarding the effectiveness of training, Altman and Iles (1998) suggested that much of the force behind the perspectives of learning organisations are grounded in the field of adult learning (e.g. Knowles, 1984; Rogers, 1986). They suggest that "adult learners learn most effectively in processes which recognise dynamic growth, self-determination, prior experience, expectations, meaningfulness, the wider social context, and the preferred learning styles of adult learners" (Altman, Iles, 1998, p. 47). Such learners typically learn in episodic, intensive, problem-oriented, learner-specific ways, and are less oriented to learning from general overall principles (Mabey & Salaman, 1995; Rogers, 1986).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The provision of job-specific, problem-oriented and experiential training seems to be the best way to improve skills and knowledge, at least with adult learners. According to Ferrari (2017), usually the overall level of training provision and its effectiveness have a strong impact on the perceived *managerial support* dimension of change readiness. Thus, fully-reflective change agents should bear in mind as they formulate and implement their respective OCD strategies that *the more effective, transferable and job-specific the training, the higher the level of perceived managerial support,* and that this leads to easier achievement of the desired positive outcomes.

However, whichever type of change strategy is implemented, the impact and consequences can either be beneficial or detrimental depending upon the effectiveness of the respective change agents (see Chapter 2). In general, considering the perceived skill mismatch, the domain-specific P/J fit and the training characteristics, a broader reflection on EBOCD strategies is appropriate (see Chapter 2). The need to adopt a descriptive logic and to avoid the 'side effects' of the change suggest that the CA should pursue strategies strongly oriented to organizational reliability. A change strategy must nonetheless focus on organizational reliability during and after change, rather than on excellence or efficiency, to prevent the inevitable side effects of the change process from being lethal to the organization. All OCD interventions must ensure a highly reliable organization, addressing the deep and often hidden elements that make the organization vulnerable during change: personal change history and the cynicism level of involved people/personnel.

Attention Point 4: The Personal Change History

Until now, empirical research has paid great attention to understanding factors that affect employee reaction toward organizational change (Jimmieson, Peach, & White, 2008; Jones, Jimmieson & Griffiths 2005; Miller, Johnson, & Grau, 1994; Oreg, 2006; Wanberg & Banas, 2000). In general, this research has increased our understanding of employee responses to organizational change and generated a great deal of knowledge on how to implement change. However, change research has largely focused on understanding employee reactions to one particular change episode, hence overlooking the fact that "past events play an important role in shaping employee reactions to current organizational events" (Bordia et al, 2011, p. 192). In a review of the change literature, Pettigrew et al. (2001) noted that organizational change research has tended to ignore time and history as important contextual forces. Bordia et al. (2011) developed and tested a model of the effects of *poor change management history* (PCMH) on employee attitudes (trust, job satisfaction, turnover intentions, change cynicism, and openness to change) and actual turnover. They found that PCMH, through PCMH beliefs, led to lower trust, job satisfaction and openness to change, and higher cynicism and turnover intentions. Although more empirical research is required to demonstrate further that *there is a positive correlation between a negatively-perceived personal organizational change history and both anxiety level and intention to quit,* fully-reflective change agents should still pay attention to this factor that can impact positively or negatively on change management effectiveness

PCMH is only one aspect of the more general problem of managing effectively the political and cultural aspects of OCD (see Chapter 2). The consultant is a 'political agent' in the 'service of established power' (ownership, leadership, dominant coalitions), and is perceived as such by those involved in change. This imposes the utmost transparency towards all those involved, highlighting both the discrepancy and the organizational and personal advantages of the change in a logic of organizational justice (Colquitt et al., 2013; Cropanzano et al., 2007). In any case, the role of the CA will always be defiled. From this

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

point of view, the CA intervention could be inspired by methodologies such as *participant observation* or *action research*. Both models propose a researcher / consultant who collects data (participant observation) and acts (action research) limiting the impact on pre-existing dynamics as much as possible or orienting them from within. The CA that chooses to adopt these intervention models should pay the utmost attention to avoid counterproductive protagonisms. Entering into a political arena actually leads the CA to become part of it, and therefore to be easily perceived and categorized by all the people involved according to the friend/foe axis. This is undoubtedly an issue to be overcome in the challenge for the reflective change agent.

Attention Point 5: The Level of Cynicism

At an *organizational* level, much of the literature and many of the research projects on organizational change relate to organizational culture in one sense or another. Culture is often seen as either the key issue to be changed, or something that is crucial and needs to be taken seriously to make change possible. Given this scenario, *organizational mergers* seem to be the most critical of change events impacting at both the individual and organizational level. In such OC situations the extant employees are more exposed to the risk of change fatigue and anxiety due to a prevailing consolidated strong and resilient organizational culture (i.e. shared values, routines and work expectations). Understanding negative employee reactions to change is important: change efforts often fail because organizations and their leaders underestimate the importance of employee reactions to the change process (Choi & Ruona, 2011; Self, Armenakis, & Schraeder, 2007). One explanation for the failure of change programmes is employee change cynicism, "a pessimistic viewpoint about change efforts being successful because those responsible for making change are blamed for being unmotivated, incompetent, or both" (Wanous et al., 2000, p. 133). As recently suggested by Brown et al. (2017), "Employee change cynicism represents a relatively malleable form of cynicism (i.e., an attitude rather than a trait)" (p.5). Thus, the organization's approach to change has the potential to influence the level of employee cynicism (Andersson & Bateman, 1997; Davis & Gardner, 2004; Wanous et al., 2000). However, cynicism could also play a role in protecting people from change-related anxiety and intention to quit. For example, it could lead to lower emotional involvement and affective investment level in organizational goals which in turn could lead people to the so called 'indifference area' (Barnard, 1938), and thus protect them from undesired change-related psychological consequences.

Given this theoretical scenario, fully-reflective change agents should be calling for more studies in this area of change management research whilst taking serious note in their change agency practice that *the level of cynicism* of employees correlates negatively with *intentions to quit* and *anxiety levels* (i.e. the higher is the level of cynicism, the lower are the intentions to quit and anxiety levels).

Attention Point 6: The Role of Organizational History

Organizations have had to deliver more value for money services and products and pursue the highest standard of effectiveness, but at the same time achieve the greatest level of cost saving and efficiency gains (see Barkema, Baum & Mannix, 2002; Champy & Nohria, 1996; Dess & Picken, 2000; Yukl, 2006). These pressures have often resulted in multidimensional restructuring, for instance in mergers (see, for example, Gunnigle, Lavelle & Monaghan, 2013; Hamlin, 2001; Shook & Roth, 2011). Contemporary literature suggests (Kunze et al., 2013) a prominent role in moderating organizational change outcomes

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

could be played by *organizational tenure*. Long-term employment at the same workplace may decrease the developmental experiences than those of colleague employees who have previously worked in other organizations, and consequently have had contact with a greater variety of work situations and exposure to different organizational change initiatives. These (decreased) developmental experiences may, in turn, affect negatively the psychological impact and outcomes of change (Abraham & Hansson, 1995; Baltes & Baltes, 1990). However, at the same time, due to their organizational history, employees may more likely have developed defence mechanism such as *cynicism* and *disillusionment*.

Given this theoretical scenario, when involved in facilitating merger-related OCD initiatives fully-reflective change agents need to anticipate that long-term employees in either of the merged organizations are likely to show a higher intention to quit than those who have short organizational histories or are not involved in the merger process.

In summary, (as highlighted in Chapter 2), there have only been a few longitudinal studies that have effectively evaluated change agency processes within different organizational contexts. From this point of view, the change agent must have a perspective along the chrono-context, starting from the past experiences (reconstruction of the organizational change history) and oriented towards future strategies. The 'hic et nunc' dear to psychologists must be enriched by historical-narrative elements, which suggest to the CA how the identity of the organization has developed over time. All this is not to propose solutions incompatible with the organization's past history but with its future objectives (and in accordance with the need to consider the discrepancy of the five-factor model of readiness to change).

CONCLUSION

In summary, a reflective OCD practitioner should follow a contingent model rather than a linear one, postmodern rather than mechanistic. He or she should aim at deuteron-individual learning rather than content-based training and strive for organizational learning rather than to the routinization of change. Furthermore, a reflective evidence-based change agent considers the time axis that precedes and follows the consulting intervention; acts in a secluded way, with the maximum political and institutional transparency, rather than being a protagonist. Thus, the main lesson to be learned from this chapter is that EBOCD practitioners should prepare and lead people through a multi-linear, learning-based path. During an organizational change, well-consolidated routines could become a trap rather than an added value. In summary, reflective evidence-based change agents should foster individual (and, as a consequence, organizational) learning-to-learn capabilities.

As mentioned in the Introduction, this paper aimed to address several questions, and now it is possible to suggest some answers:

How does the hard side of change (i.e. the business model, the job system etc.) interact with the soft side of change (i.e. the skills and the knowledge) in successful (and unsuccessful) change initiatives? This chapter suggests (Attention Point 2) preserving the P/E fit during and after an organizational change becomes a strategic goal for a firm to foster the individuals' change confidence/self-efficacy.

How can employee change cynicism be understood? Attention Point 5 highlights one explanation for the failure of change programmes is employee change cynicism: A CA should properly consider this dimension and its relation with other factors, as Poor Change Management History in designing OC.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

How does organizational history help in understanding the contextual forces shaping employee reactions to change? Attention Point 6 addresses this issue. For instance, in case of mergers, we now know a prominent role in moderating organizational change outcomes could be played by *organizational tenure*

What is the relationship between organizational change and undesired outcomes such as weak job satisfaction, low trust in the organization, and high turnover among employees? Attention Point 4 suggests that PCMH, through PCMH beliefs, leads to lower trust, job satisfaction and openness to change, and higher cynicism and turnover intentions.

However, both scholars and practitioners have until now paid scarce attention to the role training and consulting processes can play in bringing about effective organisational change. Regarding the issue of training, research has only investigated specific phases of the training process in OC (e.g. the role of the training needs analysis: Reed & Vakola, 2006) but has overlooked its effectiveness in terms of the required outcomes, such as the desired changes in behaviour and confidence. Given this scenario, this chapter contributes to current reflections on change management suggesting some 'lessons learned' to be considered in designing and implementing an OC initiative. Particularly, change agents should pay attention to the following key-points resulting from the evidence-based nature of a fully-reflective approach.

1. Empirical evidence highlights the importance of training in the organizational change process, and its contribution to the fostering of personal change readiness, though only when it is perceived effective and job-specific. Consequently, it becomes necessary to pay strong attention to conducting specific training needs analyses at the bottom line level of management.
2. Moreover, empirical evidence confirms the pivotal role played by individuals in organizational change, even when change happens at a macro-level. The real- life experience of the author as a change consultant demonstrates the role that training activities can play in: (i) increasing personal valence in OC situations; and ii) achieving a better skill-match which itself is a valuable goal and consistent with the P/J demand approach to fostering change confidence.
3. The case made by this chapter which demonstrates with empirical evidence that training which provides participants involved in OC with highly transferable skills, is perceived as a form of senior *managerial support* which increases readiness to change. Thus, in accordance with the organizational learning approach (Davenport & Prusak, 1998), and shifting from an individual to an organizational perspective, this chapter supports the idea that during an OCD initiative a properly planned training process preserves skills and knowledge as fundamental intangible assets.
4. The prominent role that could be played by individual characteristics such as *personal history* of previously experiencing organizational change, and *cynicism* and *organizational history* (Bordia et al., 2011; Brown et al., 2017; Pettigrew et al., 2001; Wanous et al., 2000) in making change management easier.

In conclusion, as suggested by some authors, the change process is continuous rather than being a moment of passage from one state to another (Weick & Quinn, 1999). Thus, maybe the main lesson gained from reviewing the literature, personal experience and evidence-based research is that a change agent should prepare involved people to engage in a continuous learning process. It means sharing strategic goals rather than simply providing new organizational routines. In this situation, paying attention to the chrono-context (both individual and organizational) becomes fundamental in making the change process smoother.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In summary, due to the complexity of an organizational change, only a longitudinal approach permits an explicit and direct observation of the change process in action, and thereby allows a description and account of how some entities or issues develop and change over time (Pettigrew et al., 2001). Although extant cross-sectional research has focused on a set of stable and enduring personal characteristics (e.g. *readiness to change*), several other characteristics both organizational and individual, such as training, have been overlooked. Hence, future research should investigate if and how the training process enables *readiness to change* over time, or instead shows its utility only when it is relating to a specific and limited period. Beyond P/E fit, future research should also attempt to shed light on other contextual factors that could affect the relationship between training and organizational justice, especially concerning informational and international justice.

Beyond its contributions, this chapter also shows some limitations. By focusing on *readiness to change* as a desired outcome it overlooks other possible/potential organizational outcomes at the individual, group, and organizational level. Although the change management literature shows the robustness of this construct at the individual level (for a review see Rafferty et al., 2013), it also shows some limitations. Hence, future research is called for to show if *self-perceived readiness to change* leads to actual organizational outcomes.

This chapter adopts a single-level perspective for discussing self-reported data about readiness to change obtained from employees and based on their perceptions. However, literature highlights that another limitation of the readiness to change model is that researchers have until now seldom adopted a multilevel analysis (Rafferty et al, 2013). Hence, for instance, it could be useful to compare the employees' self-perceived readiness to change with the perceptions of their direct supervisors, or to shift from an individual level to a group level to explore the group readiness to change.

Finally, although results have usually been controlled for age, gender, type of qualification and tenure, differences in readiness to change could be due to latent variables that are included in current models. Therefore, future research should investigate other elements to overcome these limitations; for example, the role played by personality traits and other personal characteristics.

REFERENCES

Abraham, J. D., & Hansson, R. O. (1995). Successful aging at work: An applied study of selection, optimization, and compensation through impression management. *Journals of Gerontology Series*, *50*(2), 94–103. doi:10.1093/geronb/50B.2.P94 PMID:7757837

Altman, Y., & Iles, P. (1998). Learning, leadership, teams: Corporate learning and organisational change. *Journal of Management Development*, *17*(1), 44–55. doi:10.1108/02621719810368682

Andersson, L. M., & Bateman, T. S. (1997). Cynicism in the workplace: Some causes and effects. *Journal of Organizational Behavior*, *8*(5), 449–469. doi:10.1002/(SICI)1099-1379(199709)18:5<449::AID-JOB808>3.0.CO;2-O

Antonacopoulou, E. P. (2001). The paradoxical nature of the relationship between training and learning. *Journal of Management Studies*, *38*(3), 327–350. doi:10.1111/1467-6486.00239

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Armenakis, A., Harris, S., & Field, H. (1999). Making change permanent: A model for institutionalizing change. In W. Pasmore & R. Woodman (Eds.), *Research in organization change and development* (Vol. 12, pp. 97–128). Greenwich, CT: JAI Press, Inc. doi:10.1016/S0897-3016(99)12005-6

Armenakis, A. A., Harris, S. G., Cole, M. S., Fillmer, J. L., & Self, D. R. (2007). A top management team's reactions to organizational transformation: The diagnostic benefits of five key change sentiments. *Journal of Change Management*, *7*(3), 273–290. doi:10.1080/14697010701771014

Armenakis, A. A., Harris, S. G., & Mossholder, K. W. (1993). Creating readiness for organizational change. *Human Relations*, *46*(6), 681–703. doi:10.1177/001872679304600601

Ashford, S. J. (1988). Individual strategies for coping with stress during organizational transitions. *The Journal of Applied Behavioral Science*, *24*(1), 19–36. doi:10.1177/0021886388241005

Axley, S. R. (2000). Communicating change: Questions to consider. *Industrial Management (Des Plaines)*, *42*(4), 20–21.

Balogun, J., & Hope Hailey, V. (2004). *Exploring strategic change* (2nd ed.). London, UK: Prentice Hall.

Baltes, P., & Baltes, M. (1990). Psychological perspectives on successful aging: The model of selective optimization with compensation. In P. Baltes & M. Baltes (Eds.), *Successful aging perspectives from the behavioral sciences* (pp. 1–34). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511665684.003

Barends, E., Rousseau, D.M., & Briner, R.B., (2014). *Evidence-based management. The basic principles.* Amsterdam: Center for Evidence-Based Management.

Barkema, H. G., Baum, J. A., & Mannix, E. A. (2002). Management challenges in a new time. *Academy of Management Journal*, *45*(5), 910–930. doi:10.2307/3069322

Barnard, C. I. (1938). *The functions of the executive*. Cambridge, MA: Harvard University Press.

Barney, J. B., & Wright, P. M. (1998). On becoming a strategic partner: The role of human resources in gaining competitive advantage. *Human Resource Management*, *37*(1), 31–46. doi:10.1002/(SICI)1099-050X(199821)37:1<31::AID-HRM4>3.0.CO;2-W

Bordia, P., Hobman, E., Jones, E., Gallois, C., & Callan, V. J. (2004). Uncertainty during organizational change: Types, consequences, and management strategies. *Journal of Business and Psychology*, *18*(4), 507–532. doi:10.1023/B:JOBU.0000028449.99127.f7

Borjas, G. J. (1979). Job satisfaction, Wages and Unions. *The Journal of Human Resources*, *14*(1), 21–40. doi:10.2307/145536

Bouckenooghe, D. (2010). Positioning change recipients' attitudes toward change in the organizational change literature. *The Journal of Applied Behavioral Science*, *46*(4), 500–531. doi:10.1177/0021886310367944

Bovey, W. H., & Hede, A. (2001). Resistance to organisational change: The role of defence mechanisms. *Journal of Managerial Psychology*, *16*(7), 534–548. doi:10.1108/EUM0000000006166

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Boxall, P., & Purcell, J. (2000). Strategic human resource management: Where have we come from and where should we be going? *International Journal of Management Reviews*, *2*(2), 183–203. doi:10.1111/1468-2370.00037

Boxall, P. F. (1993). The significance of human resource management: A reconsideration of the evidence. *International Journal of Human Resource Management*, *4*(3), 645–655. doi:10.1080/09585199300000041

Brockner, J., Konovsky, M., Cooper-Schneider, R., Folger, R., Martin, C., & Bies, R. J. (1994). Interactive effects of procedural justice and outcome negativity on victims and survivors of job loss. *Academy of Management Journal*, *37*, 397–409. doi:10.1111/j.1559-1816.1996.tb01133.x

Brown, M., Kulik, C. T., Cregan, C., & Metz, I. (2017). Understanding the change– cynicism cycle: The role of HR. *Human Resource Management*, *56*(1), 5–24. doi:10.1002/hrm.21708

Burnes, B. (1996). No such thing as . . . a "one best way" to manage organizational change. *Management Decision*, *34*(10), 11–18. doi:10.1108/00251749610150649

Burnes, B. (2004). *Managing change: A strategic approach to organisational dynamics* (4th ed.). Harlow, UK: Prentice Hall.

By, R. T. (2005). Organizational change management: A critical review. *Journal of Change Management*, *5*(4), 369–380. doi:10.1080/14697010500359250

Cable, D. M., & DeRue, D. S. (2002). The convergent and discriminant validity of subjective fit perceptions. *The Journal of Applied Psychology*, *87*(5), 875–884. doi:10.1037/0021-9010.87.5.875 PMID:12395812

Cable, D. M., & Parsons, C. K. (2001). Socialization tactics and person– organization fit. *Personnel Psychology*, *54*(1), 1–23. doi:10.1111/j.1744-6570.2001.tb00083.x

Cabral Vieira, J. A. (2005). Skill mismatches and job satisfaction. *Economics Letters*, *89*(1), 39–47. doi:10.1016/j.econlet.2005.05.009

Caldwell, S. D., Herold, D. M., & Fedor, D. B. (2004). Toward an Understanding of the Relationships Among Organizational Change, Individual Differences, and Changes in Person–Environment Fit: A Cross-Level Study. *The Journal of Applied Psychology*, *89*(5), 868–882. doi:10.1037/0021-9010.89.5.868 PMID:15506866

Champy, J., & Nohria, N. (1996). *Fast forward: The best ideas on managing business change*. Boston, MA: Harvard Business Press.

Choi, M., & Ruona, W. (2011). Individual readiness for organizational change and its implications for human resource and organization development. *Human Resource Development Review*, *10*(1), 46–73. doi:10.1177/1534484310384957

Collins, C. J., & Clark, K. D. (2003). Strategic human resource practices, top management team social networks, and firm performance: The role of human resource practices in creating organizational competitive advantage. *Academy of Management Journal*, *46*, 740–751. doi:10.2307/30040665

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Colquitt, J. A., Scott, B. A., Rodell, J. B., Long, D. M., Zapata, C. P., Conlon, D. E., & Wesson, M. J. (2013). Justice at the millennium, a decade later: A meta-analytic test of social exchange and affect-based perspectives. *The Journal of Applied Psychology*, *98*(2), 199–236. doi:10.1037/a0031757 PMID:23458336

Cropanzano, R., Bowen, D. E., & Gilliland, S. W. (2007). The Management of Organizational Justice. *The Academy of Management Perspectives*, *21*(4), 34–48. doi:10.5465/amp.2007.27895338

Cunningham, C. E., Woodward, C. A., Shannon, H. S., MacIntosh, J., Lendrum, B., Rosenbloom, D., & Brown, J. (2002). Readiness for organizational change: A longitudinal study of workplace, psychological and behavioral correlates. *Journal of Occupational and Organizational Psychology*, *75*(4), 377–392. doi:10.1348/096317902321119637

Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organisations manage what they know*. Boston: Harvard Business School Press.

Davidson, M. C. G., & De Marco, L. (1999). Corporate change: Education as a catalyst. *International Journal of Contemporary Hospitality Management*, *11*(1), 16–23. doi:10.1108/09596119910250355

Davis, W. D., & Gardner, W. L. (2004). Perceptions of politics and organizational cynicism: An attitudinal and leader - member exchange perspective. *The Leadership Quarterly*, *15*(4), 439–465. doi:10.1016/j.leaqua.2004.05.002

De Massis, A., Chua, J., & Chrisman, J. J. (2008). Factors Preventing Intra-Family Succession. *Family Business Review*, *21*(2), 183–199. doi:10.1111/j.1741-6248.2008.00118.x

De Wit, B., & Meyer, R. (2005). *Strategy Synthesis: Resolving Strategy Paradoxes to Create Competitive Advantage* (2nd ed.). London: Thomson Learning.

Dess, G. G., & Picken, J. C. (2000). Changing roles: Leadership in the 21st century. *Organizational Dynamics*, *28*(3), 18–34. doi:10.1016/S0090-2616(00)88447-8

Dunphy, D., & Stace, D. (1993). The strategic management of corporate change. *Human Relations*, *46*(8), 905–918. doi:10.1177/001872679304600801

Fedor, D. B., Caldwell, S., & Herold, D. M. (2006). The effects of organizational changes on employee commitment: A multilevel investigation. *Personnel Psychology*, *59*(1), 1–29. doi:10.1111/j.1744-6570.2006.00852.x

Ferrari, F. (2017). *The impact of skill-mismatch on readiness to change: empirical research in the Italian Bank sector*. Paper presented at the WOA - XVII Workshop dei Docenti e dei Ricercatori di Organizzazione Aziendale, Pisa, Italy.

Freeman, R. B. (1978). Job satisfaction as an economic variable. *American Economic Review, 68*, 135–141. Retrieved from http://www.jstor.org/stable/1816677

Grant, R. M. (1991). The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, *17*(3), 114–135. doi:10.2307/41166664

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Greenhalgh, R. T., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *The Milbank Quarterly*, *82*(4), 581–629. doi:10.1111/j.0887-378X.2004.00325.x PMID:15595944

Gunnigle, P., Lavelle, J., & Monaghan, S. (2013). Weathering the storm? Multinational companies and human resource management through the global financial crisis. *International Journal of Manpower*, *34*(3), 214–231. doi:10.1108/IJM-04-2013-0078

Hamermesh, D. S. (1977). Economic aspects of job satisfaction. In O. Ashenfelter & W. E. Oates (Eds.), *Essays in Labour Market Analysis*. New York: Wiley.

Hamlin, R. G. (2001). A review and synthesis of context and practice. In B. Hamlin, J. Keep, & K. Ash (Eds.), *Organizational change and development: A reflective guide for managers, trainers and developers* (pp. 13–38). Harlow, UK: FT Prentice Hall.

Hamlin, R. G. (2016). Evidence-based organizational change and development: Role of professional partnership and replication research. In C. Hughes & M. W. Gosney (Eds.), *Bridging the Scholar Practitioner Gap in Human Resources Development* (pp. 120–142). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9998-4.ch007

Herold, D. M., Fedor, D. B., & Caldwell, S. D. (2007). Beyond change management: A multilevel investigation of contextual and personal influences on employees' commitment to change. *The Journal of Applied Psychology*, *92*(4), 942–951. doi:10.1037/0021-9010.92.4.942 PMID:17638456

Holt, D. T., Armenakis, A. A., Feild, H. S., & Harris, S. G. (2007). Readiness for organizational change: The systematic development of a scale. *The Journal of Applied Behavioral Science*, *43*(2), 232–255. doi:10.1177/0021886306295295

Jimmieson, N. L., Peach, M., & White, K. M. (2008). Utilizing the theory of planned behavior to inform change anagement: An investigation of employee intentions to support organizational change. *The Journal of Applied Behavioral Science*, *44*, 237–262. doi:10.1177/0021886307312773

Jones, R. A., Jimmieson, N. L., & Griffiths, A. (2005). The impact of organizational culture and reshaping capabilities on change implementation success: The mediating role of readiness for change. *Journal of Management Studies*, *42*(2), 361–386. doi:10.1111/j.1467-6486.2005.00500.x

Knowles, M. S. (1984). *The Adult Learner: A Neglected Species* (3rd ed.). Houston, TX: Gulf.

Kristof-Brown, A. L., Jansen, K. J., & Colbert, A. E. (2002). A policy capturing study of the simultaneous effects of fit with jobs, groups, and organizations. *The Journal of Applied Psychology*, *87*(5), 985–993. doi:10.1037/0021-9010.87.5.985 PMID:12395823

Kunze, F., Boehm, S., & Bruch, H. (2013). Age, resistance to change, and job Performance. *Journal of Managerial Psychology*, *28*(7-8), 741–760. doi:10.1108/JMP-06-2013-0194

Lancaster, K. (1966). A new approach to consumer theory. *Journal of Political Economy*, *74*(2), 132–157. doi:10.1086/259131

Lancaster, K. (1971). *Consumer Demand: A New Approach*. New York: Columbia University Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lau Lau, C. M., & Woodman, R. W. (1995). Understanding organizational change: A schematic perspective. *Academy of Management Journal*, *38*(2), 537–554. doi:10.5465/256692

Lawler, E. E. III, & Porter, L. W. (1967). The effect of performance on job satisfaction. *Industrial Relations*, *7*(1), 20–28. doi:10.1111/j.1468-232X.1967.tb01060.x

Locke, L. A. (1969). What is job satisfaction? *Organizational Behavior and Human Performance*, *4*(4), 309–336. doi:10.1016/0030-5073(69)90013-0

Luecke, R. (2003). *Managing Change and Transition*. Boston, MA: Harvard Business School Press.

Mabey, C., & Salaman, G. (1995). *Strategic HRM*. Oxford, UK: Blackwell.

Martin-Alcazar, F., Romero-Fernandez, P. M., & Sanchez-Gardey, G. (2005). Strategic human resource management: Integrating the universalistic, contingent, configurational and contextual perspectives. *International Journal of Human Resource Management*, *16*(5), 633–659. doi:10.1080/09585190500082519

Miller, V. D., Johnson, J. R., & Grau, J. G. (1994). Antecedents to willingness to participate in a planned organizational change. *Journal of Applied Communication Research*, *22*(1), 59–80. doi:10.1080/00909889409365387

Nelson, A., Cooper, C. L., & Jackson, P. R. (1995). Uncertainty amidst change: The impact of privatization on employee job satisfaction and well-being. *Journal of Occupational and Organizational Psychology*, *68*(1), 57–71. doi:10.1111/j.2044-8325.1995.tb00688.x

Nelson, L. (2003). A case study in organizational change: Implications for theory. *The Learning Organization*, *10*(1), 18–30. doi:10.1108/09696470310457478

Okumus, F., & Hemmington, N. (1998). Barriers and resistance to change in hotel firms: An investigation at unit level. *International Journal of Contemporary Hospitality Management*, *10*(7), 283–288. doi:10.1108/09596119810240906

Olivas-Luján, M. (2008), Evidence-Based Management: A Business Necessity for Hispanics. *The Business Journal of Hispanic Research, 2*(2), 10-26. Retrieved from https://ssrn.com/abstract=2713116

Oreg, S. (2006). Personality, context, and resistance to organizational change. *European Journal of Work and Organizational Psychology*, *5*(1), 73–101. doi:10.1080/13594320500451247

Paauwe, J., & Boselie, P. (2003). Challenging 'strategic HRM' and the relevance of the institutional setting. *Human Resource Management Journal*, *13*(3), 56–70. doi:10.1111/j.1748-8583.2003.tb00098.x

Pettigrew, A. M., Woodman, R. W., & Cameron, K. S. (2001). Studying Organizational Change and Development: Challenges for Future Research. *Academy of Management Journal*, *44*(4), 697–713.

Pfeffer, J., & Sutton, R. I. (2006a). Evidence-based management. *Harvard Business Review*, *84*(1), 62–74. Retrieved from https://hec.unil.ch/docs/files/56/1290/pfeffer_&_sutton_2006_evidence_based_management_hbr.pdf PMID:16447370

Pfeffer, J. & Sutton, R.I. (2006b). *Hard Facts, Dangerous Half-Truths and Total Nonsense: Profiting from Evidence-Based Management*. Boston, MA: Harvard Business School Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Rafferty, A. E., Jimmieson, N. L., & Armenakis, A. A. (2013). Change Readiness: A Multilevel Review. *Journal of Management*, *39*(1), 110–135. doi:10.1177/0149206312457417

Rafferty, A. E., & Restubog, S. L. D. (2010). The impact of change process and context on change reactions and turnover during a merger. *Journal of Management*, *36*(5), 1309–1338. doi:10.1177/0149206309341480

Reed, J., & Vakola, M. (2006). What role can a training needs analysis play in organisational change? *Journal of Organizational Change Management*, *19*(3), 393–407. doi:10.1108/09534810610668382

Rogers, A. (1986). *Teaching Adults*. Milton Keynes, UK: Open University Press.

Rogers, E. (1995). *The diffusion of innovations* (4th ed.). New York: The Free Press.

Rousseau, D. M. (2006). Is there such a thing as 'evidence based management'? *Academy of Management Review*, *31*(2), 256–269. doi:10.5465/amr.2006.20208679

Saks, A. M., & Ashforth, B. E. (1997). A longitudinal investigation of the relationships between job information sources, applicant perceptions of fit, and work outcomes. *Personnel Psychology*, *40*, 437–453. doi:10.1111/j.1744-6570.1997.tb00913.x

Schein, E. H. (1999). Kurt Lewin's change theory in the field and in the classroom: notes towards a model of managed learning. *Reflections, 1*(1), 59-74. Retrieved at https://hsi2011.wikispaces.com/file/view/Schein_Lewin.pdf

Schön, D. A. (1991). *The reflective practitioner: How professionals think in action*. Aldershot, UK: Avebury.

Self, D. R., Armenakis, A. A., & Schraeder, M. (2007). Organizational change content, process, and context: A simultaneous analysis of employee reactions. *Journal of Change Management*, *7*(2), 211–229. doi:10.1080/14697010701461129

Senior, B. (2002). *Organisational Change* (2nd ed.). London: Prentice Hall.

Shook, L.-V., & Roth, G. (2011). Downsizing, mergers, and acquisitions: Perspectives of human resource development practitioners. *Journal of European Industrial Training*, *35*(2), 135–153. doi:10.1108/03090591111109343

Skalli, A., Theodossiou, I., & Vasileiou, E. (2008). Jobs as Lancaster goods: Facets of job satisfaction and overall job satisfaction. *Journal of Socio-Economics*, *37*(5), 1906–1920. doi:10.1016/j.socec.2008.04.003

Spector, P. E. (2002). Employee control and occupational stress. *American Psychological Society*, *11*, 153–156. doi:10.1111/1467-8721.00185

Spender, J. C., & Grant, R. M. (1996). Knowledge and the firm: Overview. *Strategic Management Journal*, *17*, 5-10. doi:10.1002mj.4250171103

Stata, R. (1989). Organisational learning: The key to management innovation. *Sloan Management Review*, (Spring): 63–74.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wanberg, C. R., & Banas, J. T. (2000). Predictors and outcomes of openness to changes in a reorganizing workplace. *The Journal of Applied Psychology*, *85*(1), 132–142. doi:10.1037/0021-9010.85.1.132 PMID:10740964

Wanous, J. P., Reichers, A. E., & Austin, J. T. (2000). Cynicism about organizational change: Measurement, antecedents, and correlates. *Group & Organization Management*, *25*(2), 132–153. doi:10.1177/1059601100252003

Watzlawick, P., Weakland, J. H., & Fisch, R. (1974). *Change: Principles of problem formation and problem resolution*. Oxford, UK: W. W. Norton.

Weick, K. E., & Quinn, R. E. (1999). Organizational change and development. Annual Review of Psychology, 50, 361-386. doi:10.1146/annurev.psych.50.1.361

Yukl, G. A. (2006). *Leadership in organizations* (6th ed.). Upper Saddle River, NJ: Pearson/Prentice Hall.

This research was previously published in Evidence-Based Initiatives for Organizational Change and Development; pages 342-360, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 38
Mapping Innovation in the Digital Transformation Era:
The Role of Technology Convergence

Elona Marku
University of Cagliari, Italy

Manuel Castriotta
University of Cagliari, Italy

Maria Chiara Di Guardo
University of Cagliari, Italy

Michela Loi
University of Cagliari, Italy

ABSTRACT

Digital transformation is imperative for gaining and sustaining a firm's competitive advantage. Hence, understanding the dynamics of technology evolution becomes salient for both scholars and practitioners. This chapter aims to provide a complementary perspective to the field of innovation by mapping and visualizing the patterns of digital transformation at the industry level with a particular focus on the role of technology convergence. The authors tracked 20 years of the technology of the U.S. communications industry in order to investigate how digital transformation has shaped the industry technological structure, which are the technological gaps and potential future technology trends. The results show a deep transformation of the industry with many interconnections between technology domains and a high degree of overlap between technology areas.

DOI: 10.4018/978-1-7998-7297-9.ch038

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

In the past few decades, high-technology industries have experienced an important evolution connected with the advancement of digital innovations, regulatory changes, as well as new consumer preferences (Curran & Leker, 2011). At the same time, scholars have been drawing increasing attention to the phenomenon of digital transformation, defining it as crucial for firm growth and success (Yoo, Boland, Lyytinen, & Majchrzak, 2012; Hess, Matt, Benlian, & Wiesböck, 2016; Soule, Puram, Westerman, & Bonnet, 2016; Schweer & Sahl, 2017; Singh & Hess, 2017). Indeed, the potential benefits resulting from this digitization trend—including big data, the Internet of things, mobile computing and cloud computing—are enormous (Fitzgerald et al., 2014; Peppard & Ward, 2016). Digitalization has reshaped the way we work and live by introducing new and more disruptive technologies. This rapid transformation continually leaves traces in the technological space reshaping the industry's technological structure. In order to capture these changes across time, the present study aims at mapping and visualizing technology and innovation in the digital transformation era. More specifically, the authors attempt to explore the technology trajectory and patterns at the industry level in order to unveil the dynamics of the evolution of digitalization, to identify its most active technological areas and focal streams.

Digital transformation is a very broad phenomenon that covers several aspects. Zhu, Kramer, and Xu (2006) have examined the digital transformation process in different countries showing that it is influenced by contextual factors including the technological, organizational, and environmental contexts have focused on the technological, organizational, and environmental factors. Other studies have revisited the innovation appropriability dynamics (Teece, 2018; Helfat & Raubitchek, 2018), while other works have examined digital transformation at individual level (i.e. Stolterman & Fors, 2004; Lanzolla & Giudici, 2017) or at the industry level (*i.e.* Agarwal, Gao, DesRoches, & Jha, 2010). However, studies that investigate the digital transformation process within the technology convergence and industry evolution paradigms are still absent.

Our goal in this chapter is to explore one aspect of digital transformation related to how it has affected the technology innovations generated by firms and how it can be explained through the technological convergence paradigm. Consistent with our goal, we analyzed the communication services industry as its digital transformation is evident, it has been a key driver of the worldwide digitization and as such it is positioned at the forefront of the deep transformation that comprehends new information technologies such as broadband networks, mobile communications, and the Internet (Maitland, Bauer, & Westerveld, 2002; Andal-Ancion *et al.,* 2003).

Moreover, the technology literature has widely shown the crucial role of patents as a meaningful instrument to measure the innovation performance (Trajtenberg, 1990; Ahuja & Katila, 2001; Hagedoorn & Cloodt, 2003; Di Guardo & Harrigan, 2016), to capture the multifaceted dimensions of technology (*i.e.* Hall, Jaffe, & Trajtenberg, 2001; Harrigan, Di Guardo, Marku, & Velez, 2017), to track the knowledge flows and spillovers (*i.e.* Jaffe A., 1986), and to monitor convergence and emerging technologies in the digital transformation era (Tijssen,1992; Engelsman & van Raan, 1994; Archibugi & Pianta, 1996; Curran & Leker, 2011; De Rassenfosse *et al*., 2013; Lee, Park, & Kang, 2018).

Based on patent co-classification analysis (Engelsman & van Raan, 1994), this study examines the digital transformation of the U.S. communications industry in a 20-year time interval that goes from 1992 to 2011. Patent co-classification analysis is widely acknowledged as a valid alternative to the most widespread patent co-citation analysis (Tijssen, 1992; Leydersdorf, 2008; Luan, Liu, & Wang, 2013; Marku, Castriotta, & Di Guardo, 2018; Marku & Zaitsava, 2018). Furthermore, the present work intro-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

duces a new approach for mapping and visualizing an industry's profile and evolution by focusing on fine-grained patent data. Departing far from extant literature, we map the co-occurrence of the technology classification codes using a novel and validated tool in management studies: the VosViewer software, whose algorithm for computing the similarity measure allows the overcoming of some of the artifacts produced by the multidimensional scaling (van Eck, Waltman, van den Berg, & Kaymak, 2006; van Eck & Waltman, 2007; Waaijer, van Bochove, & van Eck, 2010; van Eck, Waltman, Dekker, & van den Berg, 2010; Zupic & Čater 2015). In addition, following the latest trends in technology studies and avoiding the limitations of the International Patent Classification (IPC) system (Luan, Liu, & Wang, 2013), we use the Derwent World Patent Index (DWPI) classification codes (Calcagno, 2008; Luan, Liu, & Wang, 2013; Luan, Hou, Wang, & Wang, 2014). The peculiarity of the DWPI system consists of the assignment of one or several manual codes to a single patent document, aimed at covering all the relevant aspects of the invention. In this way, we can capture the smallest technology elements possessed by firms.

The remainder of this chapter is structured as follows. First, the authors discuss the relevant characteristics of digital transformation, technology convergence, and patent analysis. Second, the method based on patent co-classification and a brief explanation of the VosViewer algorithm are introduced. Third, descriptive results are presented and last, discussion, concluding remarks and implications are provided.

LITERATURE BACKGROUND

Digital Transformation

Digital transformation is imperative for firm growth and success, and even for firm survival (Andal-Ancion, Cartwright, & Yip, 2003; Fitzgerald *et al.,* 2014; Abolhassan, 2016; Riedl *et al.,* 2017; Reis *et al.,* 2018). Although terms like "digitization", "digitalization", or "digital transformation" are increasingly appearing in management studies, no clear definition has been provided yet (Agarwal et al., 2010; Andal-Ancion *et al.,* 2003; Yoo *et al.,* 2012; Hansen & Sia, 2015; Hess *et al.,* 2016; Lanzolla & Giudici, 2017; Teece, 2018; Helfat & Raubitchek, 2018). In this chapter, the authors conceive "digitization" as the creation of a digital version of physical objects such as paper documents, photographs, etc., "digitalization" encompasses the adoption and the leverage of digital technologies and digital data, meanwhile, "digital transformation" refers to the transformation from partial digitized businesses to fully digitized ones, it is an is an umbrella concept that includes artificial intelligence, robotics, machine learning, Internet of things, etc. (Riedl *et al*., 2017).

Although, existing literature has pointed out that the digital transformation represents an autonomous field (Mckelvey, Tanriverdi, & Yoo, 2016; Urbach, Drews, & Ross, 2017), the concept of digital transformation is very broad and covers several aspects. Most studies have focused on the analysis of the phenomenon at firm level, for example, Andal-Ancion, Cartwright, and George (2003) investigated the digital transformation of traditional businesses pointing out that the key to success consists in knowing how and when to apply new technologies. Other studies have examined the digital transformation process in different countries showing that it is influenced by contextual factors including the technological, organizational, and environmental contexts (Zhu, Kramer, & Xu, 2006). Moreover, other works have analyzed digital transformation at the individual level (i.e. Stolterman & Fors, 2004; Lanzolla & Giudici, 2017) as well as industry level (*i.e.* Agarwal *et al.,* 2010; Angst et al., 2017; Wang et al., 2018).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In this chapter, we examine the aspect of digital transformation related to technology innovation at the industry level. We refer to the concept of innovation in terms of inventions since they represent essential outputs of the R&D and inventive activities (Valentini & Di Guardo, 2012). It is extensively acknowledged that digital transformation has changed our work, our home, and our life, producing in this way far-reaching effects on our entire society, including firms and their inventive activities (Brynjolfsson & McAfee, 2014; Fitzgerald et al., 2014). Thus, digital technologies with their capability to enable pervasive connectivity, immediacy of interaction as well as wide access to data have changed radically the nature of innovations produced by firms (Yoo *et al.,* 2012; Matt, Hess, & Benlian, 2015; Lanzolla & Giudici, 2017). Digital transformation, empowered by the combination of different digital innovations, provides the building blocks for the development of new products and services (Hinings, Gegenhuber, & Greenwood, 2018; Teece, 2018). For this reason, no industry is immune to digital transformation as it continually modifies entire ecosystems (Hess *et al.,* 2016); almost all firms have started a process of exploration of new digital technologies in order to exploit their benefits and potentiality (Matt *et al.,* 2015; Hess et al., 2016).

In particular, the way the digital transformation has affected the technology innovations is evident in the case of the communication services industry. The latter has been a key driver of the worldwide digitization and as such it is positioned at the forefront of the deep transformation that comprehends new information technologies such as broadband networks, mobile communications, and the Internet (Maitland, Bauer, & Westerveld, 2002; Andal-Ancion *et al.,* 2003). Firms operating in this industry including hardware, semiconductors, network-based, and new information and communications technologies (ICT) have been growing up simultaneously creating a unique ecosystem progressively permeated with digital technology (Suh & Lee, 2017). Very often, the integration of digital technologies goes beyond the firm's boundaries redefining the rules of the game of the whole industry (Downes & Nunes, 2013; Matt *et al.,* 2015).

In the last decades, new technologies introduced in this industry have been disruptive leading to a paradigm shift that has changed not only the boundaries but especially the core technologies of the communications industry (Li & Whalley, 2002; Peppard & Rylander, 2006; Kim, Cho, & Kim, 2015; Lee, Kang, & Shin, 2015). The crucial role of the Internet and data communication services has moved the industry towards greater convergence and complexity (Maitland *et al.,* 2002). Indeed, everyday products such as smartphones or TVs have embedded software digital capabilities which include intelligent machines with sensors, network, and processors (Yoo *et al.,* 2012). Finally, this rapid transformation process with radical changes and technology convergence has continually left traces in the technological space, redesigning the industry's technological structure and landscape.

Technological Convergence

The concept of *technological convergence* was introduced by Rosenberg (1963) who defined it as "the process by which two hitherto different industrial sectors come to share a common knowledge and technological base". Other scholars have defined it as the blurring of boundaries between disjoint fields of science, technology, markets, or industries (Curran & Leker, 2011; Curran, 2013; Kim *et al*., 2015). In this vein, technological convergence is a process where technologies move from their prior positioning to new and common place. Consistent with this stream of research, we conceive technological convergence as the merging or overlapping of different fields of technology as a result of scientific and technological progress. More specifically, in this chapter technological convergence is defined as

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a combination of at least two existing technologies into hybrid technologies (Kodama, 1995; Curran et al., 2010; Kim *et al.,* 2018).

Technological convergence has become a key feature of all high-tech industries as they have rapidly evolved to meet market demands (Iwai, 2000; Yoo *et al.*, 2012; Lee *et al.,* 2015) moving the boundaries of existing technologies and increasing their overlapped technological area (Gambardella & Torrisi, 1998; Athreye & Keeble, 2000; Borés, Saurina, & Torres, 2003; Kim *et al.,* 2015; Aharonson & Schilling, 2016). For example, the '90s were characterized by a great technological convergence in many fields: the power of computers boosted the information technology and at the same time the communications technology rapidly evolved leading to a convergence in the ICT; personal digital assistants evolved into the omnipresent Blackberry, iPhone, MP3; the digitalization involved an integration between analog and digital technologies, voice and data, leading to a convergence of telecommunication and broadcasting (Maitland *et al*., 2002; Lee et al., 2010; Suh & Lee, 2017).

At the same pace, the innovation literature has analyzed this phenomenon (Lee et al., 2010; Curran & Leker, 2011; Jeong et al., 2015; Kim, Kim, & Lee, 2018). Caviggioli (2016) examined the main drivers of technological convergence, using patents granted by the European Patent Office (EPO) from 1991 to 2007 he found that merges are more frequent if the focal technology fields are closely related. Curran and colleagues (2010) focused on the specific phases of the convergence process such as science, technology, market, and industry. Moreover, the study of Curran and Leker (2011) highlighted how these phases are not static and convergence may occur without including all these steps, a new product, service, or business model can cause convergence in an industry. Although, technological convergence is important because it can lead to a convergence of whole industries (D'Aveni, Dagnino, & Smith, 2010; Hacklin, Marxt, & Fahrni, 2010; Zhang & Li, 2010; Hacklin & Wallin, 2013), *how* technological convergence reshapes the industry technological structure and landscape is still unexplored.

Indeed, the gaining of awareness about the features of converging technologies in a wide scenario becomes essential since technological convergence is a key driver of innovation (Curran & Leker, 2011; Karvonen & Kässi, 2013; Lee et al., 2015). Innovations that come up from converging fields seem to be more novel and breakthrough (Schumpeter,1939; Fleming, 2001; Hacklin, 2007; No & Park, 2010; Nemet & Johnson, 2012; Karvonen & Kässi, 2013). Last, sectors that face technological convergence appear to have higher innovation performance and technological impact on industry evolution, making the phenomenon even more interesting to disentangle (No & Park, 2010; Kim & Kim, 2012; Curran, 2013; Hacklinetal, 2013; Caviggioli, 2016).

Patent Analysis

Digital transformation and technology convergence have intensified the technological competition among firms leading to a higher need to secure technologies via the patenting activity (Lee *et al.,* 2016; Lee & Kim, 2017). Patents grant to their owners an exclusive monopoly power over the use of an invention and as such they play a pivotal role of patents to protect a firm's R&D output (Oh, Cho, & Kim, 2014). The technology literature broadly acknowledges their importance of assessing firm innovation performance (Trajtenberg, 1990; Ahuja & Katila, 2001; Hagedoorn & Cloodt, 2003), seizing the different dimensions of technology (*i.e.* Hall *et al.*, 2001; Harrigan *et al.,* 2017), tracking the knowledge flows and spillovers (*i.e.* Jaffe A., 1986), and also monitoring technology convergence and industry evolution (Tijssen,1992; Engelsman & van Raan, 1994; Archibugi & Pianta, 1996; Curran & Leker, 2011; De Rassenfosse *et al*., 2013; Karvonen & Kässi, 2013; Suh & Sohn, 2015; Han & Sohn, 2016; Lee, Park, & Kang, 2018).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Moreover, in comparison with other information sources, patents can signal the latest technological change (Soete & Wyatt, 1983; Chen, 2011).

Specifically, patent analysis represents a common method to transform patent data into useful information (Tseng, Hsieh, Peng, & Chu, 2011; Niemann, Moehrle, & Frischkorn, 2017). In order to better understand the dynamics of technology evolution and convergence in different time frames, prior research has applied occurrence and co-occurrence network analysis using technology classification codes, assignee, applicants, inventors, citations, and co-citations analysis (Curran et al., 2010; Curran & Leker, 2011; Karvonen & Kässi, 2013; Jeong, Kim, & Choi, 2015; Castriotta & Di Guardo, 2016; : Loi, Castriotta, & Di Guardo, 2016; Di Guardo, Galvagno, & Cabiddu, 2012). Patent citation analysis is more suitable for the identification of technology flows among different elements as well as the investigating of convergence mechanisms using those knowledge flows (Kim & Lee, 2017). Instead, patent co-occurrence analysis through a science mapping approach allows a more detailed visualization of the phenomena occurring in contexts with technology convergence.

Patent co-classification analysis is widely acknowledged as a valid alternative to the most widespread patent co-citation analysis (Tijssen, 1992; Leydersdorf, 2008; Luan, Liu, & Wang, 2013; Marku, Castriotta, & Di Guardo, 2018). It draws upon the assumption that patents classification systems assign one or several manual codes to a single patent document aimed at covering all the relevant aspects of the invention. In this regard, the DWPI patent co-classification codes analysis is a more appropriate tool for mapping and visualizing an industry's profile and evolution by focusing on fine-grained patent data (Calcagno, 2008; Luan *et al*, 2013; 2014).

Operationally, two codes that co-occur within the same patent are an indication of their technological relatedness (Park & Yoon, 2014). Then, the presence of many co-occurrences around the same patents or firms' portfolios contributes to forming a technological structure map of an entire industry or sector (Park & Yoon, 2014). In the context of co-occurrence patent studies, Curran and Leker (2011) applied patent co-classification to monitor technology convergence while Karvonen and Kässi (2011) used large-scale patent data to anticipate the early stages of technology convergence. Lee, Kang, & Shin (2015) by adopting a patent maps approach focused on the identification of potential technology opportunities in a wider scenario like an industry. In summary, this study adopts a Derwent codes patent co-classification analysis in order to detect the patterns of digital transformation and technology convergence.

METHODOLOGY

Sample and Data

Technology convergence has involved many ICT fields including telecommunications, broadcasting, information technologies, and entertainment (Borés *et al*., 2003; Han & Sohn, 2016). In particular, the technology convergence faced by the communications industry has been fueled by the introduction into the market and subsequent adoption of several radical digital technologies that have transformed the industry structure into a complex network created by the combination of wireless technologies, the Internet, and data communications (Maitland *et al*., 2002; Suh & Lee, 2017). Mainly for this reason, in this chapter, we examine the U.S. communications industry because of its high technological dynamism and complexity (Di Guardo, Harrigan, & Marku, 2018; Harrigan *et al*., 2017). Indeed, the U.S. Telecom Act of 1996 deregulated the provision of specialized communications services and the technology con-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

vergence began. Communications services technologies evolved rapidly as it became possible to digitize and transmit voice, data and video over one network and many firms made acquisitions in the late 1990s to supplement their internal technology gaps. Entry into the various service specialties brought diffusion of communications technologies that were used elsewhere. The result of this cross-pollination was a huge disruption in industry structure.

Using the COMPUSTAT database (Standard & Poor's, 2013), firms were selected according to the following SIC (Standard Industrial Classification) codes: 4812 (Radiotelephone communications), 4813 (Telephone communications, except radiotelephone), 4822 (Telegraph and other message communications), 4841 (Cable and other pay television services), and 4899 (Communication services not elsewhere classified). Patent information was retrieved from the DWPI database (2013) using a 20-year time interval that goes from 1992 to 2011; in addition to the whole dataset, four 5-year time-frame datasets were created. In order to capture the earliest stage of technology convergence, the earliest priority year was considered. This selection procedure led to a final sample that consists of 120,476 U.S. patents granted to 180 firms.

Moreover, different from prior research that mainly uses IPC (International Patent Classification) codes or U.S. classification codes, this work adopts the Derwent classification system. Although, the Derwent manual codes——similarly to the IPC codes or the U.S. classification codes——have a logical hierarchy assigned to the primary inventive features of a basic patent, their peculiarity consists of the assignment of one or several manual codes to a single patent document aimed at covering all the relevant aspects of the invention (Calcagno, 2008; Harrigan & Di Guardo, 2017; Harrigan, Di Guardo, & Marku, 2018). From an operational point of view, co-classifications can be represented by a frequency matrix of co-occurrences in which the patents fitting with our sample are paired (Engelsman & van Raan, 1994, Curran & Leker, 2011; Karvonen & Kässi, 2013).

We retrieved the co-classification codes frequencies for each patent in our sample and compiled them into a raw matrix. In our case, the co-occurrence matrix is composed of 284 Derwent codes. This 284 X 284 asymmetric matrix is the source from which we ran multivariate science mapping analysis (Van Eck *et al.,* 2010). Further, these fine-grained data allow to account for a multiplicity of technological domains and to better monitor the technology convergence and digital transformation of the industry.

Multivariate Analysis

By relying on previous patent and bibliometric studies (Di Stefano, Gambardella, & Verona, 2012), and in coherence with our research goals of exploring technology convergence and evolution of the U.S. communications industry, we apply two patent co-occurrence techniques to perform our co-classification analysis: cluster analysis and multidimensional scaling (MDS). Furthermore, a network visualization is applied to better identify the connections among the different technology classification codes and clusters (if any). Cluster analysis is a common technique well suited to find subgroups in a field that gathers the similarity among groups' constituting objects (McCain, 1990). As regards to the MDS, it attempts to find a structure in a set of proximity measures between objects (Kruskal, 1977) by producing a map in a low dimensional space (usually two) that optimizes distances between those objects and that reflects a similarity measure. Accordingly, similar items will appear closer in the map (Leydesdorff & Vaughan, 2006).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Visualization Software: VosViewer

The increase of the amount of patent documents has fostered the development of sophisticated patent analysis instruments (Abbas, Zhang, & Khan, 2014). In this study, we introduce a novel instrument to track technology convergence by using the VosViewer software. The latter is a validated tool in management studies whose algorithm for computing the similarity measure allows the overcoming of some of the artifacts produced by the multidimensional scaling (van Eck *et al.* 2006; van Eck & Waltman, 2007; Waaijer, van Bochove, & van Eck, 2010; van Eck *et al.,* 2010; Zupic & Čater 2015). The VosViewer methodology is developed by van Eck & Waltman (2007) and it is based on the association strength s_{ij} between items (concepts) that can be synthetized as follows:

$$s_{i,j} = \frac{c_{i,j}}{w_i w_j} \tag{1}$$

where c_{ij} refers to the number of co-occurrences of items i and j, while w_i and w_j concern to either the total number of occurrences of items i and j or to the total number of co-occurrences of these items. It could be considered a weighted MDS that presents the advantage to overcome two artifacts of the latter: the first regards the MDS tendency to map the most important items in the center while the less important on the periphery, and the second concerns the use of a circular structure (van Eck, *et al.,* 2010). This situation occurs because when the MDS approach is applied to similarity data, it tries to assign the same distance to each pair of items, including those with similarity equal to zero. In our case, there are many classification codes that are never combined together in a patented invention, their frequency and similarity measure is equal to zero. According to van Eck et al., (2010), in the case of similarity data that consists largely of zeros, it is not possible to build a map with an exact same distance between each pair, hence, the MDS provides an approximation of this distance. In contrast, the VosViewer approach, being a weighted MDS, it does not give equal weight to all pairs of items, it gives more weight to more similar pairs of items, low weight to pairs of items with low similarity. As similarity data are typically dominated by low values, the VosViewer pairs of items with low similarity will have little weight and consequently will receive a little effect on the map.

RESULTS

Evidence of the digital transformation experienced by firms operating in the U.S. communications industry clearly emerges by looking at Table 1 which summarizes the top-20 technologies in the four 5-year time intervals. Not surprisingly, this list includes technology groups that strongly characterize the industry, namely, “W” (Communications), “T” (Computing and control), “L” (Refractories, ceramics, cement and electro(in)organics), “P” (General), “U” (Semiconductors and electronic circuitry), “V” (Electronic components), “S” (Instrumentation, measuring and testing), “A” (Polymers plastics), and “X” (Electric power engineering). The first rows of Table 1 highlight those technologies that can be defined as core, we find “T01 E” - Digital computers (data processing), “W01 E” - Telephone and data transmission systems (wireless), “W02 E” - Broadcasting, radio and line transmission systems, and “W04 E” - Audio/visual recording and systems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In particular, it is interesting to observe the paths of two dominant technologies, Digital computers (T01 E) and Telephone (W01 E). In the first and second time frame the percentage of patents that contains a technology classified as "W01 E" was 6.49% and 9.72%, respectively. This frequency was higher than the technology "T01 E" that was embodied in the 5.02% (1992-1996) and 9.45% (1997-2001) of the patented inventions. This result can be explained by the predominance of the telephone technologies during 1992-2001, however, starting from the third time frame (2002-2006), the situation is overturned as "T01 E" boosted and scored 13.14% (2002-2006) increasing even more in the last time frame (2007-2011) with 17.44%. Although "W01 E" shows a positive trend, its speed was lower than "T01 E". The digital transformation process has started.

Table 1. Frequency percentage of the top-20 technologies in each 5-year time frame

Technology		1992-1996	1997-2001	2002-2006	2007-2011	Trend
T01 E	Digital computers (data processing)	5.02%	9.45%	13.14%	17.44%	↑
W01 E	Telephone, data transmission syst. (wireless)	6.49%	9.72%	10.31%	13.95%	↑
W02 E	Broadcasting, radio and line transmission syst.	6.96%	7.95%	6.14%	5.56%	↓
W04 E	Audio/visual recording and systems	6.65%	4.62%	4.80%	7.11%	↑
L03 C	Electro-(in)organic (electric discharge lamps)	3.94%	3.25%	2.73%	2.45%	↓
P81 N	Optics	3.37%	2.57%	2.42%	2.39%	↓
T04 E	Computer peripheral equip. (graph reading)	1.72%	1.75%	2.73%	3.73%	↑
U11 E	Semiconductor materials and processing	2.66%	2.34%	1.92%	2.19%	↑
W03 E	Tv and broadcast radio receivers	1.44%	1.45%	1.85%	3.71%	↑
U14 E	Memories, film and hybrid circuits	1.68%	1.54%	1.80%	3.01%	↑
V07 E	Fibre-optics and light control	2.13%	2.13%	1.68%	1.57%	↓
U12 E	Discrete devices	1.60%	1.73%	2.02%	2.08%	↑
P85 N	Education, cryptography, adverts	1.85%	1.93%	1.71%	1.42%	↓
S03 E	Scientific instrumentation	1.51%	1.52%	2.33%	1.24%	↓
W06 E	Aviation, marine and radar systems	1.62%	1.31%	1.42%	1.78%	↑
T03 E	Data recording (tape(/filament) transport)	2.78%	1.61%	-	-	↓
V04 E	Printed circuits and connectors	1.30%	1.43%	-	1.57%	↑
U21 E	Logic circuits, electronic switching and coding	1.46%	1.45%	1.38%	-	↓
W05 E	Alarms, signalling, telemetry and telecontrol	-	-	1.57%	1.49%	↓
P86 N	Musical instruments, acoustics	1.39%	1.44%	-	-	↓
A85 C	Electrical applications	-	1.17%	-	1.33%	↑
S05 E	Electrical medical equipment	-	-	1.85%	-	↓
V06 E	Electromechanical transducers	-	-	1.59%	-	↓
U13 E	Integrated circuits	1.39%	-	-	-	↓
S02 E	Engineering instrumentation	-	-	1.29%	-	↓
X26 E	Lighting (portable lights)	-	-	-	1.14%	↑
A89 C	Photographic, laboratory equipment, optical	-	-	-	1.10%	↑

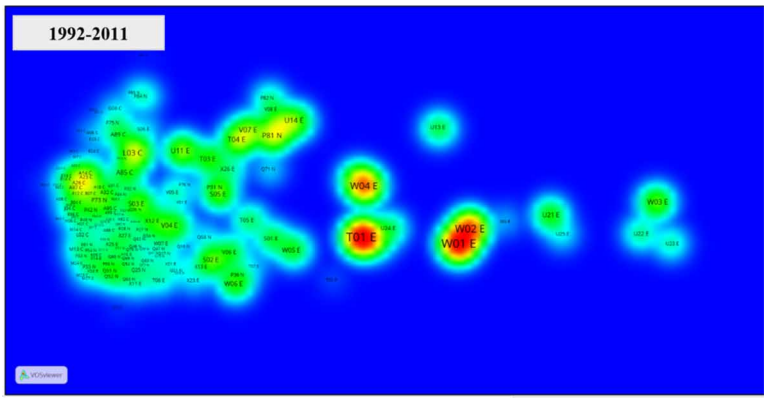
The last column of Table 1 depicts the technological trend of the different technologies, most of them seem to have a negative trend; digitalization fosters the development of technologies like digital computers while it hinders other technologies such as data recording (tape/filament). Among technolo-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

gies that decreased their technological presence in the industry, we identify: Broadcasting, radio and line transmission systems (W02 E); Electro-(in)organic (L03 C); Optics (P81 N); Fibre-optics and light control (V07 E); Scientific instrumentation (S03 E); etc. Technologies with a positive trend comprehend: Computer peripheral equipment (T04 E); Semiconductor materials and processing (U11 E); Receivers of Tv and broadcast radio (W03 E); Memories (U14 E); etc. Another interesting result is connected with the appearance and especially the disappearance of technologies from the top-20 ranking technologies. While Data recording technologies that use tape or filament (T03 E) and Musical instruments (P86 N) were shifted out from this ranking, other technologies reinforced their position, this is the case of Portable lights (X26 E) and Photographic laboratory equipment (A89 C).

The same data can be seen from another perspective, by mapping and visualizing innovation. Figure 1 illustrates the most active technological areas in the 20-year span. The core industry is held by the communications technologies "W01 E" and "W02 E" that are positioned very close to each other, and the digital technology "T01 E" which seems to have a similar distance from "W01 E" and "W04 E". The other technologies are shaped like clouds around the core presenting different densities.

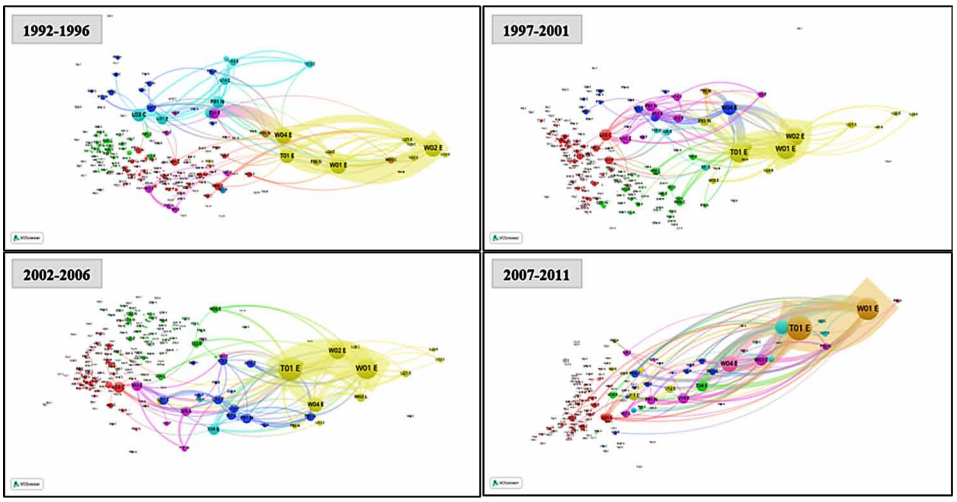
Figure 1. Density map of the 20-year time span



Moreover, Figure 2 shows four maps (one map per time window) that can be useful to understand the dynamics of technology convergence in the industry. In general, technology classification codes present our nodes in the map, thick swaths evidence a high frequency of two technology codes classified together in the same patent document. Nodes are also gathered into different clusters according to their degree of similarity. Specifically, the first quadrant of Figure 2 (1992- 1996) shows an industry characterized by clusters with well-defined boundaries with few links between them. The core technologies identified by the big nodes are commonly combined with each other with few hubs (T01 E and W04 E). Moreover, the industry appears to gain more dynamicity in the second time frame, technologies are positioned closer to each other and they are more intertwined. This signals a cross-pollination of the field. This process continues during the years that go from 2002 to 2006. Finally, the most meaningful picture of the industry is enclosed in the map that refers to the last time span (2007-2011). Technology boundaries are blurred, the map does not present distinct clusters, it is a massive cloud with a specific trajectory pulled by the core technologies (T01 E and W01E), showing in this way a high convergence among different technologies.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Visualization of technology convergence in four 5-year time frames



DISCUSSION AND CONCLUSION

The present study explored the technology trajectory and emerging patterns at the industry level in order to unveil the dynamics of the evolution of digitalization, to identify its most active technological areas and focal streams. Our analysis exploited the information included in patent documents which are commonly used as a proxy of technology innovation and their classification provides a useful means to identify technological domains and their overlap across time. Using a co-classification methodology on 20-year window data, it was possible to identify the different phases in which the digital transformation affected the technology innovations in the specific case of the U.S. communication services industry. The mapping and visualization of the industry's technological structure in different landscapes show a deep transformation of the industry, from a polycentric structure (in the timespan that goes from 1992 to 1996) to a diffused overlap between technology fields (in the timeframe 2007-2011). This is consistent with the technological convergence paradigm, two or more technologies move together in the technological space, overlapping or merging with each other while generating new innovations.

It is interesting to observe how the entry and further development of a disruptive innovation (this is the case of digital computers and data processing technologies) lead to a redefinition of all the existing links in terms of strength, new links formed or even canceled. In general, being aware of the strength of links between the technology portfolio possessed by the firm and the industry's technology core can be fundamental for the sustaining of competitive advantage or identifying new opportunities. This exploratory study increases the awareness of scholars by detecting and visualizing the technology management phenomenon as it provides a descriptive overview of the positioning of the technologies involved in the industry's inventive activity, as well as the links between them.

The contributions of the present study are threefold. It contributes to the digital transformation literature by exploring how it shapes the technology structure of an industry. Second, it sheds new light on the dynamics of technology convergence in the process of digital transformation, contributing to the technology innovation literature. A methodological contribution was provided by introducing a novel

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(although validated) tool for mapping the co-occurrence of the technology classification codes, the VosViewer software.

Managerial contributions can be also highlighted. This paper examined 20 years technology of one of the industries in which digital transformation was more evident, our findings suggest a potential scenario to managers of industries that now are facing digital transformation. If an industry's picture is similar to the first 5-year window in the case analyzed in this chapter, a suggestion for managers could be the development of a higher degree of heterogeneity of the resources involved in the R&D and inventive activities as well as the enhancement of firm's capabilities to recombine new knowledge. Moreover, the industry analyzed is characterized by a fast pace of technology, having an idea of how much time does it take for a technology structure to change its connotations can be useful for managers in their decision-making process.

In addition to the above-mentioned contributions, the present study presents several limitations. First, in this chapter, we analyzed the effect of digital transformation at a sector level on the technological structure from 1992-2011, future research might focus on what happened from 2011 to 2018 in terms of technological change as well as changes in the industry structure. Second, we examined the technology structure of a single industry, future research might focus on two more industries in order to provide a broader overview of industry convergence. Third, although the industry under examination has a high intensity of patent activities, not all inventions are patented; one common reason is the firms' reliance on secrecy.

REFERENCES

Abbas, A., Zhang, L., & Khan, S. U. (2014). A literature review on the state-of-the-art in patent analysis. *World Patent Information*, *37*, 3–13. doi:10.1016/j.wpi.2013.12.006

Abolhassan, F. (2016). *The Drivers of Digital Transformation*. Springer International Publishing.

Agarwal, R., Gao, G., DesRoches, C., & Jha, A. K. (2010). Research commentary—The digital transformation of healthcare: Current status and the road ahead. *Information Systems Research*, *21*(4), 796–809. doi:10.1287/isre.1100.0327

Aharonson, B. S., & Schilling, M. A. (2016). Mapping the technological landscape: Measuring technology distance, technological footprints, and technology evolution. *Research Policy*, *45*(1), 81–96. doi:10.1016/j.respol.2015.08.001

Ahlgren, P., Jarneving, B., & Rousseau, R. (2003). Requirements for a cocitation similarity measure, with special reference to Pearson's correlation coefficient. *Journal of the Association for Information Science and Technology*, *54*(6), 550–560.

Ahuja, G., & Katila, R. (2001). Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study. *Strategic Management Journal*, *22*(3), 197–220. doi:10.1002mj.157

Andal-Ancion, A., Cartwright, P. A., & Yip, G. S. (2003). The digital transformation of traditional business. *MIT Sloan Management Review*, *44*(4), 34–41.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Angst, C. M., Wowak, K. D., Handley, S. M., & Kelley, K. (2017). Antecedents of Information Systems Sourcing Strategies in US Hospitals: A Longitudinal Study. *Management Information Systems Quarterly*, *41*(4), 1129–1152. doi:10.25300/MISQ/2017/41.4.06

Archibugi, D., & Planta, M. (1996). Measuring technological change through patents and innovation surveys. *Technovation*, *16*(9), 451519–468. doi:10.1016/0166-4972(96)00031-4

Athreye, S., & Keeble, D. (2000). Technological convergence, globalisation and ownership in the UK computer industry. *Technovation*, *20*(5), 227–245. doi:10.1016/S0166-4972(99)00135-2

Borés, C., Saurina, C., & Torres, R. (2003). Technological convergence: A strategic perspective. *Technovation*, *23*(1), 1–13. doi:10.1016/S0166-4972(01)00094-3

Breschi, S., Lissoni, F., & Malerba, F. (2003). Knowledge-relatedness in firm technological diversification. *Research Policy*, *32*(1), 69–87. doi:10.1016/S0048-7333(02)00004-5

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.

Calcagno, M. (2008). An investigation into analyzing patents by chemical structure using Thomson's Derwent World Patent Index codes. *World Patent Information*, *30*(3), 188–198. doi:10.1016/j.wpi.2007.10.007

Castriotta, M., & Di Guardo, M. C. (2016). Disentangling the automotive technology structure: A patent co-citation analysis. *Scientometrics*, *107*(2), 819–837. doi:10.100711192-016-1862-0

Caviggioli, F. (2016). Technology fusion: Identification and analysis of the drivers of technology convergence using patent data. *Technovation*, *55*, 22–32. doi:10.1016/j.technovation.2016.04.003

Chen, Y. S. (2011). Using patent analysis to explore corporate growth. *Scientometrics*, *88*(2), 433–448. doi:10.100711192-011-0396-8

Curran, C. S. (2013). *The Anticipation of Converging Industries*. London: Springer. doi:10.1007/978-1-4471-5170-8

Curran, C. S., Bröring, S., & Leker, J. (2010). Anticipating converging industries using publicly available data. *Technological Forecasting and Social Change*, *77*(3), 385–395. doi:10.1016/j.techfore.2009.10.002

Curran, C. S., & Leker, J. (2011). Patent indicators for monitoring convergence–examples from NFF and ICT. *Technological Forecasting and Social Change*, *78*(2), 256–273. doi:10.1016/j.techfore.2010.06.021

De Rassenfosse, G., Dernis, H., Guellec, D., Picci, L., & de la Potterie, B. V. P. (2013). The worldwide count of priority patents: A new indicator of inventive activity. *Research Policy*, *42*(3), 720–737. doi:10.1016/j.respol.2012.11.002

Di Guardo, M. C., Galvagno, M., & Cabiddu, F. (2012). Analysing the intellectual structure of e-service research. [IJESMA]. *International Journal of E-Services and Mobile Applications*, *4*(2), 19–36. doi:10.4018/jesma.2012040102

Di Guardo, M. C., & Harrigan, K. R. (2016). Shaping the path to inventive activity: The role of past experience in R&D alliances. *The Journal of Technology Transfer*, *41*(2), 250–269. doi:10.100710961-015-9409-8

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Di Guardo, M. C., Harrigan, K. R., & Marku, E. (2018). M&A and diversification strategies: What effect on quality of inventive activity? *The Journal of Management and Governance*, 1–24. doi:10.100710997-018-9437-5

Di Stefano, G., Gambardella, A., & Verona, G. (2012). Technology push and demand pull perspectives in innovation studies: Current findings and future research directions. *Research Policy*, *41*(8), 1283–1295. doi:10.1016/j.respol.2012.03.021

Downes, L., & Nunes, P. F. (2013). Big-bang disruption. *Harvard Business Review*, *91*(3), 44–56.

Engelsman, E. C., & van Raan, A. F. (1994). A patent-based cartography of technology. *Research Policy*, *23*(1), 1–26. doi:10.1016/0048-7333(94)90024-8

Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2014). Embracing digital technology: A new strategic imperative. *MIT Sloan Management Review*, *55*(2), 1.

Fleming, L. (2001). Recombinant uncertainty in technological search. *Management Science*, *47*(1), 117–132. doi:10.1287/mnsc.47.1.117.10671

Gambardella, A., & Torrisi, S. (1998). Does technological convergence imply convergence in markets? Evidence from the electronics industry. *Research Policy*, *27*(5), 445–463. doi:10.1016/S0048-7333(98)00062-6

Hacklin, F. (2007). *Management of convergence in innovation: strategies and capabilities for value creation beyond blurring industry boundaries*. Springer Science & Business Media.

Hacklin, F., & Wallin, M. W. (2013). Convergence and interdisciplinarity in innovation management: A review, critique, and future directions. *Service Industries Journal*, *33*(7-8), 774–788. doi:10.1080/02642069.2013.740471

Hagedoorn, J., & Cloodt, M. (2003). Measuring innovative performance: Is there an advantage in using multiple indicators? *Research Policy*, *32*(8), 1365–1379. doi:10.1016/S0048-7333(02)00137-3

Hall, B. H., Jaffe, A. B., & Trajtenberg, M. (2001). *The NBER patent citation data file: Lessons, insights and methodological tools (No. w8498)*. National Bureau of Economic Research. doi:10.3386/w8498

Han, E. J., & Sohn, S. Y. (2016). Technological convergence in standards for information and communication technologies. *Technological Forecasting and Social Change*, *106*, 1–10. doi:10.1016/j.techfore.2016.02.003

Hansen, R., & Sia, S. K. (2015). Hummel's Digital Transformation Toward Omnichannel Retailing: Key Lessons Learned. *MIS Quarterly Executive*, *14*(2).

Harrigan, K. R., & Di Guardo, M. C. (2017). Sustainability of patent-based competitive advantage in the US communications services industry. *The Journal of Technology Transfer*, *42*(6), 1334–1361. doi:10.100710961-016-9515-2

Harrigan, K. R., Di Guardo, M. C., & Marku, E. (2018). Patent value and the Tobin's q ratio in media services. *The Journal of Technology Transfer*, *43*(1), 1–19. doi:10.100710961-017-9564-1

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Harrigan, K. R., Di Guardo, M. C., Marku, E., & Velez, B. N. (2017). Using a distance measure to operationalise patent originality. *Technology Analysis and Strategic Management*, *29*(9), 988–1001. doi: 10.1080/09537325.2016.1260106

Helfat, C. E., & Raubitschek, R. S. (2018). Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems. *Research Policy*, *47*(8), 1391–1399. doi:10.1016/j.respol.2018.01.019

Hess, T., Matt, C., Benlian, A., & Wiesböck, F. (2016). Options for Formulating a Digital Transformation Strategy. *MIS Quarterly Executive*, *15*(2).

Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization*, *28*(1), 52–61. doi:10.1016/j.infoandorg.2018.02.004

Iwai, K. (2000). A contribution to the evolutionary theory of innovation, imitation and growth. *Journal of Economic Behavior & Organization*, *43*(2), 167–198. doi:10.1016/S0167-2681(00)00115-3

Jaffe, A. B. (1986). *Technological opportunity and spillovers of R&D: evidence from firms' patents, profits and market value*. Academic Press.

Jeong, S., Kim, J. C., & Choi, J. Y. (2015). Technology convergence: What developmental stage are we in? *Scientometrics*, *104*(3), 841–871. doi:10.100711192-015-1606-6

Karvonen, M., & Kässi, T. (2013). Patent citations as a tool for analysing the early stages of convergence. *Technological Forecasting and Social Change*, *80*(6), 1094–1107. doi:10.1016/j.techfore.2012.05.006

Kim, J., & Lee, S. (2017). Forecasting and identifying multi-technology convergence based on patent data: The case of IT and BT industries in 2020. *Scientometrics*, *111*(1), 47–65. doi:10.100711192-017-2275-4

Kim, N., Lee, H., Kim, W., Lee, H., & Suh, J. H. (2015). Dynamic patterns of industry convergence: Evidence from a large amount of unstructured data. *Research Policy*, *44*(9), 1734–1748. doi:10.1016/j.respol.2015.02.001

Kruskal, J. (1977). The relationship between multidimensional scaling and clustering. In Classification and clustering (pp. 17-44). Academic Press.

Lanzolla, G., & Giudici, A. (2017). Pioneering strategies in the digital world. Insights from the Axel Springer case. *Business History*, *59*(5), 744–777. doi:10.1080/00076791.2016.1269752

Lavie, D., & Rosenkopf, L. (2006). Balancing exploration and exploitation in alliance formation. *Academy of Management Journal*, *49*(4), 797–818. doi:10.5465/amj.2006.22083085

Lee, C., Kang, B., & Shin, J. (2015). Novelty-focused patent mapping for technology opportunity analysis. *Technological Forecasting and Social Change*, *90*, 355–365. doi:10.1016/j.techfore.2014.05.010

Lee, C., Park, G., & Kang, J. (2018). The impact of convergence between science and technology on innovation. *The Journal of Technology Transfer*, *43*(2), 522–544. doi:10.100710961-016-9480-9

Lee, S., & Kim, W. (2017). The knowledge network dynamics in a mobile ecosystem: A patent citation analysis. *Scientometrics*, *111*(2), 717–742. doi:10.100711192-017-2270-9

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lee, S., Kim, W., Lee, H., & Jeon, J. (2016). Identifying the structure of knowledge networks in the US mobile ecosystems: Patent citation analysis. *Technology Analysis and Strategic Management*, *28*(4), 411–434. doi:10.1080/09537325.2015.1096336

Lee, S. M., Olson, D. L., & Trimi, S. (2010). The impact of convergence on organizational innovation. *Organizational Dynamics*, *39*(3), 218–225. doi:10.1016/j.orgdyn.2010.03.004

Leydesdorff, L. (2008). Patent classifications as indicators of intellectual organization. *Journal of the Association for Information Science and Technology*, *59*(10), 1582–1597.

Leydesdorff, L., & Vaughan, L. (2006). Co-occurrence matrices and their applications in information science: Extending ACA to the Web environment. *Journal of the Association for Information Science and Technology*, *57*(12), 1616–1628.

Li, F., & Whalley, J. (2002). Deconstruction of the telecommunications industry: From value chains to value networks. *Telecommunications Policy*, *26*(9-10), 451–472. doi:10.1016/S0308-5961(02)00056-3

Loi, M., Castriotta, M., & Di Guardo, M. C. (2016). The theoretical foundations of entrepreneurship education: How co-citations are shaping the field. *International Small Business Journal*, *34*(7), 948–971. doi:10.1177/0266242615602322

Luan, C., Hou, H., Wang, Y., & Wang, X. (2014). Are significant inventions more diversified? *Scientometrics*, *100*(2), 459–470. doi:10.100711192-014-1303-x

Luan, C., Liu, Z., & Wang, X. (2013). Divergence and convergence: Technology-relatedness evolution in solar energy industry. *Scientometrics*, *97*(2), 461–475. doi:10.100711192-013-1057-x

Maitland, C. F., Bauer, J. M., & Westerveld, R. (2002). The European market for mobile data: Evolving value chains and industry structures. *Telecommunications Policy*, *26*(9-10), 485–504. doi:10.1016/S0308-5961(02)00028-9

Marku, E., Castriotta, M., & Di Guardo, M. C. (2017). Disentangling the Intellectual Structure of Innovation and M&A Literature. *Technological Innovation Networks: Collaboration and Partnership*, 47.

Marku, E., & Zaitsava, M. (2018). Smart Grid Domain: Technology Structure and Innovation Trends. International Journal of Economics. *Business and Management Research*, *2*(4), 390–403.

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & Information Systems Engineering*, *57*(5), 339–343. doi:10.100712599-015-0401-5

McCain, K. W. (1990). Mapping authors in intellectual space: A technical overview. *Journal of the American Society for Information Science*, *41*(6), 433–443. doi:10.1002/(SICI)1097-4571(199009)41:6<433::AID-ASI11>3.0.CO;2-Q

McKelvey, B., Tanriverdi, H., & Yoo, Y. (2016). Complexity and Information Systems. Research in the Emerging Digital World. *Management Information Systems Quarterly*.

Mêgnigbêto, E. (2017). Controversies arising from which similarity measures can be used in co-citation analysis. *Malaysian Journal of Library and Information Science*, *18*(2), 25–31.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Nicita, A., Ramello, G. B., & Scherer, F. M. (2005). Intellectual property rights and the organization of industries: New perspectives in law and economics. *International Journal of the Economics of Business*, *12*(3), 289–296. doi:10.1080/13571510500299029

Niemann, H., Moehrle, M. G., & Frischkorn, J. (2017). Use of a new patent text-mining and visualization method for identifying patenting patterns over time: Concept, method and test application. *Technological Forecasting and Social Change*, *115*, 210–220. doi:10.1016/j.techfore.2016.10.004

Oh, C., Cho, Y., & Kim, W. (2015). The effect of a firm's strategic innovation decisions on its market performance. *Technology Analysis and Strategic Management*, *27*(1), 39–53. doi:10.1080/09537325.2014.945413

Park, H., & Yoon, J. (2014). Assessing coreness and intermediarity of technology sectors using patent co-classification analysis: The case of Korean national R&D. *Scientometrics*, *98*(2), 853–850. doi:10.100711192-013-1109-2

Peppard, J., & Rylander, A. (2006). From value chain to value network: Insights for mobile operators. *European Management Journal*, *24*(2-3), 128–141. doi:10.1016/j.emj.2006.03.003

Peppard, J., & Ward, J. (2016). *The strategic management of information systems: Building a digital strategy*. John Wiley & Sons.

Reis, J., Amorim, M., Melão, N., & Matos, P. (2018, March). Digital Transformation: A Literature Review and Guidelines for Future Research. In *World Conference on Information Systems and Technologies* (pp. 411-421). Springer.

Riedl, R., Benlian, A., Hess, T., Stelzer, D., & Sikora, H. (2017). On the relationship between information management and digitalization. *Business & Information Systems Engineering*, *59*(6), 475–482. doi:10.100712599-017-0498-9

Rosenberg, N. (1963). Technological change in the machine tool industry, 1840–1910. *The Journal of Economic History*, *23*(04), 414–443. doi:10.1017/S0022050700109155

Schweer, D., & Sahl, J. C. (2017). The Digital Transformation of Industry–The Benefit for Germany. In *The Drivers of Digital Transformation* (pp. 23–31). Cham: Springer. doi:10.1007/978-3-319-31824-0_3

Singh, A., & Hess, T. (2017). How Chief Digital Officers Promote the Digital Transformation of their Companies. *MIS Quarterly Executive*, *16*(1).

Soete, L. G., & Wyatt, S. M. (1983). The use of foreign patenting as an internationally comparable science and technology output indicator. *Scientometrics*, *5*(1), 31–54. doi:10.1007/BF02097176

Soule, D. L., Puram, A. D., Westerman, G. F., & Bonnet, D. (2016). *Becoming a Digital Organization: The Journey to Digital Dexterity*. Academic Press.

Stolterman, E., & Fors, A. C. (2004). Information technology and the good life. In *Information Systems Research* (pp. 687–692). Boston, MA: Springer. doi:10.1007/1-4020-8095-6_45

Suh, J., & Sohn, S. Y. (2015). Analyzing technological convergence trends in a business ecosystem. *Industrial Management & Data Systems*, *115*(4), 718–739. doi:10.1108/IMDS-10-2014-0310

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Suh, Y., & Lee, H. (2017). Developing ecological index for identifying roles of ICT industries in mobile ecosystems: The inter-industry analysis approach. *Telematics and Informatics*, *34*(1), 425–437. doi:10.1016/j.tele.2016.06.007

Sung, K., Kim, T., & Kong, H. K. (2010). Microscopic approach to evaluating technological convergence using patent citation analysis. In T.-h. Kim, J. Ma, W. c. Fang, B. Park, B.-H. Kang, & D. Ślęzak (Eds.), *U-and E-Service, Science and Technology* (pp. 188–194). Berlin: Springer. doi:10.1007/978-3-642-17644-9_21

Teece, D. J. (2018). Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world. *Research Policy*, *47*(8), 1367–1387. doi:10.1016/j.respol.2017.01.015

Tijssen, R. J. (1992). A quantitative assessment of interdisciplinary structures in science and technology: Co-classification analysis of energy research. *Research Policy*, *21*(1), 27–44. doi:10.1016/0048-7333(92)90025-Y

Trajtenberg, M. (1990). A penny for your quotes: Patent citations and the value of innovations. *The Rand Journal of Economics*, *21*(1), 172–187. doi:10.2307/2555502

Tseng, F. M., Hsieh, C. H., Peng, Y. N., & Chu, Y. W. (2011). Using patent data to analyze trends and the technological strategies of the amorphous silicon thin-film solar cell industry. *Technological Forecasting and Social Change*, *78*(2), 332–345. doi:10.1016/j.techfore.2010.10.010

Urbach, N., Drews, P., & Ross, J. (2017). Digital business transformation and the changing role of the IT Function. C*omments on the special issue. MIS Quarterly Executive*, *16*(2).

Valentini, G., & Di Guardo, M. C. (2012). M&A and the profile of inventive activity. *Strategic Organization*, *10*(4), 384–405. doi:10.1177/1476127012457980

van Eck, N. J., & Waltman, L. (2007). Bibliometric mapping of the computational intelligence field. *International Journal of Uncertainty, Fuzziness and Knowledge-based Systems*, *15*(05), 625–645. doi:10.1142/S0218488507004911

van Eck, N. J., Waltman, L., Dekker, R., & van den Berg, J. (2010). A comparison of two techniques for bibliometric mapping: Multidimensional scaling and VOS. *Journal of the American Society for Information Science and Technology*, *61*(12), 2405–2416. doi:10.1002/asi.21421

van Eck, N. J., Waltman, L., van den Berg, J., & Kaymak, U. (2006). Visualizing the computational intelligence field [Application Notes]. *IEEE Computational Intelligence Magazine*, *1*(4), 6–10.

Waaijer, C. J., van Bochove, C. A., & van Eck, N. J. (2010). Journal Editorials give indication of driving science issues. *Nature*, *463*(7278), 157–157. doi:10.1038/463157a PMID:20075899

Wang, Y., Kung, L., & Byrd, T. A. (2018). Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. *Technological Forecasting and Social Change*, *126*, 3–13. doi:10.1016/j.techfore.2015.12.019

Yoo, Y., Boland, R. J. Jr, Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization Science*, *23*(5), 1398–1408. doi:10.1287/orsc.1120.0771

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Zhu, K., Kraemer, K. L., & Xu, S. (2006). The process of innovation assimilation by firms in different countries: A technology diffusion perspective on e-business. *Management Science*, *52*(10), 1557–1576. doi:10.1287/mnsc.1050.0487

Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, *18*(3), 429–472. doi:10.1177/1094428114562629

This research was previously published in Business Transformations in the Era of Digitalization; pages 160-178, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 39
The Accessibility, Usability, Quality and Readability of Turkish State and Local Government Websites an Exploratory Study

Yakup Akgül
https://orcid.org/0000-0001-5344-4359
Alanya Alaaddin Keykubat University, Alanya, Turkey

ABSTRACT

With significant development in Internet technology contributing to daily lives in nearly every aspect, it is important that government websites and e-government services offered through them are used effectively, efficiently, and satisfactorily. Achieving accessible, usable, qualified, and readable e-government services that enable citizens to fulfill different users' requirements by everyone involved in the target group, implying a lack of equality between disabled and non-disabled people in benefiting from online governmental services regardless of time and location constraints, has become a global aim. This study investigated whether the websites of the state and local level e-government in the Turkish Republic comply with prevailing standards of accessibility, heuristic usability, mobile readiness, performance and, the readability of website content with six different indices and whether these qualities depend on the type of the government websites. After examining 77 state and 247 local e-government sites, the results indicate that the Turkish government websites have made many of the accessibility, usability, quality, and readability mistakes as predicted. In light of the study findings, this paper will present some recommendations for improving Turkish government websites, as well as discuss future implications.

DOI: 10.4018/978-1-7998-7297-9.ch039

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Recently, web accessibility and usability are becoming major attributes in both developed and developing countries, primarily for public and government institutions that rely on the web for providing the full range of usable, accessible, easy to use, readable, and easily reached services based on mobile readiness for their users. Moreover, electronic government services are expected to expand; thus, guaranteeing equal access for everyone in terms of providing citizens with more effective, efficient, and satisfactory government services that enable everyone to benefit from them and fulfilling different users' requirements based on usability, accessibility, readability, and quality dimensions, regardless of time and location constraints, have become a global aim. Disabled people constitute a noticeable percentage of the world's population (over 1 billion people), obtaining accessible e-government services that enable citizens to facilitate them and carry out different users' demands.

During the last two decades, governments in developing countries have increasingly accepted e-government as a fundamental means and crucial infrastructure of leveraging their general performance for government interaction with citizens and other stakeholders. Accessibility is crucial to usability. The usability of a website by users with disabilities was assigned as website accessibility. Cognitive, visual, mobility, auditory, or neurological disabilities are related to these disabilities (Loiacono, McCoy, & Chin, 2005). Site usability is a significant constituent of website quality, and as Scott (2005) indicates that the developers of government sites "must regularly monitor and enhance the quality of their sites to attract and satisfy users" as site content and site use raise (Scott, 2005:151). The usability of the website can leverage the trust and success in e-government services. It must be noted that trust is a crucial aspect of people's behavior to e-government websites. The usability of website leveraging trust and success in e-government services and that trust is a crucial aspect in people using e-government (Ansari, Baqar, Hassan & Saeed, 2016; Huang et al., 2009; Mensah et al., 2017; Parent, Vandebeek, & Gemino, 2005; Venkatesh, Hoehle & Aljafari, 2014). Users' trust can be leveraged by usability in e-government. At the state and local level, however, e-government websites often have usability and accessibility violations (Alryalat, 2017; Al-Yafi et al., 2016; Ho, 2002; Youngblood and Mackiewicz, 2012; Shi, 2007; Pribeanu and Fogarassy-Neszly, 2011; Pribeanu et al., 2012; Pribeanu et al., 2014; Akgül and Vatansever, 2016a; Akgül and Vatansever, 2016b; Akgül, 2016a; Akgül, 2016b; Ismailova and İnal, 2017; Ismailova, 2017). These issues become further complicated as the way citizens access the Internet is changing. The Turkish Statistical Institute reports that over forty-three percent of Turkish adults now own tablets, and ninety-seven percent of Turkish adults use the mobile phone (incl. smartphones) (TUİK, 2018). Thus, state and local websites should be usable, accessible, qualified, readable, well coded, and mobile-device ready. 53.2% of Internet users interacted with public authorities over the Internet for private purposes between April 2014-March 2015 in Turkey (TUİK, 2018). This study utilizes usability heuristics and accessibility to investigate 77 state and 247 local government websites and assess whether sites result in better site usability and accessibility. It is essential and reasonable to compare usability, and accessibility of websites depending on the state and local e-government websites.

Usability, accessibility, and readability attributes should be utilized at the design phase, especially in government websites, since they aim to provide prospective users with information about e-services. Poorly designed websites affect usage negatively and reduce website interaction (Baker, 2009; Clemmensen & Katre, 2012). The usability is acknowledged as a crucial reputation aspect of any website to provide the optimum services to the citizens of the developing countries. In this study; to assess usability, 19- dichotomous web usability standards were utilized to each site's homepage, based on prior usability

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

studies (Youngblood and Mackiewicz, 2012; West, 2008; Cappel & Huang, 2007; Galvez, and Youngblood, 2016; King & Youngblood, 2016; Youngblood and Youngblood, 2018; Akgül and Vatansever, 2015). As shown in Table 1, overall design standards; hypertext; navigational standards; readability; language option; and findability aspects have been evaluated.

The websites were checked for their compliance with existing accessibility standards including WCAG 2.0, the World Wide Web Consortium's Web Content Accessibility Guidelines, to assess state and local government websites accessibility (W3C, 2008). A combination of testing was run for compliance, an automated accessibility checker utilized each webpage for its compliance by using AChecker, automated testing cannot easily identify issues followed by manually inspecting the code for that. For instance, the presence or absence of an image's ALT attribute can be identified by using automated testing; but, it cannot promptly verify the usability ALT information.

And also, mobile-device readiness has been investigated by using the HTML and CSS of each homepage. Each webpage was also tested on a mobile device to see whether the webpage responsive to the mobile screen. Responsive Web Design makes your web page look good on all devices (desktops, tablets, and phones). Web technologies using the following guidelines can help to make information accessible to all citizens so that they will have equal accessibility opportunities to all e-government resources at any time and anywhere.

The speed of load time, response time, mobile load time, total HTTP requests, total images, total scripts, total CSS, total HTML, size, total objects, response connection errors, HTML Validation, CSS Validation, percentage of ARIA standards usage, and the number of broken links have been evaluated in the context of the quality parameters.

Citizens are increasingly using the Internet as a vehicle to acquire information for themselves of government-related topics and procedures, including e-government services. The readability of the contents of the state and local government websites have been measured through Flesch Kincaid reading ease, Flesch Kincaid grade level, Gunning fog, SMOG, Coleman-Liau index, and Automated Readability index.

Current study will help fill the gap in the existing researches, while most of the studies have investigated the usability and accessibility issues at the national (West, 2008; Jaeger, 2006; Olalere and Lazar, 2011), state (Fagan and Fagan, 2004; Lazar et al., 2013; Akgül and Vatansever, 2016a; Akgül and Vatansever, 2016b; Akgül, 2016a; Akgül, 2016b; Ismailova and İnal, 2017; Ismailova, 2017), and local (Youngblood and Mackiewicz, 2012; Cassell and Mullaly, 2012; Scott, 2005; Akgül and Vatansever, 2016b) levels. To the best of authors' knowledge, this is the first study to assess both the state and local websites in the context of Turkey. By examining mobile issues, it is very important that HTML and CSS can be resized to any screen. The study assesses that state and local governments may need to address in their current websites. This is particularly important because the higher penetration of powerful smartphones and high-speed mobile internet access (3G and 4G mobile networks) are leading to the better offer and higher usage of powerful mobile devices -especially smartphones- for mobile governmental services among people. In addition to this, usability, accessibility, quality, and readability data link the dots holistically. The main aim of this study is to connect the dots such as accessibility, usability, quality, and readability in the context of the state and the local government websites of Turkey.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

RELATED LITERATURE

Accessibility Evaluation of Government Websites

Over the past few years, a number of studies on government web pages were carried out to measure the accessibility and usability of sites. Kurniawan and Zaphiris conducted the first study for comparing governmental, organizational, educational, and commercial aging/health-related websites according to their accessibility and usability (Kurniawan, 2001).

Galvez and Youngblood (2016) investigated the accessibility, usability, and mobile readiness of 132 state and local e-government websites in Rhode Island. The authors identified substantial problems in both usability and accessibility in Rhode Island state and local government websites.

A follow-up study has been conducted by Al-Khalifa et al., (2017) revisited the homepages of his 2010. In order to track how the Saudi government websites accessibility evolved from 2010 to 2017, The results show an improvement in the accessibility of Saudi government websites since 2010. Moreover, Ismailova and Inal (2017) have analyzed the accessibility of government websites of four countries including Kyrgyzstan, Azerbaijan, Kazakhstan, and Turkey. In another study, Ismailova (2017) investigated the usability, accessibility, and security aspects of covered 55 e-government websites in the Kyrgyz Republic. The results revealed accessibility, usability and security issues, which is listed in the State Information Resources of the Kyrgyz Republic. The same year, Verkijika and De Wet (2017) examined the conformance to Web Content Accessibility Guidelines (WCAG) 2.0 levels of government websites in Sub-Saharan Africa (SSA). The results indicated that none of the 217 government websites examined adhered to all the WCAG 2.0 guidelines.

In a recent study, Ismail et al., (2018) presented a multi-tool accessibility assessment of Indian state of Jammu and Kashmir government department websites based on six accessibility tools with 14 different parameters.

Some similar studies on the accessibility of websites and web contents were also conducted by Potter (2002); Kuzma et al., (2009a); Kopacka (2010); Kuzma (2010); Latif and Masrek (2010); Lazar et al. (2010); Al-Radaideh et al. (2011); Byun and Finnie (2011); Goodwin et al. (2011); Isa et al., (2011); Olalere and Lazar (2011); Al-Khalifa (2012); Baowaly and Bhuiyan (2012); Bakhsh and Mehmood (2012); Grantham et al. (2012); AbuAli et al., (2013); Al-Faries et al. (2013); AlJarallah (2013); Al Mourad and Kamoun (2013); Kamoun and Almourad (2013); Kamoun et al. (2013); Patra et al. (2014a); Patra et al., (2014b); Youngblood (2014); Wentz et al. (2014); Lujan-Mora et al. (2014), Ismail et al., (2017) and give suggestions for accessibility improvements.

Heuristic Usability Evaluation of Government Websites

The usability of e-government defined as "the extent to which a website can be used by citizens to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified e-government service context." (Venkatesh et al.,2014:670). Usability has been known to play a central role in the success of any e-government initiative (Youngblood & Mackiewicz, 2012). That's why, e-government usability has been a crucial research field (Akgül and Vatansever, 2015; AlFawwaz, 2012; Asiimwe & Lim, 2010; Baker, 2009; Cappel and Huang,2007; Clemmensen & Katre, 2012; De Róiste, 2013; Donker-Kuijer, Jong & Lentz, 2010; Galvez and Youngblood, 2016; Huang & Benyoucef, 2014; King and Youngblood, 2016; Kirui & Kemei, 2014; Pew Center on the States, 2008; Usability.gov n.d.; Venkatesh et al., 2014;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

West, 2008; Youngblood & Mackiewicz, 2012; Youngblood and Youngblood, 2013; Youngblood and Mackiewicz, 2012;Youngblood and Youngblood, 2018).

In the literature, relatively few studies have evaluated the usability of government websites by using dichotomous usability standards, checking for the presence or absence of site features as a usability inspection method. Youngblood and Mackiewicz (2012) investigated the websites' usability of municipalities in Alabama. The results of the study revealed substantial usability and accessibility problems.

Akgül and Vatansever (2013) evaluated the usability, accessibility, HTML and CSS validity, current use of HTML 5 and ARIA sides of sixty-one Turkish government websites. The results indicated that the analyzed sample has one or more issues.

Youngblood and Youngblood (2013) assessed a state-wide population of county web portals based on 14-point usability heuristic and accessibility. Researchers found that a few met all the usability standards whereas most sites did not pass a basic accessibility analysis.

King and Youngblood (2016) examined the county voting and election websites according to the content and quality of Alabama by means of a 22-point Election Information Content Score (EICS)s. Accessibility, usability, and mobile readiness aspects have been assessed. The results indicated that voting and election information are not in full compliance with accessibility, usability, and mobile readiness standards.

Galvez and Youngblood (2016) examined the accessibility, usability, and mobile readiness aspects of 132 state and local e-government websites in Rhode Island. The leveraging attributes of usability, accessibility, and mobile readiness suggested that practice-based templates may be helpful.

In a recent study, Youngblood and Youngblood (2018) evaluated usability heuristics, trust and site's usefulness of LEMA websites in Alabama.

In the context of company websites (Cappel and Huang, 2007), the same heuristic-based content analysis has been also used in these studies (Usability.gov, n.d.; Pew Center on the States, 2008; West, 2008).

Some similar studies on the usability of websites and web contents were also conducted by Al-Khalifa (2010) Alotaibi (2013) Islam et al. (2017) Hasan (2013) Ansari et al. (2016) Donker-Kuijer et al. (2010) Holzer & Kim (2007) Karaim and Inal (2017) Verkijika and De Wet (2018) and give suggestions for improvements.

Materials and Methods

This paper presents a first examination of the accessibility, usability, quality, and readability of a sample of Turkish state and local websites' homepages. E-government homepages were evaluated because they can represent the tone of the entire website (Potter, 2002). The list of Turkish state and local level e-government covering different government sectors and their web addresses was obtained from the turkiye.gov.tr as government "services A-Z" (The e-Government Gateway, 2018). The "A-Z" list included the state and local-level agencies. In Turkey, there are 77 state level and 247 local level websites. Data collection began for this study in January 2018, and evaluation was completed in February 2018.

Materials

The main aim of this paper is to test the usability, accessibility, quality, and readability of the state level and the local level e-government websites in the Turkish Republic. For accessibility testing, AChecker was used to test each homepage against the WCAG 2.0 standards.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To test for usability standards, the coder visually inspected each homepage. Borrowing from previous studies (Cappel and Huang,2007; Youngblood and Mackiewicz, 2012; Youngblood and Youngblood, 2013; Galvez and Youngblood, 2016; King and Youngblood, 2016; Usability.gov n.d.; Pew Center on the States, 2008; West, 2008), overall design standards, conventions for hyperlinked text in main text, navigational standards, findability, and readability aspects have been utilized as five usability attributes. Splash pages, autoplay, and horizontal scrolling have been examined regarding the overall design standards category, these attributes are considered as violating design standards. The text links category examined to assess whether text links were blue if links were a different color than regular text if the link color changed after being clicked, and if text links were underlined. Then, the analyzed sample sites were evaluated for their navigational standards. The "home" link or "return" home text link was adopted as good navigational standards. Also, a navigational group should have no more than 10 items (excessively long navigational groupings). The usability measure included findability. Each homepage was assessed for its findability at the first page of Google search results. Lastly, readability was counted by assessing whether each homepage used left-aligned text, had no more than one contiguous sentence of all capitalized text, only hyperlinked text is underlined, and if there was an option to view the page in a language other than Turkish.

To evaluate mobile readiness, the Safari Web browser on an iPhone 6S was used to examine the responsiveness of a site to mobile devices, i.e., if the homepage conformed to the smaller screen size.

For the quality test, the researcher utilized the Web Page Analyzer tool, which was chosen for its online availability and wide usage by researchers in quality tests. The evaluation of the websites' performance was utilized using the speed test tool provided by Pingdom AB, available at http://www.pingdom.com. The size and composition of, and downloads time for websites have been given by this tool. Pingdom has been used in previous studies regarding the evaluation of government websites (Gopinah et al., 2016; Ismailova and İnal, 2017; Ismailova, 2017; Jati and Dominic, 2009; Manhas, 2014; Ismailova, 2017; Akgül, 2016a; Akgül, 2016b) and university websites (Jange, 2014; Kaur et al., 2016). Websitepulse has been used for the response time and PageSpeed Google tools have been used for mobile loading time. Moreover, the Chrome extension of the LinkMiner tool has been utilized to count the numbers of broken links in the analyzed websites (Cooper, 2015).

Hypertext markup language (HTML) code validation is a primary step in evaluating web accessibility (Baowaly et al., 2012). HTML and cascading style sheets (CSS) documents (CSS specifications) need to create international technical specifications (detailed rules regarding syntax or grammar) to work properly for assistive technologies (Baowaly et al., 2012; Grantham et al., 2012). HTML Markup Validation Service (https://validator.w3.org) and CSS Validator Service (http://jigsaw.w3.org/cssvalidator/) have been utilized to examine whether the analyzed sample websites follow international standards, which are both available online for free from W3C. Similarly, the validation icons did not necessarily reveal the actual up-to-date accessibility conformance (Gilbertson and Machin, 2012). In the present study, the presence of validation icons and conformance icons as an indication of the awareness of web accessibility in Turkey governmental websites have been examined. Moreover, if the conformance icon was present on a website, the author observed whether WCAG 1.0 or WCAG 2.0 conformance icons are used and whether they reflect the actual conformance level. The same measures were applied to HTML and CSS validation icons. Author checked the presence of HTML and CSS validation icons and, if they existed, the author checked whether they represent an up-to-date version of the respective website.

After the accessibility evaluation process, the readability must be checked. Readability is also an important component in evaluating the accessibility of a web page. For the readability analysis, the col-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

lection of readability score was utilized by using the calculation tool provided by Online-Utility.org based on the Flesch-Kincaid Reading Ease, Flesch-Kincaid Grade Level, Gunning FOG, Simple Measure of Gobbledygook, Coleman-Liau Index and Automatic Readability Index.

RESULTS

Usability Analysis

The overwhelming majority of sites followed the overall design standards, regardless of whether or not the site state or local level. There were only four instances in which a website used a splash page, meaning that 97% of the state level sites and only eleven instances in which a website used a splash page, meaning that 96% of the local level sites met design standard 1. Only one state-level site and seven local level sites had an audio and/or video autoplay, and only fifteen state-level sites and eighty-two local level sites required the user to scroll across the page horizontally.

Overall, state and local level sites did not fare as well with meeting hyperlinked text conventions as they did with meeting design standards. Of the four categories used to create the hyperlinked text measure, both state and local level sites scored highest for the following: "All text links are a different color than the main text". Surprisingly, "All text links are blue", "all text links change color after being clicked," and "all text links are underlined" (see Table 1). Surprisingly, state and local level sites were more likely to have text links that -had a different color than the main body text.

Not all but one (0.01%) of the websites used the color to help differentiate hyperlinks from the surrounding text. At the same time, however, four state level and seventeen local level of the websites underlined hyperlinks in the main text, presenting a potential problem for colorblind users unable to use color to separate hyperlinks from the surrounding text. When it came to navigational standards, all of the websites had a primary navigation at the top or left the side of the page. 35% of state level and 47% of local level websites have a Home link on internal pages.

Just under 95% of the state level and 86% of local level websites relied on the use of a header graphic, such as a logo, as a supplemental home link. More troubling, the majority of the state level (61%) and local level (32%) sites had overloaded with navigation—navigational groupings with more than ten items make it difficult for users to remember where information in the navigation is as they move between pages.

The websites perform reasonably well in terms of readability, with none of the websites relying on more than one continuous line of all capitalized text and only seven state-level websites (79%) having text that was underlined but was not a hyperlink. That said, all of the websites had the main body text that was not left aligned, i.e. text that was centered.

All sites were tested for their "findability," how easy they were to find by using a Google search. All of the state and local level websites (100%) met the findability criteria and appeared in the first page of Google search results.

Only forty-four local level (18%) and state level (81%) of the websites provided translated content, and the translation was always handled through a Google translate option rather than providing professionally translated material.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Results of usability evaluations

Usability Standard	State Level N=77 N (%)	Local Level N=247 N (%)
Overall design standards		
1. A splash page is not used (on the opening screen)	73 (97)	236 (96)
2. Audio and video do NOT auto play when page loads	76 (99)	240 (98)
3. Horizontal scrolling is not required with the browser window set to 1024 pixels across.	62 (82)	165 (67)
Conventions for hyperlinked text in the main text		
4. All text links are blue (some shade of blue, not necessarily the default shade, counts as blue).	7 (0.1)	20 (0.09)
5. All text links are a different color than the main text	77 (100)	242 (98)
6. All text links color changes after a link is clicked.	0 (0)	1 (0.01)
7. All text links are underlined.	4 (0.06)	17 (0.07)
Navigational standards		
8. A "home" or "return" text link (HTML text or text appearing in a graphic) appears on internal pages[a].	26 (35)	116 (0.47)
9. A logo or other header graphic serves as a "home" link on internal pages.	72 (95)	211 (0.86)
10. Main navigation is on the top and (or left side of the page)	73 (97)	225 (0.92)
11. There are 10 or fewer visible items per navigational grouping	46 (61)	79 (0.32)
12. A breadcrumb trail is provided on internal pages.	40 (53)	114 (0.47)
13. Site search capability is provided on the home page.	69 (91)	149 (0.61)
14. A FAQ or Help option is provided	24 (32)	14 (0.06)
Findability		
15. Website is in the first page of results from Google	77 (100)	247 (100)
Readability		
16. Use of left-aligned text	77 (100)	247 (100)
17. Does not include more than one contiguous sentence of all-caps text	77 (100)	247 (100)
18. All underlined text is hyperlinked	60 (79)	247 (100)
19. Page has a non-Turkish version or a translation option	61 (81)	44 (0.18)

[a]Always assessed on internal pages

Accessibility Analysis

For the analysis of compliance with accessibility guidelines in Turkey, the AChecker tool was utilized on their availability, the ability to assess manually for WCAG 2.0 conformance Level A, AA, and AAA. Table 2 depicts the average number of parsing errors in the different governmental levels. Most parsing errors have appeared at the conformance level A, with 45,41 (state) and 139,55 (local) average errors, respectively. The average number of errors at conformance level AA was lower for both the state and local level sites. Again, the lowest number of errors was found in the state level websites (13,95 errors in average) and the highest was observed in the local level websites (18,71 errors). In brief, of the 77 websites from state-level sites, only two satisfied the accessibility conformance level A, level AA and level AAA, of the 247 websites from local level sites, only twenty-three satisfied the accessibility confor-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

mance level A, level AA, and Level AAA. It was found that the most failed success criteria include: SC 1.1.1 (missing appropriate Alt Text). In the state level sites, 80% of all the errors were due to violating this criterion. In the local level websites, this error constituted more than half of all errors (49%, respectively). Among the state level websites, the violation of criterion 1.1.1 was 80%, the violation of criterion 1.4.4 resize text was 9,8% and some of the failed success criteria include SC 1.4.6 (Contrast) (17% of all errors). In the local level websites, this error was observed 2015 times, which constituted 21% of all errors (at the state level 914 times 6%), respectively, SC 1.4.4 (Resize text) local level websites (4265 times and 9.8% of all errors). In the state level websites, this error was found 623 times, respectively, constituting 8.8% of all errors (Table 3).

Table 2. Average number of accessibility errors by service level

Level	Average Number by Conformance Level		
	A	AA	AAA
State Level	45,41	13,95	12,38
Local Level	139,55	18,71	10,08

Quality in Use Analysis

The quality of websites has been assessed on the basis of selected quality parameters; the speed of response and load time of the websites (Nielsen, 1994). For the quality and performance analysis, the download time was performed as one of the first measurements, response time and mobile loading speed of state and local level websites using the website pulse, Pingdom and PageSpeed Google tools. The results for each quality attributes summarized in Table 4. The best performing website scored the websites of the local level with the average response time being 2.17 s, ranging from 0,315 to 32.63 s. The average response speed of the Turkish state level websites was higher at 3.09 s., with the minimum and maximum being 0.563 and 65.959 s, respectively. The lowest response speed among the tested websites belonged to the http://www.ubak.gov.tr/ with a minimum response time of 0.563 s and local level a minimum of 0,315 s. belonged to the Bozüyük websites (Table 5). Following the response time, the download times of websites were measured. According to the results presented in Table 4, the best performing website scored 9.74 s. with the average load time at the websites of state level, ranging from 2,37 to 60s. The average load speed of the Turkish state level websites was higher at 12.37 s., with the minimum and maximum being 1.36 and 60 s, respectively. The lowest load speed among the tested websites belonged to the state level website with a minimum load time of 1.36 s. Following the download times, the mobile loading speed of websites was measured. According to the results presented in Table 4, the best score was obtained from the websites of the local level with the average mobile loading time being 2.08 s, ranging from 0,4 to 9,5 s. The average mobile loading speed of the Turkish state level websites was higher at 2.17 s., with the minimum and maximum being 0.8 and 5,9 s, respectively. The lowest mobile loading speed among the tested websites belonged to the local level website with a minimum mobile load time of 0.4 s.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Accessibility checkpoints violated by websites by service level

Checkpoints	State Level (N=77)	Local Level (N=247)
Conformance Level A		
1.1.1	2677	29298
1.3.1	191	1511
1.4.1	0	3
2.1.1	116	764
2.2.1	39	30
2.2.2	3	18
2.4.1	0	1
2.4.2	4	20
2.4.4	189	1458
3.1.1	79	285
3.2.2	0	15
3.3.2	99	572
4.1.1	47	410
4.1.2	7	84
Conformance Level AA		
1.4.3	389	262
1.4.4	623	4265
2.4.6	48	94
Conformance Level AAA		
1.4.6	914	2015
2.1.3	27	139
2.4.9	0	282
2.4.10	0	53

Following the load, response, and mobile loading times were evaluated. The results of the average number of total HTTP requests summarized in Table 5, which shows that the average total HTTP requests of the state government websites were 78.23 s, with the minimum and maximum being 3 s and 235 s, respectively. The total number of objects were evaluated with the number of HTML files, images, style sheets, and scripts. Increase in the number of HTTP requests causes a slowdown in the loading webpage. The average number of requests of the local government websites was 12.89 requests, with the minimum and maximum being 2 and 269, respectively. The lowest and highest average the size of the websites performing scored 0.08 (state) and 0.29 (local) megabytes, respectively. The number of detailed information regarding the components is given in Table 5. It is observed that the state government websites had the lowest connection errors, of which only 29% had connection errors, with the average numbers of errors being 0.82 and 3.45, respectively. For the remaining, the percentage of websites with connection errors was found to be 49% (local level) (Table 6).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Broken links were detected in 77% of the local level websites, 77% of the state level websites. Moreover, the lowest numbers of broken links were observed on the websites of local level websites, with the maximum numbers being 350, respectively. In contrast, the maximum numbers of broken links in the websites of state-level websites were 380, respectively (Table 7).

The further details of performance were obtained by using the Pingdom tool on the state and local websites. The overall average performance of the websites was as follows: On average, 100 points of the performance of local government websites had the highest average score, followed by the state government websites in Turkey (91 points). That is, the majority of the state level websites scored higher than 77 points. The state and local government websites of Turkish scored on average 80.16 and 77.51 points, respectively.

Table 4. Load time of websites by service level

LEVEL	Load Time (s)			Response Time (s)			Mobile Load Time (s)		
	Min.	Average	Max.	Min.	Average	Max.	Min.	Average	Max.
State level	2,37	9,736623377	60	0,563	3,097844	65,959	0,8	2,17	5,9
Local level	1,36	12,37296	60	0,315	2,167579	32,627	0,4	2,08	9,5

HTML and CSS Evaluation

Table 8 depicts that the highest number of HTML validation errors scored with an average of 97.23 errors in local government websites. Also, the websites of state had the lowest number of errors with only 63.97 average errors. Regarding the CSS validation results, the highest number of CSS validation errors scored with an average of 115.76 errors in state government websites. On the other hand, the lowest number of errors with only 123.89 average errors obtained from the websites of the local level.

Presence of Validation Icons and Conformance Icons

In addition, the examination of the presence of WCAG, HTML, and CSS validation icons carried out and found that none of the websites have conformance icons. The WAVE tool was also used to detect the usage of ARIA standards in the state and local level websites. We found that most of the websites use ARIA standards. Table 9 depicts the percentage of ARIA usage in the state and local government websites.

The state and local government websites were also conducted in order to identify mobile friendliness level. Each website was browsed by using smartphones and measured by the website design adoption. It is found that only 22% of the state government websites and 18% local government websites were mobile friendly.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Size and the number of components of websites by service level

	State Level	Local Level
Total HTTP requests		
Min.	3	2
Average	78,23	12,89
Max.	235	269
Total images		
Min.	2	0
Average	51,30	17,09
Max.	205	193
Total scripts		
Min.	0	1
Average	13,12	10,97
Max.	44	52
Total CSS		
Min.	0	1
Average	10,86	5,51
Max.	84	34
Total HTML		
Min.	1	1
Average	1,94	101,98
Max.	13	50
Size (MB)		
Min.	0,08	0,29
Average	4,61	56,56
Max.	60,7	121,3
Total OBJECTS		
Min.	3	2
Average	78,26	73,43
Max.	235	1664

Table 6. Number of websites with connection errors and number of errors in websites by service level

SERVICE LEVEL	Percent of Websites With Connection Errors (%)	Response Connection Errors		
		Min.	Average	Max.
State Level	%29	0	0,82	23
Local Level	%49	0	3,45	127

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. Number of websites with broken links and number of broken links in websites by service level

SERVICE LEVEL	Percent of Websites With Broken Links (%)	Broken Links		
		Min.	Average	Max.
State Level	77%	0	23,25	380
Local Level	77%	0	10,91	350

Table 8. Comparison of the number of HTML and CSS validation errors

SERVICE LEVEL	HTML Validation			CSS Validation		
	Min.	Average	Max.	Min.	Average	Max.
State Level	1	63,97	857	0	115,76	803
Local Level	0	97,23	1001	0	123,89	1103

Table 9. Percentage of the ARIA usage in Turkish governmental websites

SERVICE LEVEL	Percentage of ARIA Standards Usage (%)
State Level	66%
Local Level	64%

Table 10. WAVE Tool Report: Government websites

Tools/ Statistical Inferences		WAVE					
		Errors	Alerts	Features	Structural Elements	HTML 5 and ARIA	Contrast Errors
State Level	Total Errors	1988	3104	1114	2913	860	2658
	Mean	24	19	11	31,5	3,5	22
	Std. Deviation	23,27	81,37	18,04	36,63	20,33	60,21
Local Level	Total Errors	13386	13506	7645	11488	3696	12257
	Mean	43	36	18,5	34,5	4	41,5
	Std. Deviation	46,64049	73,88597	40,65082	42,96647	37,60892	47,37227

WAVE Tool

As per WAVE tool report for the state level, HTML5 & ARIA violations are least in these websites and alerts are larger in number. The mean values for errors were observed as 24, alerts were 19, features was 11, structural elements was 31.5, HTML5 & ARIA was 3.5 and contrast errors was 22. The standard deviations of errors, alerts, features, structural elements, HTML5 & ARIA, and Contrast errors are 23.27, 81.37, 18.04, 36.63, 20.33 and 60.21, respectively. As per WAVE tool report for the local level, HTML5 & ARIA violations are least in these websites and alerts are larger in number. The mean values for errors were observed as 24, alerts were 19, features were 11, structural elements were 31.5, HTML5 and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ARIA were 3.5 and contrast errors was 22. The standard deviations of errors, alerts, features, structural elements, HTML5 & ARIA, and Contrast errors are 23.27, 81.37, 18.04, 36.63, 20.33 and 60.21, respectively. Hence, the result indicates that a number of alerts and contrast errors are high. For achieving better results in terms of accessibility, we need to minimize these alerts and contrast errors. The WAVE report of state and local government websites which were used for our accessibility analysis and their mean and standard deviation are given in Table 10.

Readability Test Results

On the basis of readability score calculated by all readability tools, the overall average grade level per the name of the website is mentioned in Table 11. To prevent human error during calculations and for ease of use, both readability tests were performed by using an online readability calculator. The average FRES, FKGL, SMOG, and Gunning Fog Index (GFI) scores of state level and local level websites were found to be 20.24 (state level) 23.40 (local level), 11.47 (state level) 11.18 (local level), and 6.87 (state level) 7.17 (local level), 5.83 (state level) 6.61 (local level) respectively. Both state level and local level of the websites had difficult to read FRES score (0–49). State level websites had score 5.0-5.9 Easily understood by an average 5th or 6th-grade student. Local level sites had score 6.0-6.9 Easily understood by an average 7th or 8th-grade student.

Table 11. Readability indices of government websites of Turkey

	State Level			Local Level		
	Min.	**Average**	**Max.**	**Min.**	**Average**	**Max.**
FKRE	-49	20,24306	121,2	-132,6	23,39978	121,2
FKGL	-3,4	11,46528	20,6	-3,4	11,17733	32
GFOG	0,4	5,829167	17	0,4	6,609052	16,38
SMOG	1,8	6,868056	6,7	1,8	7,168664	15,6
CLI	-16,1	15,68333	16,4	-16,1	16,29909	60,5
ARI	-20,9	5,898611	14,8	-20,9	7,193664	47

Note: Readability Tools (FKRE: Flesch-Kincaid Reading Ease, FKGL: Flesch-Kincaid Grade Level, GFOG: Gunning FOG, SMOG: Simple Measure of Gobbledygook, CLI: Coleman-Liau Index, ARI: Automatic Readability Index).

DISCUSSION AND CONCLUSION

In this study, state and local government websites of Turkey have been evaluated in terms of usability, accessibility, quality, and readability. In terms of the usability, it is an urgent need for promoting the use of usability heuristics, particularly in the main text and navigation, to guide the website development, as well as the need for hands-on usability testing. The majority of state and local government websites also need to work on making their websites more usable on mobile devices, so mobile readiness will be more efficient. This finding aligns with the researches by Ismail et al. (2018); King and Youngblood (2016); Verkijika and De Wet (2018a); Verkijika and De Wet (2018b); Youngblood and Mackiewicz (2012); Youngblood and Youngblood (2018). According to the results on the accessibility tests, of the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2 websites in the state government websites and 23 websites in the local government websites attained conformance level A, level AA, and Level AAA. Furthermore, the analysis of the distribution of error showed that in the local government websites, accessibility checkpoints were violated more often than in state governments' websites. Therefore, in designing government websites, the developers need to pay more attention to guidelines such as WCAG 2.0 to achieve a higher accessibility. The findings of this research support previous studies that examined the web accessibility level of e-government websites around the world (Al-Khalifa et al., 2017; Ismail et al., 2017; Moreno et al., 2018; Verkijika and De Wet, 2017; Verkijika and De Wet, 2018b). In terms of the usage quality, the speed of load time, response time, mobile load time, total HTTP requests, total images, total scripts, total CSS, total HTML, size, total objects, response connection errors, HTML Validation, CSS Validation, percentage of ARIA standards usage and as well as the number of broken links were evaluated. Overall, it can be said that local government websites have a higher load, response and mobile load speed and less broken links and higher performance score. They are followed by state government websites. Broken links are known to affect the quality of a website as they pose a navigation challenge for users trying to access information on the given website (Dani and Agrawal, 2018; Ismailova and İnal, 2017; Verkijika, 2017; Verkijika and De Wet, 2018a; Verkijika and De Wet, 2018b). In terms of readability, both state and local government websites had a difficulty to read FRES score. These findings further confirm previous studies that examined Patra et al. (2017) studied the compliance of WCAG 2.0 on Indian websites and specified that 39.60% of educational sites are violating the rules of readability. Karhu et al., (2012) evaluated the accessibility and readability of the contents of the websites of seven universities in Finland. A few other studies have examined the readability of the topic-specific information on the world wide web (Grewal and Alagaratnam (2013); Schloman (2004); Schutten and McFarland (2009), predicting helpful user reviews O'Mahony and Smyth (2010); Redish and Selzer (1985). Ismail et al., (2017) With respect to readability, the score was computed using six well established techniques. It was observed that the readability score of these sites were in the acceptable range. Recently, the readability of government websites in India (Ojha et al., 2018).

The findings from this study indicated that the overall usability, accessibility, quality, and readability of e-government websites in Turkey was quite poor, with both state and local level websites performing very badly in usability, accessibility, quality, and readability.

Today, primary access channel of information is the World Wide Web. They should be accessible and communicable to the people irrespective of their disabilities. In order to make the web pages accessible, we have to add some accessibility features such as screen reader link, text size, skip to main content, contrast theme, multi-language, and accessibility statement, etc. By doing this, we will make the websites universally accessible for all. This work also will help to allow IT administrators to implement websites as per WCAG guidelines to avoid these types of violations in the future.

First, it is inappropriate to generalize the findings of this study. Although generalizing the findings may seem to be inappropriate, they signify the importance of the usability, accessibility, performance, and readability in forming well-created e-government services.

LIMITATIONS AND FUTURE RESEARCH

In the context of this work, the tests (accessibility, quality, and readability) were carried out by using online evaluation tools. Although a wide range of errors of a website can be checked by using semi-automatic

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

evaluation tools, the expectations of the visitors of a website play a significant function in the website assessment. Thus, the main limitation of this work is that only semi-automatic tools examination was utilized for aspects of accessibility, quality, and readability. Also, the evaluation of accessibility based on other standards such as Section 508 should be considered. User experience tests will be conducted in the context of future work to deepen the evidence basis for the evaluation for further research. For the analysis of usability, accessibility, and readability, target groups from each website user will be selected. Accessibility analysis will be performed with users with visual impairments. Moreover, the present study was limited to the homepage rather than the entire site. Future studies should focus on the entire site to have a deeper evaluation. Thus, it would be valuable to investigate why state and government sites carry on having significant accessibility, usability, quality, and readability. Lastly, this study used a heuristic evaluation and automated testing without including user-based methods. Future studies in Turkish state and local level websites could, therefore, use user-based methods to evaluate the usability of the websites to consolidate the present literature with the identification of usability issues from the user's perspective.

The implication of this study was to provide a snapshot of usability, accessibility, quality, and readability at the time of the study, in terms of technological context things change forever. Also, as in this study, the data gathered were cross-sectional, a longitudinal study could help gain a deeper understanding of the variables of the usability, accessibility, quality, and readability to compare results with the findings of this study to determine and observe the progress made by Turkish governments. The contribution of this work both theoretically and practically. In terms of the theoretical contribution, this work (to the best author's knowledge) was the first comprehensive e-government website usability, accessibility, quality, and readability of evaluation in Turkey both in terms of the websites covered and the total number of websites evaluated. This study highlights the need to promulgate regulations, which clearly define the institutions' legal obligation of Web accessibility. Such legislation is crucial to encourage the creation of a governmental Web environment better suited for citizens with disabilities. Consequently, governments in the developed world are continuously enforcing stringent legislation to mandate the accessibility of these websites. This is, however, not the case with countries in the developing world regions, like Turkey, where accessibility laws are either non-existent or less stringent (Kuzma et al., 2009b; Verkijika and De Wet, 2017). Practice-based templates may be helpful to improve accessibility, usability, quality performance, readability, and mobile readiness for compliance with industry and legal standards.

REFERENCES

W3C (2008) Web Content Accessibility Guidelines (WCAG) 2.0. Retrieved from http://www.w3.org/TR/WCAG

Akgül, Y. (2016). Analysis on Design Issues of E-Government Websites of Turkey. In *Proceedings of the IX European Conference on Social and Behavioral Sciences* (pp. 3-6).

Akgül, Y. (2016). Quality evaluation of E-government websites of Turkey. In *Proceedings of the 2016 11th Iberian Conference on Information Systems and Technologies (CISTI)* (pp. 1-7). IEEE. 10.1109/CISTI.2016.7521567

Akgül, Y., & Vatansever, K. (2015). Assessing the Usability and Accessibility of Turkey E Government Websites. In *Proceedings of the ICEG 2015: 17th International Conference on Electronic Government*, Stockholm, Sweden, July 13 - 14.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Akgül, Y., & Vatansever, K. (2016). Web accessibility evaluation of government websites for people with disabilities in Turkey. *Journal of Advanced Management Science*, *4*(3), 201–210. doi:10.12720/joams.4.3.201-210

Akgül, Y., & Vatansever, K. (2016). Web Content Accessibility of Municipal Websites in Turkey. *Journal of Advances in Information Technology*, *7*(1), 43–48. doi:10.12720/jait.7.1.43-48

Al-Faries, A., Al-Khalifa, H. S., Al-Razgan, M. S., & Al-Duwais, M. (2013). Evaluating the accessibility and usability of top Saudi e-government services. In *Proceedings of the 7th International Conference on Theory and Practice of Electronic Governance* (pp. 60-63). ACM. 10.1145/2591888.2591898

Al-Khalifa, H. S. (2010). Heuristic evaluation of the usability of e-government websites: a case from Saudi Arabia. In *Proceedings of the 4th International Conference on Theory and Practice of Electronic Governance* (pp. 238-242). ACM. 10.1145/1930321.1930370

Al-Khalifa, H. S. (2012). The accessibility of Saudi Arabia government Web sites: An exploratory study. *Universal Access in the Information Society*, *11*(2), 201–210. doi:10.100710209-010-0215-7

Al-Khalifa, H. S., Baazeem, I., & Alamer, R. (2017). Revisiting the accessibility of Saudi Arabia government websites. *Universal Access in the Information Society*, *16*(4), 1027–1039. doi:10.100710209-016-0495-7

Al Mourad, B., & Kamoun, F. (2013). Accessibility evaluation of Dubai e-government websites: Findings and implications. *Journal of E-Government Studies and Best Practices*, 1–15. doi:10.5171/2013.978647

Al-Radaideh, M., Nuser, M., & Wahbeh, A. (2011). Evaluating accessibility of jordanian e-government websites for people with disabilities. In *Proceedings of International Conference on Information and Communication Systems* (pp. 22-24).

Al-Yafi, K., Hindi, N. M., & Osman, I. H. (2016). A User-Centric Evaluation of e-Government Services in the GCC Region: Case of State of Qatar. *International Journal of Electronic Government Research*, *12*(4), 15–34. doi:10.4018/IJEGR.2016100102

AlJarallah, K. (2013). Cognitive User-centred Design Approach to Improve Accessibility for Blind People during Online Interaction.

Alryalat, M. A. A. (2017). Measuring Citizens' Adoption of Electronic Complaint Service (ECS) in Jordan: Validation of the Extended Technology Acceptance Model (TAM). *International Journal of Electronic Government Research*, *13*(2), 47–65. doi:10.4018/IJEGR.2017040103

Ansari, R. F., Baqar, A., Hassan, H., & Saeed, F. (2016). Heuristic, accessibility and usability evaluations of Pakistan's e-government websites. *Electronic Government, an International Journal, 12*(1), 66-85.

Asiimwe, E. N., & Lim, N. (2010). Usability of government websites in Uganda. *Electronic Journal of E-Government*, *8*(1), 1–12.

ATRC. (2009). IDI web accessibility checker: web accessibility checker. Retrieved from http://achecker.ca/

Baker, D. L. (2009). Advancing e-government performance in the United States through enhanced usability benchmarks. *Government Information Quarterly*, *26*(1), 82–88. doi:10.1016/j.giq.2008.01.004

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bakhsh, M., & Mehmood, A. (2012, December). Web accessibility for disabled: a case study of government websites in Pakistan. In *Proceedings of the 2012 10th International Conference on Frontiers of Information Technology* (pp. 342-347). IEEE. 10.1109/FIT.2012.68

Baowaly, M. K., & Bhuiyan, M. (2012, May). Accessibility analysis and evaluation of Bangladesh government websites. In *Proceedings of the 2012 International Conference on Informatics, Electronics & Vision (ICIEV)* (pp. 46-51). IEEE. 10.1109/ICIEV.2012.6317487

Byun, D. H., & Finnie, G. (2010). Evaluating usability, user satisfaction and intention to revisit for successful e-government websites. *Electronic government, an international journal, 8*(1), 1-19.

Cappel, J. J., & Huang, Z. (2007). A usability analysis of company websites. *Journal of Computer Information Systems*, *48*(1), 117–123.

Cassell, M. K., & Mullaly, S. (2012). When smaller governments open the window: A study of web site creation, adoption, and presence among smaller local governments in northeast Ohio. *State & Local Government Review*, *44*(2), 91–100. doi:10.1177/0160323X12441602

Clemmensen, T., & Katre, D. (2012). Adapting e-gov usability evaluation to cultural contexts. In Usability in government systems (pp. 331-344). doi:10.1016/B978-0-12-391063-9.00053-5

Cooper, J. (2015) Introducing LinkMiner by Point Blank SEO. http://pointblankseo.com/linkminer

CSS Validator Service. (n.d.). Retrieved from http://jigsaw.w3.org/cssvalidator/

Dani, D., & Agrawal, G. Evaluating the Quality of Indian School Education boards' websites using multi criteria decision making models. *International Journal of Information Technology*, 1-9.

de Róiste, M. (2013). Bringing in the users: The role for usability evaluation in eGovernment. *Government Information Quarterly*, *30*(4), 441–449. doi:10.1016/j.giq.2013.05.007

Donker-Kuijer, M. W., de Jong, M., & Lentz, L. (2010). Usable guidelines for usable websites? An analysis of five e-government heuristics. *Government Information Quarterly*, *27*(3), 254–263. doi:10.1016/j.giq.2010.02.006

Fagan, J. C., & Fagan, B. (2004). An accessibility study of state legislative websites. *Government Information Quarterly*, *21*(1), 65–85. doi:10.1016/j.giq.2003.12.010

Galvez, R. A., & Youngblood, N. E. (2016). e-Government in Rhode Island: What effects do templates have on usability, accessibility, and mobile readiness? *Universal Access in the Information Society*, *15*(2), 281–296. doi:10.100710209-014-0384-x

Gilbertson, T. D., & Machin, C. H. (2012, April). Guidelines, icons and marketable skills: an accessibility evaluation of 100 web development company homepages. In *Proceedings of the international cross-disciplinary conference on web accessibility* (p. 17). ACM. 10.1145/2207016.2207024

Goodwin, M., Susar, D., Nietzio, A., Snaprud, M., & Jensen, C. S. (2011). Global web accessibility analysis of national government portals and ministry websites. *Journal of Information Technology & Politics*, *8*(1), 41–67. doi:10.1080/19331681.2010.508011

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gopinath, S., Senthooran, V., Lojenaa, N., & Kartheeswaran, T. (2016, May). Usability and accessibility analysis of selected government websites in Sri Lanka. In *Proceedings of the 2016 IEEE Region 10 Symposium (TENSYMP)* (pp. 394-398). IEEE. 10.1109/TENCONSpring.2016.7519439

Grantham, J., Grantham, E., & Powers, D. (2012, January). Website accessibility: an Australian view. In *Proceedings of the Thirteenth Australasian User Interface Conference* (pp. 21-28). Australian Computer Society, Inc.

Grewal, P., & Alagaratnam, S. (2013). The quality and readability of colorectal cancer information on the internet. *International Journal of Surgery*, *11*(5), 410–413. doi:10.1016/j.ijsu.2013.03.006 PMID:23523948

Harfoushi, O., AlFawwaz, B., Obiedat, R., Faris, H., & Al-Sayyed, R. (2012). Usability Assessment of the Government Web Services in the Hashemite Kingdom of Jordan. *The Journal of American Science*, *8*(12), 12.

Hasan, L. (2013). Heuristic Evaluation of Three Jordanian University Websites. *Informatics in Education*, *12*(2), 231–251.

Holzer, M., & Kim, S. T. (2007). *Digital governance in municipalities worldwide: a longitudinal assessment of municipal websites throughout the world*. Newark, NJ: National Center for Public Productivity.

HTML Markup Validation Service. (n.d.). Retrieved from https://validator.w3.org

Huang, Z., & Benyoucef, M. (2014). Usability and credibility of e-government websites. *Government Information Quarterly*, *31*(4), 584–595. doi:10.1016/j.giq.2014.07.002

Huang, Z., Brooks, L., & Chen, S. (2009, July). The assessment of credibility of e-government: Users' perspective. In *Proceedings of the Symposium on Human Interface* (pp. 26-35). Springer. 10.1007/978-3-642-02559-4_4

Isa, W. A. R. W. M., Suhami, M. R., Safie, N. I., & Semsudin, S. S. (2011). Assessing the usability and accessibility of Malaysia e-government website. *American Journal of Economics and Business Administration*, *3*(1), 40–46. doi:10.3844/ajebasp.2011.40.46

Islam, M. N., Rahman, S. A., & Islam, M. S. (2017, February). Assessing the usability of e-government websites of Bangladesh. In *Proceedings of the International Conference on Electrical, Computer and Communication Engineering (ECCE)* (pp. 875-880). IEEE. 10.1109/ECACE.2017.7913026

Ismail, A., Kuppusamy, K. S., Kumar, A., & Ojha, P. K. (2017). Connect the dots: accessibility, readability and site ranking–an investigation with reference to top ranked websites of Government of India. *Journal of King Saud University-Computer and Information Sciences*.

Ismail, A., Kuppusamy, K. S., & Nengroo, A. S. (2018). Multi-tool accessibility assessment of government department websites: A case-study with JKGAD. *Disability and Rehabilitation. Assistive Technology*, *13*(6), 504–516. doi:10.1080/17483107.2017.1344883 PMID:28766367

Ismailova, R. (2017). Web site accessibility, usability and security: A survey of government websites in Kyrgyz Republic. *Universal Access in the Information Society*, *16*(1), 257–264. doi:10.100710209-015-0446-8

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ismailova, R., & Inal, Y. (2017). Web site accessibility and quality in use: A comparative study of government Websites in Kyrgyzstan, Azerbaijan, Kazakhstan and Turkey. *Universal Access in the Information Society*, *16*(4), 987–996. doi:10.100710209-016-0490-z

Jaeger, P. T. (2006). Assessing Section 508 compliance on federal e-government Websites: A multi-method, user-centered evaluation of accessibility for persons with disabilities. *Government Information Quarterly*, *23*(2), 169–190. doi:10.1016/j.giq.2006.03.002

Jange, S. (2014). Library websites of universities in Karnataka State: An evaluative study. *J. Adv. Library Inf. Sci*, *3*(3), 195–202.

Jati, H., & Dominic, D. D. (2009, April). Quality evaluation of e-government website using web diagnostic tools: Asian case. In *Proceedings of the International Conference on Information Management and Engineering ICIME'09* (pp. 85-89). IEEE.

Kamoun, F., Al Mourad, B. M., & Bataineh, E. (2013). WCAG 1.0 versus WCAG 2.0 web accessibility compliance: a case study. In *Proceedings of the International Conference on Digital Information Processing, E-Business and Cloud Computing (DIPECC2013)* (pp. 94-101). The Society of Digital Information and Wireless Communication.

Kamoun, F., & Basel Almourad, M. (2014). Accessibility as an integral factor in e-government web site evaluation: The case of Dubai e-government. *Information Technology & People*, *27*(2), 208–228. doi:10.1108/ITP-07-2013-0130

Karaim, N. A., & Inal, Y. (2017). Usability and accessibility evaluation of Libyan government websites. *Universal Access in the Information Society*.

Kaur, S., Kaur, K., & Kaur, P. (2016). An empirical performance evaluation of universities website. *International Journal of Computers and Applications*, *146*(15), 10–16. doi:10.5120/ijca2016910922

King, B. A., & Youngblood, N. E. (2016). E-government in Alabama: An analysis of county voting and election website content, usability, accessibility, and mobile readiness. *Government Information Quarterly*, *33*(4), 715–726. doi:10.1016/j.giq.2016.09.001

Kopackova, H., Michalek, K., & Cejna, K. (2010). Accessibility and findability of local e-government websites in the Czech Republic. *Universal Access in the Information Society*, *9*(1), 51–61. doi:10.100710209-009-0159-y

Kurniawan, S. H., Ellis, R. D., & Zaphiris, P. (2001). Usability and accessibility comparison of governmental, organizational, educational and commercial aging/health-related Websites. *WebNet Journal: Internet Technologies. Applications & Issues*, *3*(3), 45–52.

Kuzma, J., Dorothy, Y., & Oestreicher, K. (2009b). Global e-government Web Accessibility: An Empirical Examination of EU, Asian and African Sites. Retrieved from https://eprints.worc.ac.uk/591/1/Global_e-government_Web_Accessibility.pdf

Kuzma, J., Weisenborn, G., Philippe, T., Gabel, A., & Dolechek, R. (2009a). Analysis of US senate websites for disability accessibility. *International Journal of Business Research*, *9*(6), 174–181.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kuzma, J. M. (2010). Accessibility design issues with UK e-government sites. *Government Information Quarterly*, *27*(2), 141–146. doi:10.1016/j.giq.2009.10.004

Latif, M. H. A., & Masrek, M. N. (2010). Accessibility evaluation on Malaysian e-government websites. *Journal of e-Government Studies and Best Practices, 2010*, 1-11.

Lazar, J., Beavan, P., Brown, J., Coffey, D., Nolf, B., Poole, R., & Wenger, B. (2010). Investigating the accessibility of state government websites in Maryland. In *Designing inclusive interactions* (pp. 69–78). London: Springer. doi:10.1007/978-1-84996-166-0_7

Lazar, J., Wentz, B., Almalhem, A., Catinella, A., Antonescu, C., Aynbinder, Y., ... Feustel, D. (2013). A longitudinal study of state government homepage accessibility in Maryland and the role of web page templates for improving accessibility. *Government Information Quarterly*, *30*(3), 289–299. doi:10.1016/j.giq.2013.03.003

Loiacono, E. T., McCoy, S., & Chin, W. (2005). Federal Web site accessibility for people with disabilities. *IT Professional*, *7*(1), 27–31. doi:10.1109/MITP.2005.1407801

Luján-Mora, S., Navarrete, R., & Peñafiel, M. (2014, April). Egovernment and web accessibility in South America. In *Proceedings of the 2014 First International Conference on eDemocracy & eGovernment (ICEDEG)* (pp. 77-82). IEEE. 10.1109/ICEDEG.2014.6819953

Manhas, J. (2014). Analysis on Design Issues of E-Government Websites of India. *International Journal of Advanced Research in Computer Science and Software Engineering*, *4*(2), 646–650.

Mensah, I. K., Jianing, M., & Durrani, D. K. (2017). Factors Influencing Citizens' Intention to Use E-Government Services: A Case Study of South Korean Students in China. *International Journal of Electronic Government Research*, *13*(1), 14–32. doi:10.4018/IJEGR.2017010102

Moreno, L., Martínez, P., Muguerza, J., & Abascal, J. (2018). Support resource based on standards for accessible e-Government transactional services. *Computer Standards & Interfaces*, *58*, 146–157. doi:10.1016/j.csi.2018.01.003

Nizar, A. A., Obedidat, A., & Abu-Addose, H. Y. (2013, May). Accessibility as an indicator of Jordanian E-government website quality. In *2013 Fourth International Conference on e-Learning" Best Practices in Management, Design and Development of e-Courses: Standards of Excellence and Creativity"* (pp. 156-160). IEEE. 10.1109/ECONF.2013.45

O'Mahony, M. P., & Smyth, B. (2010, April). Using readability tests to predict helpful product reviews. In Adaptivity, Personalization and Fusion of Heterogeneous Information (pp. 164-167). LE Centre De Hautes Etudes Internationales D'informatique Documentaire.

Ojha, P. K., Ismail, A., & Kuppusamy, K. S. (2018). Readability Assessment-cum-Evaluation of Government Department Websites of Rajasthan. In *Proceedings of First International Conference on Smart System, Innovations and Computing* (pp. 235-244). Springer, Singapore. 10.1007/978-981-10-5828-8_23

Olalere, A., & Lazar, J. (2011). Accessibility of US federal government home pages: Section 508 compliance and site accessibility statements. *Government Information Quarterly*, *28*(3), 303–309. doi:10.1016/j.giq.2011.02.002

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

OnlineUtility. (2018). Readibility test and improve. Retrieved from https://www.online-utility.org/english/readability_test_and_improve.jsp

Parent, M., Vandebeek, C. A., & Gemino, A. C. (2005). Building citizen trust through e-government. *Government Information Quarterly*, *22*(4), 720–736. doi:10.1016/j.giq.2005.10.001

Patra, M. R., Dash, A. R., & Mishra, P. K. (2014, October). Accessibility analysis of government web portals of Asian countries. In *Proceedings of the 8th International Conference on Theory and Practice of Electronic Governance* (pp. 383-386). ACM. 10.1145/2691195.2691253

Patra, M. R., Dash, A. R., & Mishra, P. K. (2017). A quantitative analysis of WCAG 2.0 compliance for some Indian web portals. arXiv:1710.08788

Pew Center on the States. (2008). Being online is not enough: State elections websites. Retrieved from http://www.pewtrusts.org/~/media/legacy/uploadedfiles/pcs_assets/2008/vipfinal101408webpdf.pdf

Potter, A. (2002). Accessibility of Alabama government websites. *Journal of Government Information*, *29*(5), 303–317. doi:10.1016/S1352-0237(03)00053-4

Pribeanu, C., & Fogarassy-Neszly, P. (2011). A review of municipal websites for accessibility: A computer-aided evaluation approach. *Studies in Informatics and Control*, *20*(3), 265–272. doi:10.24846/v20i3y201107

Pribeanu, C., Fogarassy-Neszly, P., & Pătru, A. (2014). Municipal web sites accessibility and usability for blind users: Preliminary results from a pilot study. *Universal Access in the Information Society*, *13*(3), 339–349. doi:10.100710209-013-0315-2

Pribeanu, C., Marinescu, R. D., Fogarassy-Neszly, P., & Gheorghe-Moisii, M. (2012). Web Accessibility in Romania: The Conformance of Municipal Websites to Web Content Accessibility Guidelines. *Informações Econômicas*, *16*(1), 28–36.

Redish, J. C., & Selzer, J. (1985). The place of readability formulas in technical communication. *Technical Communication*, 46–52.

Schloman, B. (2004). Information Resources Column: Health Literacy: A Key Ingredient for Managing Personal Health. *Online Journal of Issues in Nursing.* Retrieved from www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Volume92004/No2May04/HealthLiteracyAKeyIngredientforManagingPersonalHealth.aspx

Schutten, M., & McFarland, A. (2009). Readability levels of health-based websites: From content to comprehension. *International Electronic Journal of Health Education*, *12*, 99–107.

Scott, J. K. (2005). Assessing the quality of municipal government Websites. *State & Local Government Review*, *37*(2), 151–165. doi:10.1177/0160323X0503700206

Shi, Y. (2007). The accessibility of Chinese local government Websites: An exploratory study. *Government Information Quarterly*, *24*(2), 377–403. doi:10.1016/j.giq.2006.05.004

Tat-Kei Ho, A. (2002). Reinventing local governments and the e-government initiative. *Public Administration Review*, *62*(4), 434–444. doi:10.1111/0033-3352.00197

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The e-Government Gateway: A-Z Services List (n.d.). Retrieved from https://www.turkiye.gov.tr/hizmetler

TUİK. (2018) Retrieved from http://www.tuik.gov.tr/PreTablo.do?alt_id=1028

TUİK. (2018) Retrieved from http://www.tuik.gov.tr/PreHaberBultenleri.do?id=18660

U.S. Department of Health & Human Services. (n.d.). About Us. Retrieved from http://www.usability.gov

Venkatesh, V., Hoehle, H., & Aljafari, R. (2014). A usability evaluation of the Obamacare website. *Government Information Quarterly*, *31*(4), 669–680. doi:10.1016/j.giq.2014.07.003

Verkijika, S. F. (2017). *Evaluating and improving the usability of e-government websites in Sub-Saharan Africa for enhancing citizen adoption and usage* [Doctoral dissertation]. University of the Free State.

Verkijika, S. F., & De Wet, L. (2017). Determining the Accessibility of e-Government Websites in Sub-Saharan Africa Against WCAG 2.0 Standard. *International Journal of Electronic Government Research*, *13*(1), 52–68. doi:10.4018/IJEGR.2017010104

Verkijika, S. F., & De Wet, L. (2018). A usability assessment of e-government websites in Sub-Saharan Africa. *International Journal of Information Management*, *39*, 20–29. doi:10.1016/j.ijinfomgt.2017.11.003

Verkijika, S. F., & De Wet, L. (2018a). Accessibility of South African university websites. *Universal Access in the Information Society*, 1–10.

Verkijika, S. F., & De Wet, L. (2018b). Quality assessment of e-government websites in S ub-Saharan Africa: A public values perspective. *The Electronic Journal on Information Systems in Developing Countries*, *84*(2), e12015. doi:10.1002/isd2.12015

Wentz, B., Lazar, J., Stein, M., Gbenro, O., Holandez, E., & Ramsey, A. (2014). Danger, danger! Evaluating the accessibility of Web-based emergency alert sign-ups in the northeastern United States. *Government Information Quarterly*, *31*(3), 488–497. doi:10.1016/j.giq.2014.02.010

West, D. (2008). State and federal electronic government in the United States' Governance Studies at Brookings.

Youngblood, N. E. (2014). Revisiting Alabama state website accessibility. *Government Information Quarterly*, *31*(3), 476–487. doi:10.1016/j.giq.2014.02.007

Youngblood, N. E., & Mackiewicz, J. (2012). A usability analysis of municipal government website home pages in Alabama. *Government Information Quarterly*, *29*(4), 582–588. doi:10.1016/j.giq.2011.12.010

Youngblood, N. E., & Youngblood, S. A. (2013). User experience and accessibility: An analysis of county web portals. *Journal of Usability Studies*, *9*(1), 25–41.

Youngblood, S. A., & Youngblood, N. E. (2018). Usability, content, and connections: How county-level Alabama emergency management agencies communicate with their online public. *Government Information Quarterly*, *35*(1), 50–60. doi:10.1016/j.giq.2017.12.001

This research was previously published in the International Journal of Electronic Government Research (IJEGR), 15(1); pages 62-81, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 40
Transformational Leadership and Attitude Toward Enterprise Resource Planning System:
A Perspective of Organizational Change

Paul Chou
Department of Business Administration, Minghsin University of Science and Technology, Xinfeng, Taiwan

ABSTRACT

In order to survive in competitive markets, modern organizations introduce enterprise resourcing planning systems to enhance their competitive positions and their survivability in competitive markets. Nevertheless, organizations often fail to utilize and explore this new system's functionalities to achieve business objectives and have not fulfilled their expected effectiveness after adopting it. Given that countless companies fail to implement ERP systems successfully in recent decades, the aim of this study is to explore the inner workings of employees' attitudes towards ERP systems from the perspective organizational change. The results from a sample of 334 respondents in Taiwan provide additional insight into the mechanism through which transformational leadership influences employees' attitudes towards ERP systems.

INTRODUCTION

Modern organizations strove to retain their competitive edge by adopting information system (IS), such as hardware, software, data in paper or electronic form, as it enables them to enhance their operation's efficiency, increase productivity and service quality in order to secure their competitive positions and their survivability in competitive markets (Avgerou, 2001; Hammer & Champy, 1993; Lu et al., 2011). For example, Enterprise Resourcing Planning (ERP) systems have been introduced by many organizations with purpose to improve workflow and efficiency for the last two decades (Jacobson, Shepherd, D'Aquila, & Carter, 2007; Momoh, Roy & Shehab, 2010).

DOI: 10.4018/978-1-7998-7297-9.ch040

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

For decades, information technology acceptance and use is a critical issue that has received much attention from researchers and practitioners (Venkatesh, 2000). In practice, successful investment in IS can lead to enhanced productivity, while failed systems implementation can lead to undesirable consequences such as financial losses and dissatisfaction among employees (Venkatesh, 2000). Nevertheless, organizations often fail to utilize and explore the new IS's functionalities to achieve business objectives and have not fulfilled their expected effectiveness after the new systems are committed to routine operation (Bhattacherjee & Premkumar, 2004; Kaplan & Norton, 2008). Consequently, from the perspective of organizational level, successful implementation of new IS has become an important management task. In other words, "organizations need to ensure the success of the new IS project in order to succeed in executing their strategy and in turning their vision into reality" (Serra & Kunc, 2015, p. 53).

In many cases, the reason for new IS implementation failure is a lack of change management (Momoh, Roy & Shehab, 2010; Ziemba & Obłak, 2015). Indeed, according to Carnall's (1986) definition of organizational change, adopting new IS within an organization can be seen as one form of organizational change. However, very little effort has been devoted to understanding the determinants of new IS acceptance and usage from the perspective of organizational change. In addition, leadership is posited as one of the most important variables affecting the attitudinal dimension of organizational life (Jaskyte, 2003). Therefore, to make up for such deficiency, the present study attempts to examine the antecedents of employees' attitude towards ERP system from the perspective of leadership and organizational change. More clearly, the present study hypothesizes that transformational leadership exerts it influences on employee's affective commitment to organization which, in turn, enhances affective commitment to change and, ultimately, influences employees' attitude towards ERP system.

LITERATURE REVIEW ON ERP DEPLOYMENT

Adoption of ERP System and Organizational Change

Current literature on information systems has sought to provide guidance on the actions that management should take to harness the effectiveness of information systems in order to secure a competitive position of a firm within its environment (Hammer & Champy, 1993). However, despite significant technological advances and increasing organizational investment in these new information systems, the problem of underutilized systems annoys businesses. Indeed, in many cases, the process of adopting new IS involved creates fear, uncertainty and doubt because employees are skeptical about it and concerned about its outcomes, and may fear failure as they are faced with this new system (Vakola and Nikolaou, 2005), thus hampering user acceptance and usage of the new system.

Conceptually, organizational change refers an attempt or series of attempts to modify an organization's structure, goals, technologies, systems, or work tasks (Carnall, 1986). Following this definition, introducing a new information system into an organization can be seen as one form of organizational change. In other word, change is an inevitable consequence of implementing various new IS projects (Hornstein, 2015; Serra & Kunc, 2015). In essence, it is well accepted that organizational changes are viewed as a formidable stressor in organizational life because it creates fear, uncertainty, and doubt, and adopting new information systems within an organization is viewed as a formidable stressor in organizational life (Allen et al., 2007; Judge et al., 1999).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Further, as Dawson (1994) notes, resistance to organizational change can result from substantive change in job (skill requirements) and/or psychological threats (whether perceived or actual). As such, adopting new information systems experienced by employees may cause their resistance to accept and use new information systems. Thus, the premise of successful adoption of new information systems is to gain employees' positive attitude (i.e., acceptance and support) toward this change (Fedor, Caldwell, & Herold, 2006; Miller, Johnson, & Grau, 1994). In summary, in order to enhance the possibility of successful adopting of new IS, organizations should devote their efforts on understanding employees' attitudes towards new IS from the perspectives of organizational change.

Transformational Leadership and Attitude Towards ERP System

It is suggested that employees engage in an exchange relationship with both the organization as a whole and their immediate supervisor (Stinglhamber & Vandenberghe, 2003). At workplace, the supervisor is the most immediate and salient person, as employees tend to view actions by agents of the organization (i.e., supervisor) as actions of the organization itself (Livinson, 1965). In that case, the supervisor must have a direct influence on their subordinate's attitudes and behaviors through leadership.

For long, leadership has been seen as one of the most important variables affecting the attitudinal dimension of organizational life (Jaskyte, 2003). With respect to leadership, Burns (1978) and Bass (1985) distinguished transformational leaders from transactional leaders. Specifically, Bass and Avolio (1994) identified four behaviors associated with transformational leaders: (1) idealized influence, which refers to serving as a charismatic role model to followers; (2) inspirational motivation that involves articulation of a clear, appealing, and inspiring vision to followers; (3) intellectual stimulation of follower creativity by questioning assumptions and challenging the status quo; and (4) individual consideration, which involves attending to and supporting the individual needs of followers.

Indeed, supervisors play an important role in structuring the work environment by providing information and feedback to employees (Griffin, Patterson & West, 2001) and by controlling the powerful rewards that acknowledge the employee's personal worth (Doby & Caplan, 1995). As such, the social interaction between an employee and his/her immediate supervisor is the primary determinant of an employee's supportive attitude and behavior to organizational change (adopting new IS in this case) (Wayne, Shore, & Liden, 1997). More clearly, it is logical to assume that transformational supervisor should have a direct influence on subordinate's attitudes towards new IS through daily interaction.

Further, in light of the concept of personifying the organization (Levinson, 1965), the immediate supervisor's behaviors are likely to be perceived by employees as representative of organizational decisions (Griffin et al., 2001). Accordingly, favorable treatment provided by a transformational leader is interpreted as the organization's benevolent orientation towards them (Loi, Ngo, & Foley, 2006). In that case, employees with high perceived organizational support, based on the norm of reciprocity (Gouldner, 1960), are likely to develop a generalized felt obligation to care about the organization's welfare and help the organization achieve its objectives (i.e., successful implementation of new IS) (Eisenberger et al., 2001).

Moreover, leaders are characterized by change-oriented and inspiring (Hogg, 2001). In order to extract extra efforts from their followers, they arouse team spirit, reframe stressful events into developmental opportunities, and inspire followers to perceive difficult situations as meaningful challenges necessary for developing one's professional and personal skills (Sosik & Godshalk, 2000). In other words, transformational leadership evokes followers' higher-order needs and motivates them to identify with a vision

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

that reaches beyond their own self-interest (Judge & Bono, 2000). Thus, it is reasonable to assume that transformational leaders tend to orient their followers to perceive new IS in a positive way and enhance their supportive attitude towards new IS. Accordingly, hypothesis 1 is stated as:

H1: There is a positive direct positive relationship between transformational and attitude towards ERP system.

Transformational Leadership and Affective Commitment to Organization

Affective commitment to organization is defined as an individual's identification with, involvement in, and emotional attachment to an organization, making the company's goals their own (Allen & Meyer, 1990; Meyer & Allen, 1991, 1997). Evidence has been provided that employees do engage in enduring exchanges with both the organization as a whole and their immediate supervisor (Stinglhamber & Vandenberghe, 2003). In that case, according to the norm of reciprocity (Gouldner, 1960), employees led by transformational leaders would develop a generalized felt obligation to care about the organization's welfare and help the organization achieve its objectives (Eisenberger et al., 2001).

Further, the influence of transformational leaders is based on their success in connecting followers' self-concept or identity to the mission and goals of their organization (Kark and Shamir, 2002). In other words, transformational leaders are able to influence followers' behavior by promoting higher levels of intrinsic value associated with goal accomplishment, emphasizing the linkages between followers' effort and goal achievement, and by creating a higher level of personal commitment on the part of the leader and followers to a common vision, mission, and organizational goals (Avolio, et al., 2004).

Specifically, transformational leadership has been empirically linked to organizational commitment. For example, Judge & Bono's (2000) findings support the argument that leaders who were rated by their subordinates as transformational were more likely to be associated with subordinates who expressed commitment to their organizations. In particular, Gillet and Vandenberghe (2014) found the relationship between transformational leadership and affective commitment. Thus, it is reasonable to assume that transformational leaders tend to enhance their followers' affective commitment to organization. Accordingly, hypothesis 2 is stated as:

H2: There is a direct positive relationship between transformational leadership and affective commitment to organization.

Affective Commitment to Organization and Affective Commitment to Change

Affective commitment to change captures the notion of positive, proactive intent that is not just the lack of resistance to change or the absence of negative attitudes (Piderit, 2000). As mentioned earlier, organizational commitment involves manifesting strong desire to remain a member of the organization and entails a high level of identification with the goals of the organization and the values it stands for (Allen & Meyer, 1990).In that event, employees with a strong affective commitment to an organization are likely to value the course of action, that is necessary for successful change, are therefore willing to do whatever is required to achieve the target of that action (Meyer, Srinivas, Lai, & Topolnytsky, 2007). In other words, employees with strong organizational commitment to change are prone to be willing and committed to make extra effort towards realizing these goals and manifesting these values. More clearly,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the higher the employees' affective commitment to their organization, the greater their willingness to accept organizational change (i.e., affective commitment to change) will be.

Empirically, organizational commitment has been found to act as both a determinant and mediator in the management of change (Iverson, 1996). In particular, previous studies indicated that affective commitment to organization plays a significant role in influencing employee's affective commitment to change (Darwish, 2000; Herold et al., 2008; Iverson, 1996; Lau & Woodman, 1995; Neubert & Cady, 2001; Vakola & Nikolaou, 2005; Yousef, 2000). Thus, the present study argues that those who strongly identify with the company (i.e., strong affective commitment to organization) are likely to perceive the company's goals as their own and are then willing to do more than is required of them during adopting new IS (Vakola & Nikolaou, 2005). Accordingly, Hypothesis 3 is stated as:

H3: There is a direct positive relationship between affective commitment to organization and affective commitment to change.

Affective Commitment to Change and Attitude Toward ERP System

In practice, those who buy in to adopting new IS (i.e., strong affective commitment to change) should be willing to go above and beyond the call of duty to find ways to ensure its success. Indeed, some researchers (e.g., Armenakis & Bedeian, 1999; Kotter, 1995) specifically highlighted the importance of employees' commitment to change in carrying out successful change efforts. For example, research findings provide some evidence that variations in commitment to change are related to variations in the level of behavioral support during the process of organizational change (Herscovitch & Meyer, 2002; Meyer et al., 2007).

Empirically, commitment to change has been found to be a better predictor of specific change-related behaviors (Fedor et al., 2006; Herscovitch & Meyer, 2002; Meyer et al., 2007). According to the theory of reasoned action (Fishbein & Ajzen, 1975), most human behavior can be predicted from intentions alone. Intention, based on the theory of planned behavior (Ajzen, 1991), is thus assumed to be the immediate antecedent of behavior. In that event, it is plausible to assume that employees with strong affective commitment to change are prone to demonstrate positive attitudes towards the new IS which, in turn, motivate their usage of new IS. Accordingly, Hypothesis 4 is stated as:

H4: There is a direct positive relationship between affective commitment to change and attitude toward ERP system.

Mediators - Affective Commitment to Organization and Affective Commitment to Change

Transformational Leadership and Affective Commitment to Change

Conceptually, leaders provide direction to the people they lead. In terms of leadership behavior, transformational leaders are characterized by idealized influence, inspirational motivation, intellectual stimulation and individual consideration (Bass and Avolio, 1994). With these behaviors, transformational leaders make followers more aware of the importance and values of task outcomes, activate their higher-order

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

needs, and induce them to transcend self-interest for the sake of the organization (Bass, 1985, Meyer and Herscovitch, 2001).

Specifically, Herscovitch and Meyer (2002) asserted affective commitment to change as a belief in a change's inherent benefit and the desire to provide support on its behalf. Indeed, employees' affective commitment to change is critical to the successful implementation of organizational change (Meyer et al., 2007). In practice, the changes experienced by employees are best represented by the new demands affecting their jobs, which are governed by their immediate supervisors. Thus, the impact of a particular change on employees' commitment to such change is expected to be based on their daily interaction and experience with their immediate supervisors.

In summary, during the period of change, transformational leadership stimulates team spirit, reframes stressful events into developmental opportunities, and inspires others to perceive tough situations as meaningful challenges necessary for developing one's professional and personal skills (Sosik and Godshalk, 2000). Therefore, it is reasonable to assume that such behaviors demonstrated by a transformational leader positively orientate their subordinates' perceptions towards change which enhance their employees' affective commitment to change.

Affective Commitment to Organization and Attitude Toward ERP System

It is suggested that individuals with high affective commitment to organization would strongly identify with the vision of the organization and the goals/values of change initiatives (Dvir, Kass & Shamir, 2004). In other words, employees with a strong affective commitment to an organization are likely to value the course of action that is necessary for successful organizational change (in this study, adopting a new information system) and are therefore willing to do whatever is required to achieve the target of that action (Meyer et al., 2007). Thus, this study argues that those who strongly identify with the company (i.e., strong affective commitment to organization) are likely to perceive the company's goals as their own and are then willing to do more than is required of them during organizational change (Vakola & Nikolaou, 2005), even if it involves some personal sacrifice (Meyer & Herscovitch, 2001; Meyer et al., 2007).

Empirically, prior studies indicated that affective commitment to organization plays a vital role in employees' acceptance of change initiatives (Yousef, 2000; Iverson, 1996). In particular, according to Iverson's (1996) findings, affective commitment to organization can predict behavioral intention. In this regard, it is reasonable to expect that there is a positive relationship between affective commitment to organization and attitude towards the new information system. Therefore, it is plausible to expect a positive relationship between affective commitment to organization and attitude towards the new IS.

In summary, on the basis of all of the inferences discussed above for the simple bivariate associations between transformational leadership and affective commitment to organization, LMX relationships and attitude towards the new IS, Hypotheses 5, 6 and 7 are stated as:

H5: Affective commitment to organization mediates the relationship between transformational leadership and affective commitment to change.

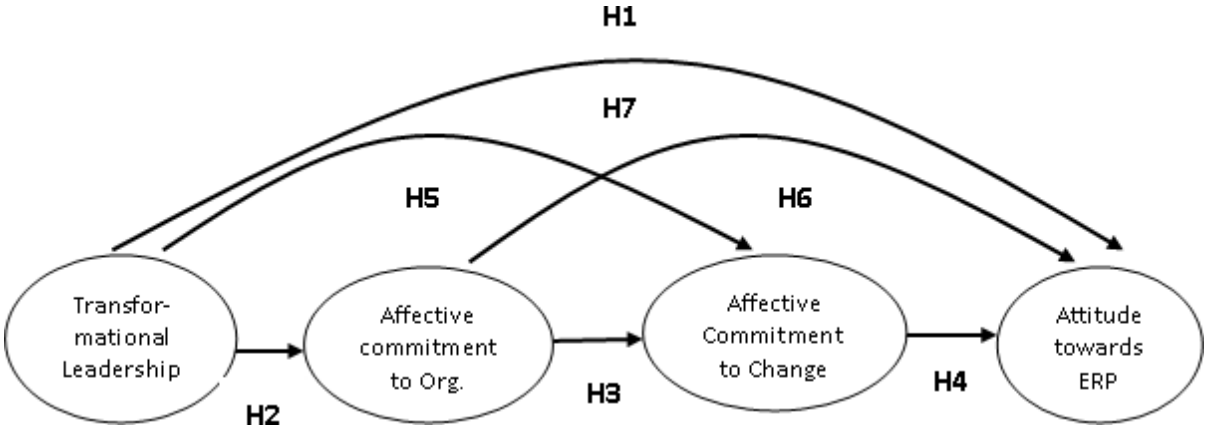
H6: Affective commitment to change mediates the relationship between affective commitment to organization and attitude towards ERP system.

H7: Affective commitment to organization and affective commitment to change mediate the relationship between transformational leadership and attitude towards ERP system.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In summary, with respect to research framework, Figure 1 depicts the research framework of this study.

Figure 1. Research framework



METHODS

Participants

Invitations for participation were sent to three companies located at Hsinchu County which are undergoing ERP project less than 8 months. Procedure-wise, a total of 600 questionnaires with a cover letter explaining the purpose of the survey were sent to the head of the Human Resource Department of the three surveyed companies along with a return envelope for each participant to ensure that participants could send back the completed questionnaire on their own. A total of 350 questionnaires were returned (58% response rate), with 334 valid questionnaires after screening (56%).

Descriptive statistics for the valid respondents are presented in Table 1.

Measures

Unless otherwise stated, all responses were made on a 6-point scale ranging from (1) strongly disagree to (6) strongly agree:

- **Transformational Leadership (TL):** Transformational leadership was assessed through four dimensions, namely individual consideration, intellectual stimulation, inspirational motivation, and idealized influence, using Chou's (2013) 12 items which was adapted from Sosik and Godshalk's (2000) 15 items. The responses were measured along a 6-point Likert scale ranging from "strongly disagree" to "strongly agree" with respect to the respondent's certainty as to their immediate supervisor's leadership ability. The internal consistency of this 12-item scale was .97 in the current sample;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Affective Commitment to Organization (ACO):** Affective commitment to the organization was measured using the six items developed by Meyer, Allen and Smith (1993) (e.g., "I really feel that this organization's problems are my own."). The internal consistency of this six-item scale was 0.88 for this sample;
- **Affective Commitment to Change (ACC):** Affective commitment to change was measured with the six items developed by Herscovitch and Meyer (2002). The internal consistency of this six-item scale was .81 for this sample;
- **Attitude Toward ERP System (ATE).** Attitude towards ERP System was measured using three items adopted from Porter and Donthu (2006) (e.g., "I am positive toward the ERP system". The internal consistency of this three-item scale was .89 in the current sample.

Overall, the strength of the internal consistency estimates of the variables in this study suggests homogeneity of the scale items.

Table 1. Descriptive profile of respondents

Gender	Male	63%
	Female	37%
Job Rank	Managerial position	17%
	Non- managerial position	83%
Age(years)	<30	30%
	31-40	44%
	41-50	21%
	>50	5%
Seniority(years)	>15	47%
	11-15	23%
	5-10	12%
	<5 years	18%
Education Level	Master	18%
	University Degree	48%
	Diploma	17%
	High School	17%
Annual Income(NT$)	>1,200,000	3%
	800,001-1,200,000	3%
	400,001-800,000	32%
	<400,000	62%

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ANALYSIS AND RESULTS

Analysis

Before testing the study hypotheses, confirmatory factor analysis (CFA) was conducted with the AMOS software (Arbukle, 2003) to examine the convergent and discriminant validity of the study measures. Given the large number of items (27) relative to the sample size (334), the procedures recommended by Mathieu and Farr (1991) were followed by creating four (dimension), three, and three composite indicators for transformational leadership, affective commitment to organization, affective commitment to change respectively, in order to maintain an adequate sample-size-to-parameter ratio (Landis, Beal, & Tesluk, 2000).

Following the approach suggested by Andersen and Gerbing (1988), convergent validity is demonstrated when the path loading (λ) from an item to its latent construct is significant and exceeds 0.50 in addition to the constructs have an average variance extracted (AVE) of at least 0.50 and composite reliability (CR) greater than 0.6 (Hair, Anderson, Tatham, & Black, 2006). As shown in Table 2, the AVEs of all four constructs in this study exceed 0.50 (0.59-0.79); the CRs of all four constructs are also above 0.6 (0.82-.94); all path loading (λ) in this study was above 0.50 (0.70-0.95). Thus, all constructs in this study demonstrate adequate convergent validity.

To assess discriminant validity, the procedures outlined by Fornell and Larcker (1981) were employed to examine whether the square root of AVE for the two constructs exceeds their correlation. As shown in Table 2, the square root of AVE for the two constructs is greater than their correlation. Thus, all tests of reliability and validity lead to the conclusion that the measures used in the subsequent statistical analyses are of acceptable reliability and validity.

Table 2. Descriptive statistics and correlations among study variables

Variable	Mean	SD	Cronbach α	CR	Item Loading(λ) (min-max)	1	2	3	4
1. TL	4.36	.91	.97	.94	(.86-.91)	(.89)			
2. ACO	4.43	.88	.88	.88	(.84-.85)	.67**	(.85)		
3. ACC	4.25	.69	.81	.82	(.70-.84)	.46**	.54**	(.77)	
4. ATE	4.56	.90	.89	.90	(.80-.95)	.41**	.38**	.44**	(.86)

Note:
TL= Transformational leadership
ACO= Affective Commitment to Organization
ACC=Affective Commitment to Change
ATE=Attitudes towards ERP System
CR=Composite reliability
Item Loading (λ) is standardized.
Values along the diagonal represent the square root f average variance extracted (AVE)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In addition, given that the data were collected from a single source and Harman's test is insensitive (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003), the procedures recommended by Podsakoff, et al. (2003) were employed to examine whether the hypothesized four-factor model was influenced by the common-method bias. The result shows that the hypothesized four-factor model (X2(59) =104.229; GFI = .953; CFI = .985; TLI = .981; RMSEA = .048) had a better fit than the single-factor model (X2(59) =1089.343; GFI = .628; CFI = .671; TLI = .605; RMSEA =.218). Thus, although the present data may have common-method variance, the common-method bias does not seem to be a serious problem in this study.

Hypothesis Testing

Means, standard deviations, internal reliabilities, and inter-correlations among the variables are reported in Table 2. All measures show high internal reliabilities, with coefficient alphas ranging from .81 to .97. In addition, transformational leadership has a significant positive relationship with the potential mediators, affective commitment to organization (0.67, $p < 0.01$) and affective commitment to change (0.46, $p < 0.01$), and with the outcome variable of attitude towards ERP (0.41, $p < 0.01$). Moreover, affective commitment to organization has a statistically significant positive relationship with affective commitment to change (0.54, $p < 0.01$) and attitude towards new IS (0.38, $p < 0.01$). In addition, affective commitment to change has a statistically significant positive relationship with attitude towards ERP (0.44, $p < 0.01$). By and large, the pattern of correlations is consistent with the hypothesized relationships.

Next, structural equation modeling was performed using AMOS 5.0 (Arbukle, 2003). According to Anderson and Gerbing's (1988) recommendation, the measurement model was tested before actually testing the hypothesized model. The full measurement model was tested whereby all latent variables in this study were allowed to correlate. The fit, according to Hu and Bentler (1999), was a good fit, with relative fit indices of 0.985 for CFI, 0.981for TLI and 0.048 for RMSEA ($X^2 = 104.229$. df = 59, $p < 0.000$). With the fitness of the measurement model confirmed, the hypothesized model was then tested.

The last step is to test the mediating roles of affective commitment to organization and affective commitment to change in the relation between Transformational leadership and attitude towards ERP. Bootstrapping was employed to test directly for the mediators with AMOS software since it is currently regarded as a more powerful tool for testing the mediating effects in comparison with Baron and Kenny's (1986) approach (Preacher & Hayes, 2008).

The standard estimated indirect effect of transformational leadership on affective commitment to change thus obtained was 0.35 (95% CI: 0.187-0.510), the standard estimated indirect effect of transformational leadership on attitude towards new IS was 0.21 (95% CI: 0.123-0.329), and the standard estimated indirect effect of affective commitment to on attitude towards ERP was 0.18 (95% CI: 0.78-0.303). These results confirm the mediating roles of affective commitment to organization and affective commitment to in the hypothesized relations.

Further, in order to test whether a fully mediating relationship exists between transformational leadership and attitude towardsERP, a competitive modeling test was conducted. Table 3 presents fit indices for the hypothesized model, along with three alternative models. Results of comparison show that Alternative Model 2 is the most adequate for explaining the data as indicated by a RMSEA of 0.047, a CFI of 0.985, a GFI of 0.953, and a TLI of 0.981, whereas the Alternative Model 3, albeit shows similarly better fit indices in comparison with Alternative Model 2, indicates affective commitment to change fully mediates the relationship between affective commitment to organization and attitude towards ERP.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Competitive model test

	X^2	df	X^2/df	ΔX^2	RMSEA	CFI	TLI	GFI
Hypothesized Model	124.022	62	2.000		.055	.980	.975	.945
Alternative Model 1[a]	110.058	61	1.804	13.964	.049	.984	.980	.950
Alternative Model 2[b]	104.467	60	1.741	19.555	.047	.986	.981	.953
Alternative Model 3[c]	104.229	59	2.267	19.793	.048	.985	.981	.953

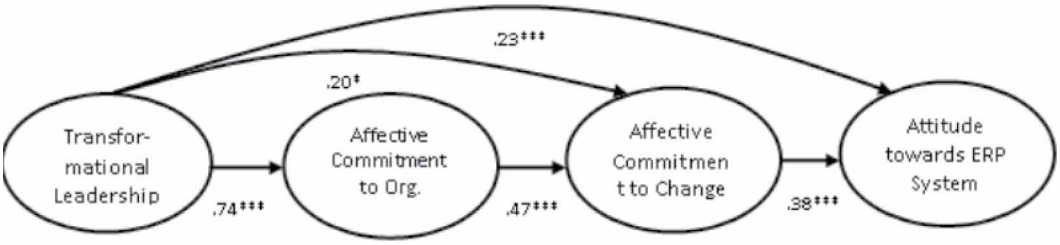
[a] Alternative Model 1 only added the direct path from transformational leadership toward ERP system

[b] Alternative Model 2 added (1) the direct path from transformational leadership to attitude toward ERP system (2) the direct path from transformational leadership to affective commitment to change.

[c] Alternative Model 3 added (1) the direct path from transformational leadership to attitude toward ERP system (2) the direct path from transformational leadership to affective commitment to change (3) the direct path from affective commitment to organization to attitude toward ERP system.

Standardized parameter estimates for the best-fitting model (Alternative Model 2) are shown in Figure 2. For ease of presentation, only the structural model is presented rather than the full measurement model. Examination of the path coefficients reveals that transformational leadership is related to affective commitment to organization in the positive direction and has significant direct associations with affective commitment to change and with attitude towards new IS; affective commitment to organization is related to affective commitment to change in the positive direction, and affective commitment to change is related to attitude towards new IS in the positive direction. Thus, both Hypotheses 1, 2, 3, 4 and 6 are supported whereas, Hypotheses 5 and 7 are partially supported.

Figure 2. Research results



DISCUSSION AND CONCLUSION

Summary of Findings

The results of hypotheses testing are presented in Table 4.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Hypotheses testing results

H1	There is a positive relationship between transformational leadership and attitude towards ERP system.	Supported
H2	There is a positive relationship between transformational leadership and affective commitment to organization.	Supported
H3	There is a positive relationship between affective commitment to organization and affective commitment to change.	Supported
H4	There is a positive relationship between affective commitment to change and attitude towards ERP system.	Supported
H5	Affective commitment to organization mediates the relationship between transformational leadership and affective commitment to change.	Partially Supported
H6	Affective commitment to change mediates the relationship between affective commitment to organization and attitude towards ERP system.	Supported
H7	Affective commitment to organization and affective commitment to change mediate the relationship between transformational leadership and attitude towards ERP system.	Partially Supported

This study proposes an integration of two of the dominant streams in organizational behavior – leadership and organizational change. The results of this study indicate that transformational leadership has positive association with attitude toward ERP system, whereas Affective commitment to change mediates the relationship between affective commitment to organization and attitude towards ERP system and affective commitment to organization partially mediates the relationship between transformational leadership and affective commitment to organization.

By and large, the present findings are consistent with considerable research's findings that leadership as one of the most critical success factors in adopting new IS (Law & Ngai, 2007; Rai, Brown, & Tang, 2009). In other words, certain leadership is efficacious in determining the success of implementing new IS (ERP in this case). Specifically, the present findings indicate the efficacy of transformational leadership in enhancing affective commitment to organization which, in turn, uplifts affective commitment to change and, ultimately, fostering employees' supportive attitudes towards new IS (ERP in this case).

Practical Implications

This present study has several practical implications for organizations while adopting ERP system. First, the findings of this study suggest that the success of implementing ERP system depends on, at least in part, transformational leadership. Realizing the importance of transformational leadership in the process of adopting ERP system, organizations should consider how to develop transformational leadership skills for their managers. More clearly, management and HRM practitioners should focus on certain practices, such as leadership development/training program with the intention of enhancing the characteristics of transformational leadership. For example, training their supervisors on how to articulate a clear, ap-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

pealing, and inspiring vision to followers, act as a charismatic role model to followers, and support the individual needs of followers.

Second, the results of this study confirm that affective commitment to organization also account for variances in employees' attitude towards ERP system via affective commitment to organization as well as affective commitment to change. In that event, organizations, while adopting ERP system, should also pay particular attention on how to enhance their employees' affective commitment to organization and to change. To this end, management and HRM practitioners should devote efforts to establish a fair and supportive working environment in order to develop high-quality employee-employer relationship which has been found very productive in enhancing employee's affective commitment to the organization (Eisenberger et al., 2001; Meyer, Stanley, Herscovitch, & Topolnytsky, 2002).

Finally, as Hornstein (2008) noted, it is not the technology that provides an organization with a successful implementation of new IS systems, but the integration of technology into an organization change management process. The findings of this study reveal that a successful ERP system implementation requires, among other things, management and HRM practitioners to enhance employees' affective commitment to change from the perspective of change management.

Limitations and Directions for Future Research

Like other previous research, this study also has certain limitations. First, the data were collected from only three organizations which might in turn limit the generalizability of its findings and conclusions to other enterprises. Thus, further replication is needed prior to generalization. Second, despite the appropriateness of using self-report validated measures, this approach introduces potential problems of common-method bias as the research variables were gathered from the same source, although a test shows that common-method bias is not a serious problem in this study. Third, one must be cautious when interpreting the findings of this study due to the possible constraint of non-response bias, such that non-respondents might hold different views with respect to the variables in question, leading to possible bias in survey estimates. Finally, this study suffers from the common limitations of cross-sectional field research. In this regard, caution is necessary for its inability to make causal inferences with confidence between the variables examined in the study.

Regarding the directions for future research, as noted by Podsakoff et al. (2003), using self-reported measures for both constructs may inflate their correlations due to self-reporting bias. Thus, future research should focus on other ratings of employee's attitude towards ERP systems to reduce common-method variance. For instance, the use of immediate supervisors or coworkers' assessments of affective commitment to organization and attitude towards new information systems would further validate the use of individuals' self-reported data only. Further, given that transformational leadership, in this study, has been found efficacy in fostering employees' supportive attitudes towards ERP, it would be an interesting avenue to explore whether leader-member exchange relationship exerts its influence on employees' supportive attitudes towards adoption of ERP.

Contributions

In spite of the above-mentioned limitations, this study has a couple of unique contributions. First, as noted above, although TAM has been and still is extensively used, its universality to predict across all situations has recently been called into question (Greenfield & Rohde, 2011). In this regard, this study

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

sheds new light on understanding the critical determinants of employee's attitude toward ERP system from the perspectives of organizational change. Such understanding can assist in the proactive planning of intervention mechanisms for maximizing the possibility of success in implementing ERP system in addition to TAM's knowledge. In other words, the findings of this study contribute as a supplement of TAM, which focuses on "ration" (i.e., ease of use and perceived usefulness), by providing an alternative approach with focus on "human emotion" (i.e. social support) to gain a deeper understanding of employee's attitude toward ERP.

Second, in regard to organizational change management, this study confirms that individuals' attitude toward ERP system as a function of transformational leadership and affective commitment to change. Given that the available knowledge of how HR professionals perform effectively as "change agents" is relatively limited (Alfes, Truss, & Gill, 2010), results of this study confirm transformational leader's effects on employee's attitude towards ERP system partly via enhancing affective commitment to the organization and affective commitment to change.

Third, although considerable studies have shown that transformational leadership behaviors are related to high employee performance (Lowe, Kroeck, & Sivasubramaniam, 1996), scholars have given little attention to what underlying mechanisms, in the process of organizational change(adopting ERP in this case), enable transformational leaders to affect followers' attitude and to arouse different types of motivation among their followers (Avolio, et al., 2004; Bono & Judge, 2003; Kark & Shamir, 2002; Kirk & Dijk, 2007). In this regard, the present study's findings about the efficacy of transformational leadership provide organizations a new path towards successful adoption of ERP system.

CONCLUSION

Given that almost all organizations are experiencing pressure to adopt new information systems, such as ERP system, in order to survive in the competitive markets, improving our understanding of the inner working mechanism associated with employees' supportive attitude towards ERP system has become increasingly important. The present study's findings shed new light on understanding the critical determinants of employee's attitude towards ERP system from the perspectives of organizational change. That is, successful ERP system project depends, at least in part, on change management (Ziemba & Obłak, 2015). Such understanding can contribute in the proactive planning of intervention mechanisms for maximizing the possibility of success in adopting ERP system beyond Davis' (1989), DeLone and McLean's (1992) and the Seddon's (1997) models which suggested that system quality, information quality, perceived usefulness, user satisfaction, and IS use are major variables in explaining successful adopting of new IS systems.

In summary, the present findings suggest that transformational leadership not only cultivates employees' supportive attitudes towards ERP system directly, but also indirectly exerts its influence via affective commitment to organization and affective commitment to change on employees' attitudes towards ERP system.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Adamides, E. D., & Karacapilidis, N. (2013). Understanding the Role of Computer-Supported Argumentation in the Strategic Change Process. *International Journal of Information Systems and Social Change*, *4*(4), 45–61. doi:10.4018/jissc.2013100103

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. doi:10.1016/0749-5978(91)90020-T

Allen, J., Jimmieson, N. L., Bordia, P., & Irmer, B. (2007). Uncertainty during Organizational Change: Managing Perceptions through Communication. *Journal of Change Management*, *7*(2), 187–210. doi:10.1080/14697010701563379

Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *Journal of Organizational Psychology*, *63*, 1–18.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411–423. doi:10.1037/0033-2909.103.3.411

Arbukle, J. L. (2003). *AMOS 5.0: update to the AMOS user's guide*. Chicago, IL: SPSS.

Armenakis, A. A., & Bedeian, A. G. (1999). Organizational Change: A review of theory and research in the 1990s. *Journal of Management*, *25*(3), 293–315. doi:10.1177/014920639902500303

Avgerou, C. (2001). The significance of context in information systems and organizational change. *Information Systems Journal*, *11*(1), 43–63. doi:10.1046/j.1365-2575.2001.00095.x

Avolio, B. J., Zhu, W., Koh, W., & Bhatia, P. (2004). Transformational leadership and organizational commitment: Mediating role of psychological empower and moderating role of structural distance. *Journal of Organizational Behavior*, *25*(8), 951–968. doi:10.1002/job.283

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. doi:10.1037/0022-3514.51.6.1173 PMID:3806354

Bass, B. M. (1985). *Leadership and performance beyond expectation*. New York: Free Press.

Bass, B. M., & Avolio, B. J. (1994). Transformational Leadership and Organizational Culture. *International Journal of Public Administration*, *17*(3-4), 541–554. doi:10.1080/01900699408524907

Bhattacherjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: a theoretical model and longitudinal test. *Management Information Systems Quarterly*, *28*(2), 229–254. doi:10.2307/25148634

Bono, J., & Judge, T. A. (2003). Self-concordance at work: Toward understanding the motivational effects of transformational leadership. *Academy of Management Journal*, *46*, 554–571.

Burns, J. M. (1978). *Leadership*. New York: Harper & Row.

Carnall, C. A. (1986). Toward a theory for the evaluation of organizational change. *Human Relations*, *39*(8), 745–766. doi:10.1177/001872678603900803

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chou, P. (2013). The effect of transformational leadership on follower's affective commitment to change. *World Journal of Social Sciences*, *3*(1), 38–52.

Darwish, Y. (2000). Organizational commitment and job satisfaction as predictors of attitudes toward organizational change in a non-western setting. *Personnel Review*, *29*(5-6), 6–25.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly*, *13*(3), 318–339. doi:10.2307/249008

Dawson, P. (1994). *Organizational Change: A Processual Approach London*. Paul Chapman.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research*, *3*(1), 60–95. doi:10.1287/isre.3.1.60

Dezdar, S. (2017). ERP Projects Implementation in Asian Countries: A Comparative Study on Iran and China. *International Journal of Information Technology Project Management*, *8*(3), 52–68. doi:10.4018/IJITPM.2017070104

Doby, V. J., & Caplan, R. D. (1995). Organizational stress as threat to reputation: Effects on anxiety at work and at home. *Academy of Management Journal*, *38*(4), 1105–1123.

Dvir, T., Kass, N., & Shamir, B. (2004). The emotional bond: Vision and organizational commitment among high-tech employees. *Journal of Organizational Change Management*, *17*(2), 126–143. doi:10.1108/09534810410530575

Eisenberger, R., Armeli, S., Rexwinkel, B., Lynch, P. D., & Rhoades, L. (2001). Reciprocation of perceived organizational support. *The Journal of Applied Psychology*, *86*(1), 42–51. doi:10.1037/0021-9010.86.1.42 PMID:11302232

Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. *The Journal of Applied Psychology*, *71*(3), 975–991. doi:10.1037/0021-9010.71.3.500

Fedor, D. B., Caldwell, S., & Herold, D. M. (2006). The effects of organizational changes on employee commitment: A multilevel investigation. *Personnel Psychology*, *59*(1), 1–29. doi:10.1111/j.1744-6570.2006.00852.x

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison Wesley.

Fornell, C. R., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error. *JMR, Journal of Marketing Research*, *18*(1), 39–50. doi:10.2307/3151312

Gillet, N., & Vandenberghe, C. (2014). Transformational Leadership and Organizational Commitment: The Mediating Role of Job Characteristics. *Human Resource Development Quarterly*, *25*(3), 321–347. doi:10.1002/hrdq.21192

Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. *American Sociological Review*, *25*(2), 161–178. doi:10.2307/2092623

Griffin, M. A., Patterson, M. G., & West, M. A. (2001). Job satisfaction and teamwork: The role of supervisor support. *Journal of Organizational Behavior*, *22*(5), 537–550. doi:10.1002/job.101

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hair, J. J. F., Anderson, R., Tatham, R. L., & Black, W. C. (2006). *Multivariate data analysis -international editions* (6th ed.). Englewood Cliffs, NJ: Prentice Hall.

Hammer, M., & Champy, J. (1993). *Reengineering the corporation: A manifesto for business revolution*. London: Nicholas Brealey.

Herold, D. M., Fedor, D. B., Caldwell, S. D., & Liu, Y. (2008). The effects of transformational leadership and change leadership on employees' commitment to a change. *The Journal of Applied Psychology*, *93*(2), 346–357. doi:10.1037/0021-9010.93.2.346 PMID:18361637

Herscovitch, L., & Meyer, J. P. (2002). Commitment to organizational change: extension of a three-component model. *The Journal of Applied Psychology*, *87*(3), 474–487. doi:10.1037/0021-9010.87.3.474 PMID:12090605

Hogg, M. A. (2001). A social identity theory of leadership. *Personality and Social Psychology Review*, *5*(3), 184–200. doi:10.1207/S15327957PSPR0503_1

Hornstein, H. A. (2008). Using a change management approach to implement IT programs. *Ivey Business Journal online, 72*(1). Retrieved from http://iveybusinessjournal.com/publication/using-a-change-management-approach-to-implement-it-programs/

Hornstein, H. A. (2015). The integration of project management and organizational change management is now a necessity. *International Journal of Project Management*, *33*(2), 291–298. doi:10.1016/j.ijproman.2014.08.005

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indices in coveriance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. doi:10.1080/10705519909540118

Iverson, R. D. (1996). Employee acceptance of organizational change: The role of organizational commitment. *International Journal of Human Resource Management*, *7*(1), 122–149. doi:10.1080/09585199600000121

Jacobson, S., Shepherd, J., D'Aquila, M., & Carter, K. (2007). The ERP market sizing report: 2006 – 2011. *AMR Research*. Retrieved Nov. 25, 2015 from http://www.sap.com/uk/solutions/business-suite/erp/pdf/

Jaskyte, K. (2003). Assessing changes in employees' perceptions of leadership behavior, job design, and organizational arrangements and their job satisfaction and commitment. *Administration in Social Work*, *27*(4), 25–39. doi:10.1300/J147v27n04_03

Judge, T. A., & Bono, J. E. (2000). Five-factor Model of Personality and Transformational Leadership. *The Journal of Applied Psychology*, *85*(5), 751–765. doi:10.1037/0021-9010.85.5.751 PMID:11055147

Judge, T. A., Higgins, C. A., Thoresen, C. J., & Barrick, M. R. (1999). The big five personality traits, general mental ability, and career success across the life span. *Personnel Psychology*, *52*(3), 621–652. doi:10.1111/j.1744-6570.1999.tb00174.x

Kaplan, R. S., & Norton, D. P. (2008). *The Execution Premium: Linking Strategy to Operations for Competitive Advantage*. Boston: Harvard Business School Publishing Corporation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kark, R., & Shamir, B. (2002). The dual effects of transformational leadership: Priming relational and collective selves and further effects on followers. *Transformational and Charismatic Leadership*, *2*, 67–91.

Kirk, R., & Dijk, D. (2007). Motivation to lead, motivation to follow: The role of the self-regulatory focus in leadership processes. *Academy of Management Review*, *32*(2), 500–528. doi:10.5465/amr.2007.24351846

Kofahi, I., & Alryalat, H. (2017). Enterprise Resource Planning (ERP) Implementation Approaches and the performance of Procure-to-Pay Business Processes: (Field Study in Companies that Implement Oracle ERP in Jordan). *International Journal of Information Technology Project Management*, *8*(1), 55–71. doi:10.4018/IJITPM.2017010104

Landis, R. S., Beal, D. J., & Tesluk, P. E. (2000). A comparison of approaches to forming composite measures in structural equation models. *Organizational Research Methods*, *3*(2), 186–207. doi:10.1177/109442810032003

Lau, C. M., & Woodman, R. W. (1995). Understanding Organizational Change: A Schematic Perspective. *Academy of Management Journal*, *38*(2), 537–554. doi:10.5465/256692

Law, C., & Ngai, E. (2007). ERP Systems Adoption: An Exploratory Study of the Organizatinal Factors and Impacts of ERP Success. *Information & Management*, *44*(4), 418–432. doi:10.1016/j.im.2007.03.004

Levinson, H. (1965). Reciprocation: The relationship between man and organization. *Administrative Science Quarterly*, *9*(4), 370–390. doi:10.2307/2391032

Loi, R., Hang-Yue, N., & Foley, S. (2006). Linking employees' justice perceptions to organizational commitment and intention to leave: The mediating role of perceived organizational support. *Journal of Occupational and Organizational Psychology*, *79*(1), 101–120. doi:10.1348/096317905X39657

Lowe, K. B., Kroeck, K. G., & Sivasubramaniam, N. (1996). Effectiveness correlates of transformational leaderhsip and transactional leadership: A meta-analytic review of the MLQ literature. *The Leadership Quarterly*, *7*(3), 385–425. doi:10.1016/S1048-9843(96)90027-2

Lu, Y., Xiang, C., Wang, C., & Wang, X. (2011). What affects information systems development team performance? An exploratory study from the perspective of combined socio-technical theory and coordination theory. *Computers in Human Behavior*, *27*(2), 811–822. doi:10.1016/j.chb.2010.11.006

Meyer, J. P., & Allen, N. J. (1991). A Three-component conceptualization of organizational commitment. *Human Resource Management Review*, *1*(1), 61–89. doi:10.1016/1053-4822(91)90011-Z

Meyer, J. P., & Allen, N. J. (1997). *Commitment in the workplace: Theory, research, and application*. CA: Sage publications.

Meyer, J. P., Allen, N. J., & Smith, C. A. (1993). Commitment to organizations and occupations: Extension and test of a three-component conception. *The Journal of Applied Psychology*, *78*(4), 538–552. doi:10.1037/0021-9010.78.4.538

Meyer, J. P., & Herscovitch, L. (2001). Commitment in the workplace toward a general model. *Human Resource Management Review*, *11*(3), 299–326. doi:10.1016/S1053-4822(00)00053-X

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Meyer, J. P., Srinivas, E. S., Lai, J. B., & Topolnytsky, L. (2007). Employee commitment and support for an organizational change: Test of the three-component model in tow culture. *Journal of Occupational and Organizational Psychology*, *80*(2), 185–211. doi:10.1348/096317906X118685

Miller, V. D., Johnson, J. R., & Grau, J. (1994). Antecedents to willingness to participate in a planned organizational change. *Journal of Applied Communication Research*, *22*(1), 59–80. doi:10.1080/00909889409365387

Momoh, A., Roy, R., & Shehab, E. (2010). Challenges in enterprise resource planning implementation: State-of-the-art. *Business Process Management*, *16*(4), 537–565. doi:10.1108/14637151011065919

Neubert, M. J., & Cady, S. H. (2001). Program Commitment: A Multi-Study Longitudinal Field Investigation of Its Impact and Antecedents. *Personnel Psychology*, *54*(2), 421–448. doi:10.1111/j.1744-6570.2001.tb00098.x

Piederit, S. K. (2000). Rethinking resistance and Recognizing ambivalence: A multidimensional view of attitudes toward an organizational change. Academy of Management Review, 25(4), 783-794.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *The Journal of Applied Psychology*, *88*(5), 879–903. doi:10.1037/0021-9010.88.5.879 PMID:14516251

Porter, C. E., & Donthu, N. (2006). Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of Business Research*, *59*(9), 999–1007. doi:10.1016/j.jbusres.2006.06.003

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891. doi:10.3758/BRM.40.3.879 PMID:18697684

Rai, A., Brown, P., & Tang, X. (2009). Organizational assimilation of electronic procurement innovations. *Journal of Management Information Systems*, *26*(1), 257–296. doi:10.2753/MIS0742-1222260110

Seddon, P. B. (1997). A respecification and extension of the DeLone and McLean model of IS success. *Information Systems Research*, *8*(3), 240–253. doi:10.1287/isre.8.3.240

Serra, C. E. M., & Kunc, M. (2015). Benefits Realisation Management and its influence on project success and on the execution of business strategies. *International Journal of Project Management*, *33*(1), 53–66. doi:10.1016/j.ijproman.2014.03.011

Settoon, R. P., Bennett, N., & Liden, R. C. (1996). Social exchange in organizations: Perceived organizational support, leader-member exchange, and employee reciprocity. *The Journal of Applied Psychology*, *81*(3), 219–227. doi:10.1037/0021-9010.81.3.219

Sosik, J. J., & Godshalk, V. M. (2000). Leadership styles, mentoring functions received, and job-related stress: A conceptual model and preliminary study. *Journal of Organizational Behavior*, *21*(4), 365–390. doi:10.1002/(SICI)1099-1379(200006)21:4<365::AID-JOB14>3.0.CO;2-H

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Stinglhamber, F., & Vandenberghe, C. (2003). Organizations and supervisors as sources of support and targets of commitment: A longitudinal study. *Journal of Organizational Behavior*, *24*(3), 251–270. doi:10.1002/job.192

Vakola, M., & Nikolaou, I. (2005). Attitudes towards organizational change: What is the role of employees' stress and commitment? *Employee Relations*, *27*(2), 160–174. doi:10.1108/01425450510572685

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, *11*(4), 342–365. doi:10.1287/isre.11.4.342.11872

Wayne, S. J., Shore, L. M., & Liden, R. C. (1997). Perceived organizational support and leader-member exchange: A social exchange perspective. *Academy of Management Journal*, *40*, 82–111.

Yousef, D. A. (2000). Organizational commitment and job satisfaction as predictors of attitudes toward organizational change in a non-western setting. *Personnel Review*, *29*(5), 567–592. doi:10.1108/00483480010296401

Ziemba, E., & Obłak, I. (2015). Change Management in Information Systems Projects for Public Organizations in Poland. *Interdisciplinary Journal of Information, Knowledge, and Management*, *10*, 47–62. doi:10.28945/2185

This research was previously published in the International Journal of Information Technology Project Management (IJITPM), 10(1); pages 55-71, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 41
Organization-Wide Culture Change in a Large Healthcare Organization: A Case History

Louis Neumann Quast
https://orcid.org/0000-0002-9774-6284
University of Minnesota, USA

Jane M. Kuhn
University of Minnesota, USA

ABSTRACT

This reflective case history explores a large-scale organizational culture change in a private, global organization based in the United States. The organizational culture concept first emerged in the 1970s and is an influential and controversial concept in research and practice. The success rate of change initiatives is only about 30%, while success for culture-change drops to 10%. Because culture change is not easy, this case history highlights evidence-based practices, supportive factors, barriers, and recommendations for culture change.

INTRODUCTION

The U.S. health care industry has undergone considerable upheaval and public scrutiny over the past 30 years and continues to experience challenges as the Trump Administration is challenging the Affordable Care Act (ACA), which President Obama signed in 2010. To address the current challenges of health care costs and government regulations, while managing the delicate balance of numerous stakeholders, health care organizations are looking for ways to do business more efficiently and effectively.

DOI: 10.4018/978-1-7998-7297-9.ch041

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

With the increased rate of change and uncertainty plus the added pressure from the ACA implementation, this large (>300,000 employees) global health care organization, headquartered in the United States, considered various opportunities to prepare for these changes and pressures. Additionally, the organization had recently experienced other challenges, including service concerns and reputation issues. One of these opportunities to ensure on-going success was to implement an organizational culture change to serve as an organizational foundation and a common frame of reference to encourage collaboration and innovation.

Schein's (2004) research suggested that crises create new norms, thus driving the culture change. These crises usually cause anxiety, and people are more open to shift their thinking to help reduce the anxiety. Schein (2004) noted that there must be "some sense of threat, crisis, or dissatisfaction … before enough motivation is present to start the process of unlearning and relearning" (p. 324). Schein (2000), however, warned that "management should seek not to change culture, but to change effectiveness. Only if it can be shown that the culture is actually a constraint should one launch a culture change program" (p. xxix).

Shifting the organizational culture at this time in its company history and industry environment was strategically important for the organization; as Ribando and Evans (2015) noted, a dynamic culture should change as the organization changes and the old culture behaviors considered part of their success are no longer effective.

However, making large-scale changes is not easy; researchers report that the great majority of change efforts fail (Choi & Behling, 1997; Kotter, 1995). According to Griffith (2010), "Given the dismal record of organizational change, it is imperative that a prescriptive protocol for effective and rapid change be made available to practitioners" (p. 2). Implementing organizational culture change is particularly difficult, due to organizational cultures' complexity of shared beliefs, behaviors, and assumptions of people. Hofstede (2015) acknowledged that "understanding, and dealing with, culture is strategically important for organizations" (p. 566). Because of the complexity of organizational culture change and the low likelihood for success, this global organization implemented a planned approach by partnering with an external culture change consultancy.

EVIDENCE-BASED OCD INITIATIVE

Implementing Organizational Culture Change

Changing a culture is not easy and is not a "one-shot process;" rather, "it takes sustained attention from top management, persistence for several years, and usually a second culture assessment to see whether the intended changes have, indeed, been attained" (Hofstede, 1994, p. 11). Over a timeframe of eight years (and on-going), the organization attempted to use an evidence-based approach to organizational change and development. According to Hamlin (2016), "evidence-based organizational change and development is the conscientious, explicit and judicious use of current best evidence and/or of action research to inform, shape, critically reflect upon, and iteratively revise decisions made in relation to the formulation and implementation of organizational change and development interventions and the associated change management processes" (p. 129). The approach taken by this organization reflects the persistent attention recommended by Hofstede, particularly his observation that sustained culture change takes time and requires implementing numerous actions to transform the organization's culture to align with its business strategy.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The organization implemented changes in four categories drawing upon evidence-based practices identified in the literature on culture change along with an action research approach to guide the culture change process. These broad focal areas provide the structure for the next section of the case history:

1. Creation of Leadership Buy-in and Support;
2. Implementation of Learning and Development Opportunities;
3. Alignment of Human Resources Processes with Culture Transformation; and
4. Involvement of Employees throughout Transformation.

Creation of Leadership Buy-In and Support

The first area of focus was work by the senior leadership team to define both the current state and the desired future state of the organization. They believed that leadership behavior was key to driving culture evolution, as suggested by Kotter (1996) and Schein (1999). Kotter (1996) noted that "management is a set of processes that can keep a complicated system of people and technology running smoothly . . . leadership is a set of processes that creates organizations in the first place or adapts them to significantly changing circumstances . . . successful transformation is 70-90 percent leadership and only 10-30 percent management" (p.25-26). Schein (1999) found that leaders controlled mechanisms that influenced culture, including how to adapt to the environment, evolve workgroups, empower subcultures that represent ideal norms, and create committees to manage the culture.

According to Chaudhry, Yuan, Hu, and Cooke (2016), there are two distinct schools of thought regarding the evolution of organizational culture. The first perspective is that organizational culture is unique and is shaped by numerous factors such as senior leadership values (Berson, Oreg, & Divr, 2008), leaders' shared vision and behaviors (Blattner & Walter, 2015; Schein, 1983), and organizational HR practices (Jung & Takeuchi, 2010). The second is a contingency approach in which culture is shaped by contextual values including societal values (Hofstede et al., 1990; House et al., 2004) and industry characteristics (Dickson, Aditya, & Chhokar, 2000; Dickson, BeShears, & Gupta, 2000; Gordon, 1985).

Research conducted by Chaudhry et al. (2016) of 3,245 respondents in 424 organizations in 12 different industries suggested that "while cultures might vary across industries as well as organizations, the differences are much greater across the latter than the former. The strength and direction of cultures within an organization appear to evolve mainly in response to attributes specific to the organization and do not necessarily reflect industry characteristics and trends" (p. 582). They found that "leaders have a powerful influence on cultures", which "underscores and parallels the conclusions of numerous qualitative studies, beginning with the work of Schein (1983)" (Chaudhry et al., 2016, p. 583).

Smith (2003) found that "over half of the culture change efforts were sponsored by either the CEO or the COO" (p. 260). While these top executives were most often the sponsors, "success was more likely when the sponsors were perceived to be 'other' officers and division/department heads rather than only the chief executive officers (CEOs) and chief operating officers (COOs)" (Smith, 2003, p. 252). Smith (2003) noted the crucial role of the middle rank of leadership at the department, division, or business unit level to successful change and that "… their sponsorship was perceived as more related to successful culture change than sponsorship by the highest corporate officers…" (p. 259).

Conner (1992) contended that "change cannot succeed without a network of sustaining sponsorship that constantly reinforces the importance of a change as it moves through the organization" (p. 121). This organization gained support of senior leadership through a top-down implementation strategy led

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and supported by the CEO. Furthermore, the organization formed culture leadership teams to drive and support the culture transformation across the organization.

Thus, at the start of the culture transformation initiative, senior executives participated in the development of a company-wide set of shared values to establish the language and the foundation for the culture shift. This was done through a facilitated process, in which external consultants guided the senior executives to identify the top values to drive preferred behaviors that would support the organization's mission. The core values are the organization's goals, strategies, and philosophies that the organization advocates about itself and "are also reflected in an organization's strategy, structure, systems and processes, leadership style, staffing, and resources; and in its rules, policies and procedures" (Higgins & McAllaster, 2004, p. 69). These are often well known within organizations considered to have strong cultures and "public companies have been making their own culture, and concepts of vision, mission and values a regular part of their literature" (Ortega-Parra & Sastre-Castillo, 2013, p. 1071). Schein (1990) indicated that "through interviews, questionnaires, or survey instruments one can study a culture's espoused and documented values, norms, ideologies, charters, and philosophies" (p. 112).

Hogan and Coote (2014) proposed that "values serve an important function guiding specific norms, or expectations of behavior, within organizations" (p. 1611). Behavior that reinforces these organizational values and norms can be seen in what is rewarded, and what is not (Higgins & McAllaster, 2004). They suggested that "values and norms can, in turn, manifest into artifacts (e.g., organizational rituals, language and stories, and physical configurations) and lead to desired behaviors such as innovation" (Hogan & Coote, 2014, p. 1613).

The intrinsic worth of values is to serve as social principles of philosophies to guide behaviors and set a framework for organizational routines and practices (Hatch, 1993; O'Reilly, Chatman, & Caldwell, 1991). Values, therefore, provide a subtle way that senior management can exercise influence (Hogan & Coote, 2014; Mumford, Scott, Gaddis, and Strange, 2002).

Implementation of Learning and Development Opportunities

The second crucial area of focused activity in the organization was the implementation of a curated set of learning and development opportunities, selected and deployed to equip people at all organizational levels with the knowledge, skills, and attitudes to succeed in the new organizational culture. As an organizational culture is established, it reflects the groups' values; however, the cultural norms are often not easy to identify. Researchers noted that these norms are passed on to new employees and applied to new situations (Beckhard & Pritchard, 1992; Cameron & Quinn, 2006; Schein, 1999, 2004). These cultural or behavioral norms tell employees how to behave, make decisions, and approach tasks in a way that allows them to fit in the organization. While organizational culture helps create commitment and a sense of identity, it can, unfortunately, be a liability "when the shared values are not in agreement with what is needed to enhance organizational effectiveness" (Simpson & Cacioppe, 2001, p. 396).

The desired new cultural norms and values were shared with employees through several learning and development opportunities, including classroom offerings, webinars, and eLearning. These various training sessions provided the opportunity for all employees to gain an understanding of the shared values and expectations. In addition to these offerings, the organization introduced a facilitated problem-solving process using the culture values as the foundation for decision making.

To support these facilitated sessions, the organization created an internal facilitator certification process to learn the culture principles and demonstrate their facilitation competency. This certification process

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

included classroom sessions to learn facilitation techniques, understand culture principles, practice facilitation, and receive feedback. Additionally, the facilitators in training delivered workshops, being observed by internally certified culture coaches. This process created a strong, supportive facilitator community, with relationships created across the organization. In total, the organization trained and certified over 100 internal culture facilitators who facilitated culture workshops, webinars, and problem-solving sessions. Furthermore, these senior leader facilitators served as change champions across the organization because "change cannot succeed without a network of sustaining sponsorship that constantly reinforces the importance of a change as it moves through the organization" (Conner, 1992, p. 121).

These learning and development opportunities were viewed as investments in the employees, as supported by human capital theory, which determined that education, training, and development, and obtaining other knowledge are all investments. Beyond the personal benefits of improved health and increased earnings, human capital theory suggests that society derives economic benefits from investments in people as well.

Furthermore, offering learning and development opportunities to all employees supported an equitable perspective across all employees. As noted by Harder (1991), "According to equity theory, outcomes will be perceived as fair when the ratio of outcomes to inputs is equal across individuals" (p. 458). Inequity exists when the outcome-input ratios between two individuals appear to be unequal. This inequity is thought to create tension which motivates the individual to "alter inputs, outcomes, or social referents to restore equity or to withdraw from the exchange in either psychological or actual terms" (Duchon & Jago, 1981, p. 728).

In addition to the creation and roll-out of the culture-focused offerings, the organization embedded the culture values and principles into existing training and development programs. This ensured continuous reinforcement of the culture language to advance the culture.

Alignment of Human Resources Processes with Culture Transformation

The third area of intentional planning and focus was to align human resources processes with the desired cultural behaviors, as organizational culture impacts virtually every aspect of organizational life, from how decisions are made, to how rewards are distributed, to how people are treated. All processes are affected, including goal setting, learning and development, compensation and rewards, and espoused values. According to Hofstede, Hofstede, and Minkov (2010), "no group can escape culture" (p. 12). Denison (1996) proposed that "Culture refers to the deep structure of organizations, which is rooted in values, beliefs, and assumptions held by organizational members" (p. 624).

Organizational culture runs broad and deep, covering all areas of life. According to Hofstede (2015), "any group of people that spends time together, of whatever size, forms culture" which means they are creating "shared and transferable perceptions, values, or practices" (p.546). Because of the power of organizational culture, shifting the culture does not occur in isolation; rather, organizational culture evolves over years and the preferred behaviors need to be aligned with human resources processes and observable cultural artifacts.

These observable cultural artifacts are particularly important in the workplace, as they "are those sets of attributes - objects and behaviors – that help definitively characterize one organization as opposed to another" (Higgins & McAllaster, 2004, p. 64). Furthermore, cultural artifacts add value by playing a critical role in changing organizational behavior to support a change in the organizational strategy (Higgins, McAllaster, Certo, & Gilbert, 2006). Cultural artifacts are also effective in reinforcing values

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and practices that have been used for a long period of time (Higgins et al., 2006). Due to the power and impact of cultural artifacts, failing to remove or modify the old artifacts with the desired new artifacts may result in the failure of a change initiative (Higgins & McAllaster, 2004). Higgins et al. (2006) proposed that "it is because an organization's culture (its values, norms, and practices) and its strategy are so very interdependent that using cultural artifacts to reinforce a culture or modify it to align with strategy is so effective" (p. 398).

As a result, the organization embedded the culture behaviors and expectations into the performance management and feedback processes, aligned its compensation and reward systems to acknowledge the demonstration of the culture values and behaviors; incorporated organizational culture into the talent recruiting process; implemented a company-wide online recognition tool to acknowledge culture behaviors and create a culture of appreciation and gratitude; and updated organization signage and artifacts to include culture messaging.

This on-going reinforcement was crucial, as cultures are never static (Greenwood, 2015; Kotter and Heskett, 1992). Rather, culture evolves over time and becomes a pervasive force and its systemic impacts underlay much of the organization's practices. Culture is a dynamic system in a natural state of movement in which there is continued shuffle, selection, variation, and retention of culture components that are shaped by the organization's adaptations to its environment (Weeks & Galunic, 2003; Zheng, Qu, & Yang, 2009). According to Ribando and Evans (2015), "A dynamic culture should change as the organization changes, restructures, is merged with other institutions, responds to environmental shifts, adds new members, or loses others" (p. 102).

Involvement of Employees Throughout Transformation

The fourth area of focused activity was the constant involvement of people at all levels of the organization in the culture change effort. Organizational culture is highly complex and includes shared beliefs, behaviors, and assumptions of people. Hofstede (2015) proposed that "… understanding, and dealing with, culture is strategically important for organizations" (p. 566). Changing an organization's culture requires employees to alter what they say, in addition to altering the myths, rituals, symbols, and signs that signify the preferred change (Ford & Ford, 1995). Making these changes is not easy, however, as change programs often fall short (Beer, Spector & Eisenstat, 1990). Perhaps the most important reason to involve employees is that one of the most commonly cited reasons for change implementation failure is not appropriately addressing people-related issues in the change process (Kotter, 1995; Maheshwari & Vohra, 2015; Spiker & Lesser, 1995).

Beer, Spector, and Eisenstat (1990) found that very little changed in organizations where strategies were 'sold' to employees and followed up with communication and implementation plans. Rather, successful companies leveraged employee involvement to identify and implement desired behaviors and competencies to achieve their goals, leading to the preferred culture (Maheshwari & Vohra, 2015).

So, in a planned way, employees were involved throughout the culture transformation, from the creation of the organizational culture values to the facilitation of culture workshops to the alignment of culture within human resources processes. Additional employee involvement and support was through the creation of a grass-roots change agent community, which started with just two employees wanting to change the culture and do more after participating in the culture workshop. This community grew from these two employees to thousands of employees who supported the shift and intentionally embedded culture into daily activities and decision making. These change agents received additional information

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

on an on-going basis, in addition to learning opportunities experienced in monthly meetings and an annual conference designed to expand networks and introduce adjacent concepts to support existing culture principles.

The creation of this change agent community was supported by the resource-based view theory that accentuates the importance of a pool of resources and capabilities that drive performance. Lado and Wilson (1994) proposed that "the resource-based view suggests that human resource systems can contribute to sustained competitive advantage through facilitating the developing of competencies that are firm specific, produce complex social relationships, are embedded in a firm's history and culture, and generate tacit organizational knowledge" (p. 699).

According to Barney (1995), resources and capabilities are "all of the financial, physical, human, and organizational assets used by a firm to develop, manufacture, and deliver products or services to its customers" (p. 50). Barney (1991) postulated that firms that develop resources that are valuable, rare, and hard to imitate create a sustained competitive advantage. In particular, Barney (1995) noted that organizational talent can develop a culture, social networks, and a management structure that is very difficult to duplicate, thus creating a competitive advantage.

RESULTS: WHAT ACTUALLY HAPPENED

According to research, there are three factors required in order for change to be successful: (a) individuals must understand and believe there is a need for organizational change (Armenakis & Harris, 2009; Fernandez & Rainey, 2006); (b) individuals must be involved in the change process planning and implementation (Oswald, Mossholder, & Harris, 1997); and (c) the benefits of change must be communicated throughout the organization at multiple levels (Conway & Monks, 2011; Dent & Goldberg, 1999).

The culture transformation described in this case history was initiated about 8 years ago and current activities continue to support and reinforce the culture change. Since initiating these changes, the organization has grown considerably, with positive outcomes:

- Revenue more than doubled;
- Employee engagement scores increased by over 10%,
- Stock price increased by more than 800%, and
- Earnings per share more than doubled.

The work during these 8 years has addressed the three factors for successful organizational change (noted above). There have been tremendous business results, and the organization continues to grow as a global organization and provide shareholder value. While the culture transformation may not be the sole reason for the organization's success, it is likely a contributing factor.

Due to the success of these culture efforts, these evidence-based practices are being leveraged to drive the organization's Diversity and Inclusion efforts:

1. **Creation of Leadership Buy-in and Support:** Establishment of sponsors and council;
2. **Implementation of Learning and Development Opportunities:** Identification of topics to advance diversity and inclusion understanding and advancement;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

3. **Alignment of Human Resources Processes With Culture Transformation:** Opportunity for reinforcement and implementation within existing human resources processes; and
4. **Involvement of Employees Throughout Transformation:** Employee involvement at all levels to drive change deeper within the organization.

It is being considered the next generation of the culture journey to continue to reinforce the culture values, while creating a highly engaging, inclusive work environment in which employees can leverage their strengths, contribute fully, and be their authentic selves at work.

Recommendations for OD Practitioners

Organizational culture change is difficult and highly complex. It cannot be done in a short timeframe and is not a one-time implementation. Furthermore, there is no 'quick-fix' or 'simple' solution that can be duplicated using another organization's approach. Rather, organizational culture change is the combination of many aligned initiatives over time that truly changes and sustains an organizational culture. While these changes and initiatives may be different for other companies, there are some 'best practice' approaches and recommendations for OD practitioners:

1. Understand your role as a change agent;
2. Respect the organization's learning environment and ability to change;
3. Leverage employee passion and involvement;
4. Celebrate short-term wins for long-term change; and
5. Relish the opportunity to work on a major change initiative.

Understand Your Role as a Change Agent

According to Smith (1998), "in the most successful organizations, employees understand their role in the change effort" (p. 47). Research done by Shaw et al. (2012) noted that successful change agents or champions demonstrated several key behaviors: (a) actively promoting a new innovation; (b) networking across the organization; (c) identifying and leveraging resources; (d) navigating the socio-political organization; (e) building support by sharing the vision and increasing employees' understanding; and (f) ensuring that the innovation is implemented, even with potential organizational resistance.

As an evidence-based change agent, understand your competencies and knowledge of strategic thinking, organizational change, communications, and organization development. These key areas provide the foundation for your change agent role to conduct the analysis of the situation and your organization, planning and development of a change strategy, the implementation of a major change, and the evaluation of the effectiveness of the process and the outcomes.

Additionally, throughout the process, build in time for critical reflection and evaluation to understand the effectiveness of your practices and your lessons learned to leverage for future changes. This time will be invaluable to support the long-term effectiveness of a major organizational change and your resiliency as a change agent.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Respect the Organization's Learning Environment and Ability to Change

The implementation of organizational culture change has organizational learning implications. These organizational learning implications refer to the organization's capacity to bring them closer to their targets, with the focus on improving organizational life (Argyris & Schön, 1996; Edmondson & Moingeon, 1998; Senge, 2006). As a result, change agents need to understand the importance of analyzing and creating a learning environment in which employees learn how to welcome the change and adapt to the culture shift. This shift may include sequential steps to move the organization from the current 'undesired' state to the future 'desired' state, which may work for organizations operating in a relatively stable environment; however, for organizations operating in a dynamic, turbulent environment, this sequential approach may not be effective to implement sustainable change. Rather, practitioners must be open to new opportunities that may support the change.

Leverage Employee Passion and Involvement

Numerous change management authors emphasized the importance of employee involvement during the change process (Conner, 1992; Fullan, 2008; Hall & Hord, 1987; Kahan, 2010; Wheatley, 2006, 2009). According to Burt (2011), "While it is important for leaders to involve employees under normal circumstances, it is even more critical to involve them during an organizational change, particularly when that change has an impact on the underlying culture of the organization" (p. 5).

Beer, Spector, and Eisenstat (1990) found that very little changed in organizations where strategies were 'sold' to employees and followed up with communication and implementation plans. Rather, successful companies leveraged employee involvement to identify and implement desired behaviors and competencies to achieve their goals, leading to the preferred culture (Maheshwari & Vohra, 2015).

Organizational culture change requires employee involvement at all levels. While it is key to gain leadership buy-in and the demonstrated support by walking the talk and recognizing others for supporting the cultural change, true organizational change happens throughout the organization at multiple levels. Additionally, successful organizational change occurs by allowing and encouraging the grass-roots, 'bottom up' change initiatives, rather than dictating changes and plans through a 'top down' command and control environment. The ability to leverage these 'bottom up' changes demonstrate the value of all employees and their passion to support the change.

Celebrate Short-Term Wins for Long-Term Change

Organizational culture change takes time, considerable effort, and on-going reinforcement. It takes on-going perseverance and determination to stick with the plans and efforts to change an organization's culture. Because of this long-term perspective, it is particularly important to celebrate short-term wins on the transformation journey to ensure that the employees are appreciated and recognized for these changes; celebrating short-term wins is one of the stages in Kotter's (1996) eight-stage change process. This is particularly important in large-scale change implementation, as "short-term wins help to demonstrate the viability of change and to build momentum" (Pollack & Pollack, 2015, p. 59).

Building on the momentum requires on-going reinforcement; it is not about only changing the values or the principles, but supporting these changes through learning and development opportunities, processes, and continued alignment with other human resources processes. McAllaster (2004) noted that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

"no strategic change will occur if it is not constantly reinforced and monitored by the people at the top, and then repeated throughout the management chain of command" (p. 326). This reinforcement and alignment process takes time, as it requires an approach that includes a planned blend of both continuity and change.

Relish the Opportunity to Work on a Major Change Initiative

Organizational change is constant due to competitive pressures, local and global economies, and innovative advancements. To keep up with these many challenges, organizations must continuously change and evolve to remain competitive. Unfortunately many organizational changes fail, so it is imperative that a prescriptive protocol for effective change be available for practitioners (Griffith, 2010). Whether these changes are intended to improve workplace processes, systems, or strategies, they all have an impact on people. This is the exciting aspect for an OD practitioner – understand the desired changes and the effects on people and the organization as a whole.

While working on large-scale organizational change can be daunting, look at the challenge as an opportunity to leverage your knowledge of OD models, best practices, and theories, as researchers noted that individuals who are scholar-practitioners are more effective than their non-scholar peers (Holton, 2004; Lombardozzi, 2013; Short & Shindell, 2009). Throughout the journey there will be many ups and downs, as well as starts and stops; these are the moments for your critical reflection to understand your lessons learned and develop transferable skills for the next challenge. Opportunities to make a difference and have a large-scale impact on an organization do not happen often, so relish the opportunity to work on a major change initiative.

CONCLUDING REFLECTIONS

With today's competitive landscape, organizations are focusing on ways to create a competitive advantage for organizational success and growth. Health care organizations are particularly challenged, due to the recent health care reform changes, combined with considerable competitive challenges. Worley and Mohrman (2014) noted that "the traditional models of change management that served organizations well during the old normal are no longer sufficient to guide them through the types of changes they are facing today. The new normal calls for different theories of change and changing" (p. 221).

The "new normal" is an opportunity for practitioners to catalyze and steer the on-going changes, with the goal to help the success rates of change efforts, which are estimated to be a dismal 10 to 32 percent success (Smith, 2003). Furthermore, organizational culture changes prove even more challenging, with only a 10 percent success rate.

To ensure a higher success rate for a culture change, this case history highlighted four categories of evidence-based practices to leverage for culture transformation:

1. Creation of Leadership Buy-in and Support;
2. Implementation of Learning and Development Opportunities;
3. Alignment of Human Resources Processes with Culture Transformation; and
4. Involvement of Employees throughout Transformation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Argyris, C., & Schön, D. (1996). *Organizational Learning II: Theory, Method, and Practice*. Reading, MA: Addison-Wesley.

Armenakis, A. A., & Harris, S. G. (2009). Reflections: Our journey in organizational change research and practice. *Journal of Change Management*, *9*(2), 127–142. doi:10.1080/14697010902879079

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120. doi:10.1177/014920639101700108

Barney, J. B. (1995). Looking inside for competitive advantage. *The Academy of Management Executive*, *9*(4), 49–61. doi:10.5465/ame.1995.9512032192

Beckhard, R., & Pritchard, W. (1992). *Changing the essence*. San Francisco, CA: Jossey-Bass.

Beer, M., Spector, P., & Eistenstat, G. (1990). Why change programs don't produce change. *Harvard Business Review*, *68*(6), 158–166. PMID:10107960

Berson, Y., Oreg, S., & Dvir, T. (2008). CEO values, organizational culture and firm outcomes. *Journal of Organizational Behavior*, *29*(5), 615–633. doi:10.1002/job.499

Blattner, J., & Walter, T. (2015). Creating and sustaining a highly engaged company culture in a multi-generational workplace. *Strategic HR Review*, *14*(4), 124–130. doi:10.1108/SHR-06-2015-0043

Burt, D. S. (2011). *Exploring Employee Involvement in Change: Appreciative Conversations with Community College Leaders* (Dissertation). ProQuest. Fielding Graduate University.

Cameron, K. S., & Quinn, R. E. (2006). *Diagnosing and changing organizational Culture: Based on the competing values framework* (Rev. ed.). San Francisco, CA: Jossey-Bass.

Chaudhry, A., Yuan, L., Hu, J., & Cooke, R. A. (2016). What matters more? The impact of industry and organizational factors on organizational culture. *Management Decision*, *54*(3), 570–588. doi:10.1108/MD-05-2015-0192

Choi, T. Y., & Behling, O. C. (1997). Top managers and TWM success: One more look after all these years. *The Academy of Management Executive*, *11*(1), 37–47. doi:10.5465/ame.1997.9707100658

Conner, D. (1992). *Managing at the speed of change*. New York, NY: Villard Books.

Conway, E., & Monks, K. (2011). Change from below: The role of middle managers in mediating paradoxical change. *Human Resource Management Journal*, *21*(2), 190–203. doi:10.1111/j.1748-8583.2010.00135.x

Denison, D. R. (1996). What is the difference between organizational culture and organizational climate? A native's point of view on a decade of paradigm wars. *Academy of Management Review*, *21*(3), 619–654. doi:10.5465/amr.1996.9702100310

Dent, E. B., & Goldberg, S. G. (1999). Challenging "resistance to change.". *The Journal of Applied Behavioral Science*, *35*(1), 25–41. doi:10.1177/0021886399351003

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Dickson, M. W., BeShears, R. S., & Gupta, V. (2000). The impact of societal culture and industry on organizational culture. In Handbook of Organizational Culture and Climate. Sage.

Dickson, M. W., Aditya, R. N., & Chhokar, J. S. (2000). Definition and interpretation in cross cultural organizational culture research: Some pointers from the GLOBE research program. In N. M. Ashkanasy, C. P. M. Wilderom, & M. F. Peterson (Eds.), *Handbook of Organizational Culture and Climate* (pp. 447–464). Thousand Oaks, CA: Sage.

Duchon, D., & Jago, A. G. (1981). Equity and the performance of Major League Baseball players: An extension of Lord and Hohenfeld. *The Journal of Applied Psychology*, *66*(6), 728–732. doi:10.1037/0021-9010.66.6.728

Edmondson, A., & Moingeon, B. (1998). From organizational learning to the learning organization. *Management Learning*, *29*(1), 5–20. doi:10.1177/1350507698291001

Fernandez, S., & Rainey, H. G. (2006). Managing successful organizational change in the public sector. *Public Administration Review*, *66*(2), 168–176. doi:10.1111/j.1540-6210.2006.00570.x

Ford, J. D., & Ford, L. W. (1995). The role of conversations in producing intentional change in organizations. *Academy of Management Review*, *20*(3), 541–570. doi:10.5465/amr.1995.9508080330

Fullan, M. (2008). *The six secrets of change*. San Francisco, CA: Jossey Bass.

Gordon, G. (1985). The relationship of corporate culture to industry sector and corporate performance. In Gaining Control of Corporate Culture. San Francisco, CA: Jossey-Bass.

Greenwood, D. J. (2015). An analysis of the theory/concept entries in the SAGE Encyclopedia of action research: What we can learn about action research in general from the encyclopedia. *Action Research*, *13*(2), 198–213. doi:10.1177/1476750315573592

Griffith, S. D. (2010). *Transformational leadership and change readiness using assessments for near-term prescriptive organizational intervention*. Ann Arbor, MI: ProQuest.

Hall, G., & Hord, S. (1987). *Change in schools*. New York, NY: State University of New York Press.

Hamlin, R. G. (2016). Evidence-based organizational change and development: Role of professional partnership and replication research. In C. Hughes & M. W. Gosney (Eds.), *Bridging the Scholar Practitioner Gap in Human Resources Development* (pp. 120–142). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9998-4.ch007

Harder, J. W. (1991). Equity theory versus expectancy theory: The case of major league baseball free agents. *The Journal of Applied Psychology*, *76*(3), 458–464. doi:10.1037/0021-9010.76.3.458

Hatch, M. J. (1993). The dynamics of organizational culture. *Academy of Management Review*, *18*(4), 657–669. doi:10.5465/amr.1993.9402210154

Higgins, J. M., & McAllaster, C. (2004). If you want strategic change, don't forget to change your cultural artifacts. *Journal of Change Management*, *4*(1), 63–73. doi:10.1080/1469701032000154926

Higgins, J. M., McAllaster, C., Certo, S. C., & Gilbert, J. P. (2006). Using cultural artifacts to change and perpetuate strategy. *Journal of Change Management*, *6*(4), 397–415. doi:10.1080/14697010601087057

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hofstede, G. (1994). The business of international business is culture. *International Business Review*, *3*(1), 1–14. doi:10.1016/0969-5931(94)90011-6

Hofstede, G., Neuijen, B., Ohayv, D., & Sanders, G. (1990). Measuring organizational culture: A qualitative and quantitative study across twenty cases. *Administrative Science Quarterly*, *35*(2), 286–316. doi:10.2307/2393392

Hofstede, G. H., Hofstede, G. J., & Minkov, M. (2010). *Culture and organizations: software of the mind – Intercultural cooperation and its importance for survival* (3rd ed.). New York, NY: McGraw Hill.

Hofstede, G. J. (2015). Culture's causes: The next challenge. *Cross Cultural Management*, *22*(4), 545–569. doi:10.1108/CCM-03-2015-0040

Hogan, S. J., & Coote, L. V. (2014). Organizational culture, innovation, and performance: A test of Schein's model. *Journal of Business Research*, *67*(8), 1609–1621. doi:10.1016/j.jbusres.2013.09.007

Holton, E. III. (2004). Implementing evidence-based practices: Time for a national movement? *Human Resource Management Review*, *3*(3), 187–188. doi:10.1177/1534484304269055

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., & Gupta, V. (2004). *Culture, leadership, and organizations*. Thousand Oaks, CA: Sage.

Jung, Y., & Takeuchi, N. (2010). Performance implications for the relationships among top management leadership, organizational culture, and appraisal practice: Testing two theory-based models of organizational learning theory in Japan. *International Journal of Human Resource Management*, *21*(11), 1931–1950. doi:10.1080/09585192.2010.505093

Kahan, S. (2010). *Getting change right: How leaders transform organizations from the inside out*. San Francisco, CA: John Wiley and Sons.

Kotter, J. P. (1995). Leading change: Why transformation efforts fail. *Harvard Business Review*, *73*(2), 59–67.

Kotter, J. P. (1996). *Leading change*. Boston, MA: HBS Press.

Kotter, J. P., & Heskett, J. L. (1992). *Corporate culture and performance*. New York, NY: Simon and Schuster.

Lado, A. A., and Wilson, M. C. (1994). Human resource systems and sustained competitive advantage: A competency-based perspective. *Academy of Management Review, 19*(A), 699-727. doi:10.5465/amr.1994.9412190216

Lombardozzi, C. (2013). The SMART practice of scholarly practice. *Advances in Developing Human Resources*, *15*(3), 314–328. doi:10.1177/1523422313487839

Maheshwari, S., & Vohra, V. (2015). Identifying critical HR practices impacting employees perception and commitment during organizational change. *Journal of Organizational Change Management*, *28*(5), 872–894. doi:10.1108/JOCM-03-2014-0066

McAllaster, C. (2004). The 5 P's of change: Leading change by effectively utilizing leverage points within an organization. *Organizational Dynamics*, *33*(3), 318–328. doi:10.1016/j.orgdyn.2004.06.008

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mumford, M. D., Scott, G. M., Gaddis, B., & Strange, J. M. (2002). Leading creative people: Orchestrating expertise and relationships. *The Leadership Quarterly*, *13*(6), 705–750. doi:10.1016/S1048-9843(02)00158-3

O'Reilly, C. A., Chatman, J. A., & Caldwell, D. F. (1991). People and organizational culture: A profile comparison approach to assessing person-organization fit. *Academy of Management Journal*, *34*, 487–516. doi:10.5465/256404

Ortega-Parra, A., & Sastre-Castillo, M. A. (2013). Impact of perceived corporate culture on organizational commitment. *Management Decision*, *51*(5), 1071–1083. doi:10.1108/MD-08-2012-0599

Oswald, S., Mossholder, K., & Harris, S. (1997). Relations between strategic involvement and managers' perceptions of environment and competitive strengths. *Group & Organization Studies*, *22*(3), 343–365. doi:10.1177/1059601197223003

Pollack, J., & Pollack, R. (2015). Using Kotter's eight stage process to manage an Organizational change program: Presentation and practice. *Systemic Practice and Action Research*, *28*(1), 51–66. doi:10.100711213-014-9317-0

Ribando, S. J., & Evans, L. (2015). Change happens: Assessing the initial impact of a university consolidation on faculty. *Public Personnel Management*, *44*(1), 99–119. doi:10.1177/0091026014550406

Schein, E. H. (1983, Summer). The role of the founder in creating organizational culture. *Organizational Dynamics*, *12*(1), 13–28. doi:10.1016/0090-2616(83)90023-2

Schein, E. H. (1990). Organizational culture. *The American Psychologist*, *45*(2), 109–119. doi:10.1037/0003-066X.45.2.109

Schein, E. H. (1999). *The corporate culture survival guide: Sense and nonsense about culture change*. San Francisco, CA: Jossey-Bass.

Schein, E. H. (2000). Sense and nonsense about culture and climate. In N. M. Ashkanawy, C. P. M. Wilderom, & F. Peterson (Eds.), Handbook of Organizational Culture and Climate (pp. xxiii-xxx). Thousand Oaks, CA: Sage.

Schein, E. H. (2004). *Organizational culture and leadership*. San Francisco, CA: Wiley and Sons.

Senge, P. (2006). *The Fifth Discipline: The Art and Practice of the Learning Organization*. Sydney, Australia: Random House.

Shaw, E. K., Howard, J., West, D. R., Crabtree, B. F., Nease, D. E. Jr, Tutt, B., & Nutting, P. A. (2012). The role of the champion in primary care change efforts: From the state networks of Colorado ambulatory practices and partners (SNOCAP). *JABFM*, *25*(5), 676–685. doi:10.3122/jabfm.2012.05.110281 PMID:22956703

Short, D. C., & Shindell, T. (2009). Defining HRD scholar-practitioners. *Advances in Developing Human Resources*, *11*(4), 472–485. doi:10.1177/1523422309342225

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Simpson, S., & Cacioppe, R. (2001). Unwritten ground rules: Transforming organization culture to achieve key business objectives and outstanding customer service. *Leadership and Organization Development Journal*, *22*(8), 394–401. doi:10.1108/EUM0000000006272

Smith, D. (1998, May). Invigorating change initiatives. *Management Review*, 45–48.

Smith, M. E. (2003). Changing an organization's culture: Correlates of success and failure. *Leadership and Organization Development Journal*, *24*(5), 249–261. doi:10.1108/01437730310485752

Spiker, B. K., & Lesser, D. (1995). We have met the enemy . . .. *The Journal of Business Strategy*, *16*(2), 17–21. doi:10.1108/eb039686

Weeks, J., & Galunic, C. (2003). A theory of the cultural evolution of the firm: The intra organizational ecology of memes. *Organization Studies*, *24*(8), 1309–1352. doi:10.1177/01708406030248005

Wheatley, M. J. (2006). *Leadership and the new science: Discovering order in a chaotic world*. San Francisco, CA: Berrett-Koehler.

Wheatley, M. J. (2009). *Turning to one another: Simple conversations to restore hope to the future*. San Francisco, CA: Berrett-Koehler.

Worley, C. G., & Mohrman, S. A. (2014). Is change management obsolete? *Organizational Dynamics*, *43*(3), 214–224. doi:10.1016/j.orgdyn.2014.08.008

Zheng, W., Qu, Q., & Yang, B. (2009). Toward a theory of organizational cultural evolution. *Human Resource Development Review*, *8*(2), 151–173. doi:10.1177/1534484309333619

This research was previously published in Evidence-Based Initiatives for Organizational Change and Development; pages 547-561, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 42
Digital Transformation in the Utilities Industry:
Industry 4.0 and the Smart Network Water

Marcelo Teixeira de Azevedo
https://orcid.org/0000-0003-1676-7380
Universidade de São Paulo, Brazil

Alaide Barbosa Martins
Universidade de Sao Paulo, Brazil

Sergio Takeo Kofuji
Universidade de Sao Paulo, Brazil

ABSTRACT

Nowadays, there is a digital transformation in industry, which is being referred to as a new revolution, known as the fourth industrial revolution. Today, we are in the fourth industrial revolution, which strongly supports itself at enabling technologies, such as: Internet of Things (IoT), big data, cyber-physical systems (CPS) and cloud computing. These technologies are working cooperatively to promote a digital transformation in the forms of: Industry 4.0, Industrial Internet Consortium and Advanced Manufacturing. To meet these needs and as a proof of concept, a platform for digital transformation for a water issue is proposed with the objective of achieving an efficient management of resources linked to rational use of water. For the platform definition, a survey was performed of the process of a water treatment plant from the third industrial revolution and improved the process by applying the concepts of digital transformation to improve the new platform.

DOI: 10.4018/978-1-7998-7297-9.ch042

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1. INTRODUCTION

Digital transformation is part of a major ongoing technological process and it is associated with the application of digital technology in all aspects of human society. According to Khan (2016) and Westerman (2014), digital, digitization and digital transformation are concepts that are commonly confused, and there is no clear or broadly accepted definition of digital transformation.

Also, according to Khan (2016), it is first necessary to establish the concepts of digital and digitization in order to be able to define digital transformation. Digital is associated with the process of converting analogical information into digital format; in Collin et al. (2015), it is defined as a condition for converting, for example, a print photograph into a digital format. Meanwhile, according to Bounfour (2016), digitization is related to the issue of transforming physical processes into virtual processes using specifically tailored technologies. In accordance with Khan (2016) and Collin et al. (2015), digital transformation is the effect of this digitization, and thus not only pertains to the adoption of new technologies, but also to new ways of making business operations more efficient and competitive. However, it is still not known how digital transformation will be implemented, its degree of complexity, the nature of its interconnections among different sectors and, above all, its impact on society.

The new technologies involved in this transformation will bring far-reaching changes to all sectors of society, affecting current business, production, consumption, transportation and delivery methods, as well as the very way people live. Therefore, it is necessary to obtain a comprehensive vision of how this digital transformation will change all aspects (social, cultural or economic) of the world in which people live.

In recent centuries, industry has undergone vast operational changes, generating innovation and far-reaching social and economic shifts. The first industrial revolution took place in England at the end of the 18th Century and beginning of the 19th Century, and it was characterized by coal as the primary energy source, leading to the development of the steam engine and, consequently, the locomotive. One of the first areas to implement this new technology was the textile industry, which, prior to this revolution, was intensively manual. This new industrial model accelerated the rural exodus, thus leading to burgeoning urban centers. The second industrial revolution triggered from the second half of the 19th Century as part of the quest for continual improvement. This basically comprised the discovery of fossil fuels and electromagnetism as energy sources, with electricity arising as an alternative to steam power. Use of these resources accelerated the industrial steamroller with the discovery of the potential for reducing both costs and product manufacturing time, with the result that goods could be consumed on an ever-greater scale. One of the most evident examples of this revolution is the introduction of the assembly line, the most traditional reference of which is the Ford Model T automobile. The third industrial revolution began in the middle of the 20th Century, characterized by the intensive use of electronics and information technology (IT) in order to achieve the objective of automation in manufacturing. In the industrial area, Supervisory Control and Data Acquisition (SCADA) systems, in conjunction with the programmable logic controller (PLC) were its most significant feature, and these systems are currently converging to open-source systems that, in some cases, are connected to corporate networks or even the internet. The use of telecommunications resources and technological advances have enabled remote access, sharing, integration and, consequently, long-distance data processing using these resources. Integration with different systems is aimed at increasing productivity and efficiency in decision-making processes.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Currently, according to Schwab (2016), we are currently on the cusp of a fourth industrial revolution, the so-called Cyber-Physical Systems (CPS) systems-based industrial revolution. In addition to Cyber-Physical Systems, new technologies are arising in the form of the current enabling technologies, whose use is leading to the breakdown of the current paradigm. Such technologies include Internet of Things (IoT), big data analytics and cloud computing, intended to address the requirements of an advanced manufacturing system through integration of the entire supply chain. This new revolution is characterized by the intensive use of digital technologies with the purpose of manufacturing products rapidly, with an agile response to demands and real-time production and supply-chain optimization. Also, according to Schwab (2016), the fourth industrial revolution basically comprises three pillars, namely: the physical, digital and biological, which have already impacted the economy, business, society, private individuals and government.

This research is intended to contribute to the understanding of digital transformation and its impacts. This new paradigm shift affects both existing business models and the entire supply chain. Considering the current moment in time, this study identifies enabling technologies that form the technological pillars on which this new revolution is to be based, in order to do the same work as global visions that attempt to comprehend, qualify and guide companies, the government and civil society towards this transformation.

Given that digital transformation affects the entire production chain in its different branches and sectors, it has become a very wide-ranging and complex issue. Accordingly, this research attempts to contextualize the issue based on a single niche, that of the Utilities industry and, specifically, the issue of rational water use in Brazil. The Utilities industry is defined by Mcnabb (2005) as companies operating in the production, transportation, distribution and commercialization of energy (electricity and gas) and water and its main attribute is that it is essential and, in the case of failure, critical for society.

1.1. Objectives

The objective of this chapter is to understand the impacts of digital transformation on the industry and to improve the currently existing architecture for an all-new platform. The current 5-layer pyramid automation architecture is transformed into a new model that makes use of enabling technologies to digitally transform the entire supply chain of a certain market niche. This research is supported by digital transformation in the context of the Utilities industry, in order to promote efficient management with rational water use linked to existing risks and threats.

1.2. Rationale

Digital transformation is becoming a reality, although studies on the impact of the adoption of technologies that enable digital transformation to be implemented have not yet matured to the degree that they inspire the confidence required to make it a reality.

The choice of industrial segment was made based on the fact that no balance between the knowledge of the managers of these industries and visions of digital transformation has been identified in research conducted to date. At the current moment, industries are operating with SCADA systems in the 5-layer pyramid model, in order to continue executing vital functions for society. With the recent appearance of enabling technologies, change in this architecture is now possible and, consequently, it is also possible to achieve the gains expected from digital transformation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The definition and concept of digital transformation is not unanimous, and it requires investigation in several fields, such as the creation of standards, reference architecture, training, adaptation to legislation, platform and regulatory framework, among others. The absence of digital transformation policies linked to the criticality of the industries provides the grounds for this research.

Furthermore, specifically with regard to the water issue, according to Torres (2008), there is an executive order in the United States identified under the number 13,010, which names the water supply system as one of the eight critical infrastructures most targeted by terrorists and, accordingly, it requires greater protection. Although, as the author himself states, the probability of contamination is slight, attempts and actual attacks on the water supply system in the United States have proven to be a real issue, as shown in Table 1.

Table 1. Attacks against the American water treatment system

Year	Attacker	Event	Agent
1984	Religious Cult	Contamination of municipal potable water tanks in the state of Oregon/USA	Salmonella
2001	Bin Laden sympathizers	Detection of a potential contamination event in the water distribution network in 28 American states.	N/A
2002	Moroccans	Development of an initiative to contaminate water pipes at the American embassy in Rome.	Cyanide
2002	Al Qaeda	Resident arrested with plans and procedures for contaminating the water distribution network.	N/A
2003	Iraqi agents	Poisoning of food and water distribution networks.	Botulinum toxin
N/A	Religious Cult	Acquisition of cyanide to contaminate some of the reservoirs in Minneapolis	Cyanide

Source: Torres (2008)

Although there is very extensive literature available on mitigation, response and recovery, this work is most related to natural disasters. However, it is possible to observe a gradual increase in attacks on the water distribution system this decade. The American Water Works Association (AWWA), the American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF) recently drafted an experimental common standard on guidelines for improvement of the physical safety of facilities used for the treatment and distribution of potable water.

2. THEORETICAL REFERENCE

In this chapter, the bibliographical references that serve as the basis for the development, structure and execution of this study are analyzed and discussed. The proposed subject, in its entirety, is very wide-ranging and may cover many areas of knowledge; accordingly, the references also cover several correlated areas, including concepts, applications, protocols and theoretical and practical examples. Furthermore, IoT visions in industry and a description of emerging technologies are presented, such as IoT, machine learning, M2M, CPS, big data, analytics and risk analysis. The main purpose of this item is to contextualize the research by exploring approaches to IoT in industry, emerging technologies that contribute to these visions and the issue of risk (security and safety).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2.1. Related Works

In "*Security and Privacy Challenges in Industrial Internet of Things*" (Sadeghi, Wachsmann & Waidner, 2015), the authors base their work on the principle that, due to the strong tendency of connectivity and IoT-based initiatives, everyday equipment is becoming more and more connected, from vehicles to critical infrastructure and, accordingly, it is more exposed to safety and privacy issues. Thus, this article briefly introduces the systems that use the industrial IoT concept related to safety and privacy challenges, presenting a holistic perspective on the potential solutions to these issues. Furthermore, the authors research details pertaining to attacks on an IoT industrial system and relate the existing architecture to CPS and protection techniques. Finally, they conclude that current systems are inadequate and conclude that a holistic approach is necessary for the development of a framework for cybersecurity that takes into consideration all the abstract layers of the IoT system, as well as the frontiers that interact with the platform; however, there is no practical demonstration of the concepts and solutions presented, only a conceptual consideration.

In the study entitled "*Internet of Things Applications in Future Manufacturing*" (Soldatos et al., 2016), the authors base their work on the principle that the factory of the future will be governed by flexibility in manufacturing and rapid responses to market demands, thus providing a new production model that goes beyond mass production. Accordingly, manufacturing will migrate from the stock production model to a new demand-oriented model. This also means that a new platform to support this new model will be required. The study discusses initiatives, IoT technologies and applications related to future internet technologies, including the FITMAN project. One of the purposes of the article is to demonstrate how IoT can transform manufacturing by using emerging technologies and thus to illustrate the potential factory of the future.

The article entitled "*Towards Manufacturing 2.0: an Innovative Architecture for the Factory of the Future*" (Fiaschetti, Pietrabissa, & Priscoli, 2015) proposes an information management system for the new paradigm of the factory of the future. The authors start with the initial idea that the new production model incorporated by the factory of the future will produce a huge amount of data to be processed by operators, and with the current tools available, data management is not very effective for decision making. With this in mind, the authors conclude that new technologies are necessary in order to deal with innovative manufacturing processes. Accordingly, the article demonstrates an innovative architecture solution based on use and integration in ICT, based on the Future Internet framework, specifically, the PLATINO project.

On the other hand, the starting point for "*A Cyber-Physical Systems Architecture for Industry 4.0-based manufacturing systems"* (Lee, Bagheri, & Kao, 2015) is the evolution of the manufacturing industry; the authors propose a unified architecture based on five levels working as a guide for the implementation of CPS (Cyber-Physical Systems), with the purpose of improving the quality of products and the reliability of the system with more intelligent and resilient equipment. Accordingly, five steps are proposed, including: intelligent connection, conversion of data to information, cyber, cognition and configuration.

In the article entitled "*Implementing Smart Factory of Industry 4.0: An Outlook*" (Wang, Li, & Zhang, 2015), the authors describe the concept of Industry 4.0 and the requirement for horizontal, *end-to-end* and vertical integration in order to fulfill the Industry 4.0 proposal. The primary objective of the article is to address the issues of vertical integration; in order to fulfill this objective, the authors propose a framework for control systems engineering that incorporates industrial wireless networks, cloud computing, big

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

data and intelligent terminals, in order to form a self-organized system assisted by cloud-implemented feedback blocks and coordination, based on big data analysis.

In the article entitled "*Smart Factories in Industry 4.0: A Review of the Concept and of Energy Management Approached in Production Based on the Internet of Things Paradigm*" (Shrouf, Ordieres, & Miragliotta, 2014), the authors present a reference architecture for intelligent factories based on the internet of things, defining the main characteristics of these factories with a focus on sustainability perspectives. Subsequently, they propose an approach for energy management, wherein decision making is carried out using energy consumption data from the factory floor (production line), providing *on-line* consumption in real time for any device.

The integration of these data improves efficiency, because they can be used to discover and reduce waste, and to allow conscientious decision making at the production management level (for example, maintenance, production programming and management).

The study entitled "*Service innovation and smart analytics for Industry 4.0 and big data environment*" (Lee; Kao, & Yang, 2014) is based on the principal that, in Industry 4.0, machines are connected like a collaborative community and its evolution requires use of advanced prediction tools. This article addresses the tendencies in the transformation of production services in a *big data* environment, as well as the availability of tools to manage *big data*, in order to achieve transparency and productivity.

In the article entitled "*Classification Model for Water Quality using Machine Learning Techniques"* (Muhammad et al., 2015), machine learning techniques were employed with the purpose of classifying water quality, revealing the best model for undertaking this classification. Accordingly, five models were applied: Naive Bayes, Conjunctive Rule, J48, Kstar and Bagging. In the tests proposed by the authors, the Kstar algorithm proved to be the most accurate.

The research outlined in the article entitled "Cloud based machine learning approaches for leakage assessment and management in smart water networks" (Mounce et al., 2015) is based on the problem that one third of public services worldwide report losses of almost 40% of clean water due to leaks, and this loss could be minimized by means of an intelligent water system. In order to prove this concept, a loss analysis in a controlled environment was proposed using machine learning techniques to predict leaks, with historical flows and pressure data as parameters.

In the study entitled "*Mathematical Model for Detection of Leakage in Domestic Water Supply Systems by Reading Consumption from an Analogue Water Meter*" (Oren & Stroh, 2013), a mathematical model is presented to detect domestic leaks in real time. The model uses data measured from a water meter and it employs two criteria simultaneously, namely: deviations in mean consumption and comparisons of water consumption over time. The simulation of a domestic consumption model was implemented in a device called Antileaks that was constructed by the authors. This device transforms analogical consumption data into digital format in real time.

In the study entitled "A Medição Setorizada Como Instrumento De Gestão Da Demanda De Água Em Sistemas Prediais – Estudo De Caso: Programa De Uso Racional Da Água Da Universidade De São Paulo" [Sectorized Measurement as an Instrument for Managing Water Demand in Buildings - Case Study: University of São Paulo Program for Rational Water Use] (Tamaki, Sanches, & Gonçalves, 2006), concluded that many benefits obtained and reported in the case of the University of São Paulo can be extrapolated to similar situations involving the implementation of sectorized measurement in order to manage water demand, taking into account considerations raised and the peculiarities of each application.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In the article entitled "*Towards an IoT Based Water Management System for a Campus*" (Verma et al., 2015), the design and results of an IoT based system for water distribution management on a university campus are discussed. The scope is focused on two main components, namely: 1) low-cost ultrasound water level measurement sensors; and 2) a sub-GHz wireless network to connect the sensors. The network is connected to a gateway that can update the data online for viewing and analytics.

In the study entitled "*Managing the water distribution network with a Smart Water Grid*" (Walter, 2018), the author base their work on the implementation of a Smart Water Grid system supports the Public Utilities Board (PUB)'s mission to supply good water 24/7 to its customers. With sensors and analytic tools deployed island-wide to provide a real-time monitoring and decision support system.

In the other study "LIFE SWSS - Smart Water Supply Systems", (SWSS, 2018) is based on the propose to decrease to 15% the energy consumption and CO2 emission associated with the water supply for the Singapore customers based on the use of enable technologies.

In line with the aforementioned studies, this study intends to contribute with projects in the area of intelligent cities and, specifically, the issue of water treatment through the use of enabling technologies and approaches to digital transformation.

3. THEORETICAL GROUNDS

The architecture of industrial automation is represented by Moraes and Castrucci (2007) by means of a pyramid called the Pyramid of Automation, whose primary objective is to divide equipment levels involved in accordance with their role in industry. This pyramid can be observed in Figure 1, where:

Level 1: The level of machines.
Level 2: The level of digital, dynamic and logic controllers.
Level 3: Enables the production process in the plant to be controlled.
Level 4: Responsible for production programming and planning.
Level 5: Responsible for management of company resources.

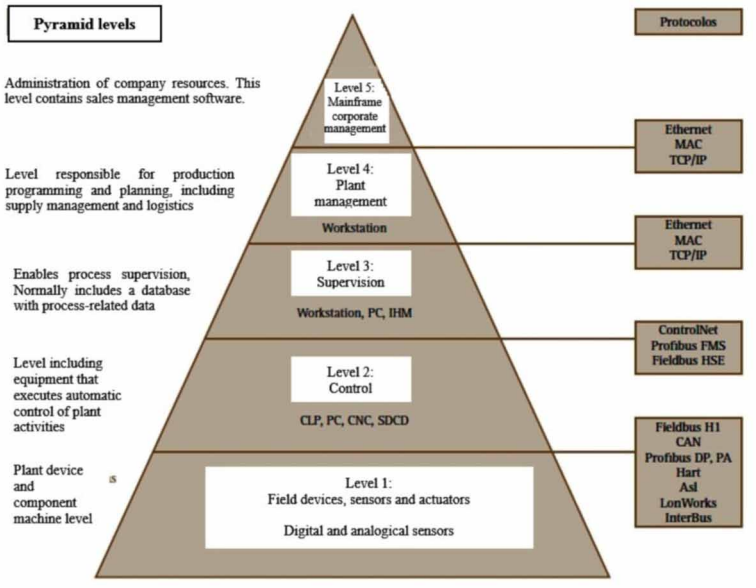
The next items identify new technologies that led changes in this traditional pyramid toward a new concept based on enabling technologies, which are discussed below.

Enabling technologies are the technological pillars for digital transformation, permitting the development of new processes and products. According to the European Commission, the formalization of enabling technologies, called KETs (Key Enabling Technologies) is characterized by the huge potential of knowledge and abundance of research and development (R&D), containing rapid innovation cycles and intensity in capital and qualification (Key Enabling Technologies, 2016). According to the European Commission, key technologies are:

- Advanced Materials
- Nanotechnology
- Micro and nanoelectronics
- Industrial Biotechnology
- Photonics
- Advanced Manufacturing Systems

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Automation pyramid
Source: Moraes and Castrucci (2007)



Advanced manufacturing is based on the use and coordination of automation, information, computation, software, sensing and networking, and it requires intensive use of enabling technologies (Loural, 2014). The North American government drafted a document entitled A National Strategic Plan for Advanced Manufacturing, which defined advanced manufacturing as follows:

... is a family of activities that depend on the use and coordination of automation, information, computation, software, sensing, and networking, and/or make use of cutting edge materials and emerging capabilities enabled by the physical and biological sciences, for example nanotechnology, chemistry, and biology. It involves both new methods for manufacturing existing products, and the manufacture of new products emerging from new advanced technologies. (NSTC, 2012)

3.1. IoT (Internet of Things)

The first reference to the concept to what is now known as IoT - Internet of Things was in 1982, when researchers from Carnegie Mellon University developed the first Coca-Cola machine with IoT characteristics (Oldest Internet of Things Objects in the World, 2017). Subsequently, at the beginning of the 1990s, Mark Weiser developed the widest ranging-concept of these characteristics, describing specialist hardware and software elements connected by cables, radio and infrared waves whose presence could not be perceived, thus introducing the term “Ubiquitous Computing” (Weiser, 1992). The term Internet of Things was defined around 1999 by Kevin Ashton, during a presentation at Procter & Gamble (P&G), in which it was connected to the RFID concept within the supply chain, with the subject in focus at the time, which was the Internet (Ashton, 2009). Subsequently, IoT was formally introduced by the International Telecommunication Union (ITU) through the 2005 ITU Internet Report. Then, in 2012, IoT was defined by the ITU-T Y.2060 recommendation as a global infrastructure for the information society, enabling

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

advanced services to be supplied through the interconnection of things (physical and virtual) based on the already existing information and communication technology, as well as its evolution.

The term Internet of Things (IoT) is a new paradigm that has been gaining space in the modern wireless telecommunications scenario, wherein the main idea is the pervasive presence around individuals by means of a variety of things or objects, such as Radio-Frequency Identification (RFID) tags, sensors, actuators, mobile telephones, etc.

3.2. Big Data and Analytics

Nist (2015) defines the term big data as a huge data set, in which the great mass of data is not structured and requires real-time analysis. The term big data addresses the inability of traditional data architecture to efficiently handle large quantities of data, requiring a scalable platform to effectively store, process and analyze them. The characteristics of big data imply a new architecture known as the "V's" of Big Data, which are:

- Volume (size of the data set);
- Variety (data from multiple repositories, domains or types);
- Velocity (data flow rates);
- Variability (coherence in the data set).

3.3. Cloud Computing and Fog Computing

The definition of cloud computing given by Nist (2011) is a model that permits ubiquitous, convenient and on-demand access to shared and configurable resources, which can be rapidly provided and released with minimal management effort. It comprises five essential characteristics, three service models and four implementation models, and its essential characteristics are as follows:

1. **On-demand and self-service:** Consumers may provision computational capacity without requiring human interaction with the service provider;
2. **Wide-ranging access to the network:** The resources are available through the network and can be accessed by means of heterogenic platforms, such as: mobile phones, tablet computers, laptop computers and work stations;
3. **Set of resources:** The access provider's computer resources are grouped to serve several consumers with different physical and virtual resources, which are dynamically assigned according to consumer demand;
4. **Rapid Elasticity:** The resources may be elastically provisioned (in any quantity and at any moment) and released according to demand;
5. **Measurement Service:** The cloud service automatically manages and optimizes use of the resources, and these are monitored, controlled and reported in a manner that is transparent both to the provider and to the consumer of the acquired service.

The three service models are:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1. **Software as a Service (SaaS):** Use of applications in a manner that is accessible by different platforms. Consumers have no managerial control whatsoever over computer resources;
2. **Platform as a Service (PaaS):** Consumers have control over the implementation of the application and the possibility of configurations in the application environment; however, they do not manage the infrastructure of the cloud computing resources;
3. **Infrastructure as a Service (IaaS):** Provides consumers with the capacity to manage cloud-computing resources and to implement and execute applications of their choosing.

The four implementation models are:

1. **Private Cloud:** Cloud infrastructure is provisioned for exclusive use of a single organization, comprising several consumers;
2. **Community Cloud:** Cloud infrastructure is provisioned for community use and specific use by certain users with shared interests;
3. **Public Cloud:** Cloud infrastructure is provisioned for open use and for the general public;
4. **Hybrid Cloud:** The cloud infrastructure comprises two or more cloud infrastructures (for example, private, public or community), which remain single entities, but which are linked according to standardization.

3.4. Machine Learning

The first definition of machine learning was made by Samuel (1959), who defined it as a field of study that provides computers with the ability to learn without being specifically programmed to do so. Later, it was redefined by Mitchell (1997) as techniques capable of improving performance in a given task using prior experience. Further according to Mitchell (1997), the machine learning algorithms can be divided in 04 ways, namely: supervised, unsupervised, semi-supervised and reinforcement learning.

In supervised learning, data (inputs and outputs) are presented in a model, providing the desired output for each input, where the primary objective is to learn a general rule in order to understand the inputs and outputs. In unsupervised learning, no type of information is given to the algorithm, and the algorithm itself is left to understand the data structure. In the semi-supervised algorithm, a training set with several missing outputs is provided. Reinforcement learning involves interaction with a dynamic environment in which a certain objective is proposed; autonomous vehicles are the classic example.

Learning algorithms can be divided into predictive (classification and regression) and descriptive (grouping, summarization and association) algorithms. Algorithms are used according to the objective and the issue to be resolved. For example, it is possible to highlight analyses of temporal series that use algorithms with the purpose of learning a function that maps a real value example. Examples of algorithms for this class of problems are regression trees, artificial neural networks, linear regression and support vector machines. On the other hand, the purpose of learning a function that associates the description of an example to a class can be exemplified by Bayesian, logistic regression and K-NN networks, among others.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

3.5. Information Security and Process Safety

The importance of defining the two areas of activity in this study (security and safety) is obvious, because both are included in the risk analysis and verification of failures for the improvement of process safety.

In order to obtain a better definition of the terms security and safety, we should first understand the term 'risk'. According to Almeida Jr. (2003):

…risk can be viewed as being directly related to the frequency of potentially hazardous events and with the severity of their consequences. The greater the frequency of a hazardous event, the greater the risk and severity of its outcomes, and, thus, the greater the risk assumed. ...any system has inherent associated risks, and the risk presented by one system may or may not be accepted by society, which, ultimately, will define the concept of acceptable risk. (p. 15)

With regard to the nomenclatures of the terms security and safety, Almeida Jr. (2003) presents the following definitions:

Although there is a difference, in Portuguese, these two factors have the same denomination; i.e. 'segurança', which in English can mean either 'safety' or 'security'. The term safety is used to refer to the safety of Critical Systems, while the term security is used to refer to the security of Information Systems. (p. 19)

In this study, the term security is used for the definitions of procedures, structures and processes for the improvement of information security systems, data and architecture of the communication network; while the term safety refers to the state of protection of a system, person, object or process, and it covers several types of error, failure and problem. The term is differentiated in a way similar to that adopted by Almeida Jr. (2003) in his research: safety for process safety (the safety of critical systems) and security for information security (information systems).

Process safety correlates quality, reliability, maintenance and safety of people and the environment. The primary objective is to know and manage risks.

Risk analysis means the process of understanding the nature of the risk and ascertaining risk levels. According to Braendeland, Refsdal and Stolen (2010), risk is defined as a combination of the consequences and probability of an undesired event.

According to the CETESB P4.261(2003) standard:

Recommendations and measures resulting from the risk analysis and assessment study for the reduction of the frequency and consequences of potential accidents, must be considered as integral parts of the risk management process; however, regardless of the adoption of these measures, premises containing hazardous substances or processes must be operated and maintained throughout their useful lives within standards considered tolerable, which is why the Risk Management Program [Programa de Gerenciamento de Riscos, PGR] must be implemented and used in all the activities, both routine and otherwise, of an industrial plant. (p. 34)

The requirement for more and more reliable systems is included in a context that demands a point of equilibrium to be reached, since poor reliability may result in loss of human life and material losses; however, on the other hand, extreme reliability may not be financially feasible.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

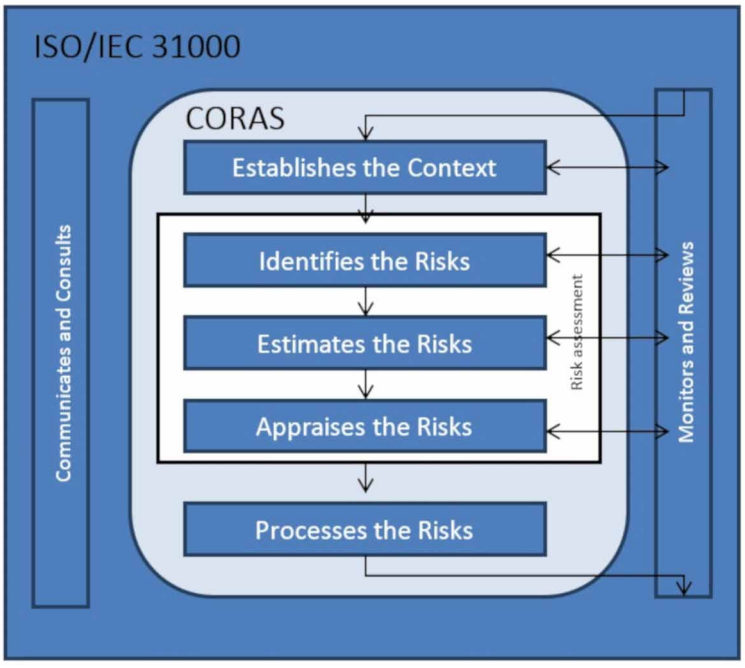
In the process of this study, several standards and measurement and risk analysis techniques are addressed, such as IEC 61508, Reliability, FMEA, CORAS, QSP 31000 (ISO/IEC 31000), CETESB P4.261 and others.

3.6. Consultative Objective Risk Analysis Systems (CORAS)

CORAS is a methodology that includes several techniques to appraise risk based on Unified Modeling Language (UML). The project was initiated in 2001 by four European Union countries (Greece, Germany, Norway and the United Kingdom), with support from IT companies (Intracom, Solinet and Telenor) and seven institutes (CTI, FORTH, IFE, NCT, NR, RAL and Sintef), as well as the QMUL University in the United Kingdom. The project was conducted in two stages: the main task in the first phase (2001-2003) was to develop an information evaluation platform and the primary objective of the second phase (2004-2007) was to improve CORAS functionalities.

CORAS complies with international standards, such as Austria Standard/New Zealand Standard (AS/NZS) 4360:1999 and ISO/IEC 17799-1:2000. However, its main basis lies in the risk management norm that establishes the international standard, ISO/IEC 31000:2009 – General Guidelines for Principles and Implementation of Risk Management, which, in turn, was based on the AS/NZS 4360 standard. The risk management process according to the ISO/IEC 31000 standard has the scope presented in Figure 2, which includes the CORAS stages.

Figure 2. ISO/IEC 31000 diagram
Source: IEC (2027)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Phase 1 - Identify the context: Aims to characterize the target of the analysis, and the focus and scope of the risk analysis. To what level is risk tolerable?
Phase 2 - Identify the risks: Identify threats and vulnerabilities to assets.
Phase 3 - Estimate the level of risk, evaluate risks: Not all risks can be eliminated, and thus we need to decide which risks need to be processed.
Phase 4 - Process the risks: Identify the processing of undesirable risks. Evaluate and prioritize different methods of processing.

CORAS uses identification and risk analysis tools originating from process accident prevention (safety), such as:

1. Hazard and Operability Study (HAZOP);
2. Failure Tree Analysis (FTA);
3. Failure Mode and Effect Criticality Analysis (FMECA);
4. Markov quantitative analysis methods (Markov);
5. CCTA risk analysis and management (CCTA *Risk Analysis and Management Method* – CRAMM).

The primary objective of CORAS is to improve traditional risk assessment methodologies in order to achieve better outcomes. Analysis is performed over eight stages.

Table 2. 8-stage analysis

Context	1. Analysis preparation (scope definition); 2. Definition of targets; 3. Detail of origin (asset diagram); 4. Approval of detail of the objective;
Risk assessment	5. Risk identification (threat diagram); 6. Risk estimate (threat diagram); 7. Risk assessment (risk diagram); 8. Risk processing (processing diagram).

CORAS is the risk analysis method that identifies, analyzes and describes risks in standardized language. The CORAS structure can be split into three different instruments:

1. **Risk modeling language:** Graphs and textual syntax;
2. **Method:** Description of the safety analysis process and guidelines for creating CORAS diagrams;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

3. **Tool:** For documentation, maintenance and communication of the risk analysis outcomes.

CORAS method resources:

1. Open-source solution;
2. Free updates and software;
3. Supplied with five risk assessment methods, including HAZOP, FMECA, Markov analysis and CRAMM;
4. Portable with XML standard;
5. In modules, which facilitate the inclusion of new functionalities;
6. Integrated with three main eXtensible Markup Language (XML) data models, including:
   a. XML Metadata Exchange (XMI) standardized per Object Management Group (OMG);
   b. Compatible with XML, formatted risk assessment indicator data;
   c. Intrusion Detection Messaging Exchange Format (IDMEF) by the Internet Engineering Task Force (IETF).

Furthermore, CORAS UML and Unified Process (UP) are applied in risk assessments for information security and process safety.

The CORAS language is a graphic modeling language for documentation, communication, security threat and risk scenario analysis. In risk analysis, it is common to use the structured brainstorming technique in meetings to obtain information. In these brainstorming sessions, the CORAS language is applied to create threat and risk scenario models. One of the advantages of using the CORAS language in brainstorming session is to promote standardization in a heterogenic environment, in which many people with specific knowledge are involved. The CORAS language improves the efficiency of the analysis process, as well as the quality of the outcomes obtained. According to Lund, Solhaug and Stolen (2011), standardization is facilitated mainly by the limited use of icons to represent the different environments, such as described in the Table 3.

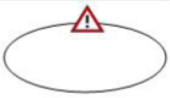
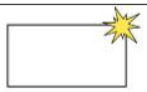
3.7. MTBF

Mean time between failures (MTBF) is the reliability parameter of a component, measured between the initial functioning timepoint and the occurrence of an incident that causes a stoppage in the regular functioning of this system (unavailability). The value is normally given by the manufacturer of the component in its technical specifications and it indicates, in accordance with the testing procedure employed, the mean time between failures of that product in the manufacturer's laboratories.

In this study, an assessment of the failure probability and unavailability time was made for the system under analysis, taking into account the data provided by the suppliers of the components and the parameters referenced by the IEEE 493-2007 standard.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Icons representation

	Assets: something of value for the interested party that requires protection.
	Internal threats: unconscious – a potential cause of an undesirable incident.
	External threats: conscious.
 Threat (non-human)	Non-human threats.
	*Stakeholders:* people or organizations that may be affected, or that may influence an assessment or activity under analysis.
	Vulnerability: weakness that may be exploited by threats.
	Threat scenario: something that may occur because of a threat that exploits a particular vulnerability.
	Undesirable incident: something that we want to avoid, because it may cause damage to assets.
	Risk: the possibility of something happening that will impact assets.
	Treatment scenario: failure correction tools and techniques.

Source: Author.

4. PROPOSED SOLUTION

Considering the entire process pertaining to the Utilities industry for water treatment and based on the FINESCE Smart Energy platform, we propose a new architecture involving enabling technologies and approaches to digital transformation. As stated in the introduction, the pyramid architecture for automation is based on the 5-layer concept. For the purposes of illustration, Figure 3 demonstrates the water treatment plant inside this current model.

Using enabling technologies and approaches to digital transformation, we propose a new collaborative architecture based on 3 layers, rather than the pyramid-based scheme. The new high-level architecture can be seen in Figure 4, which works as described below:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Pyramid architecture of an ETA (water treatment station)
Source: Author

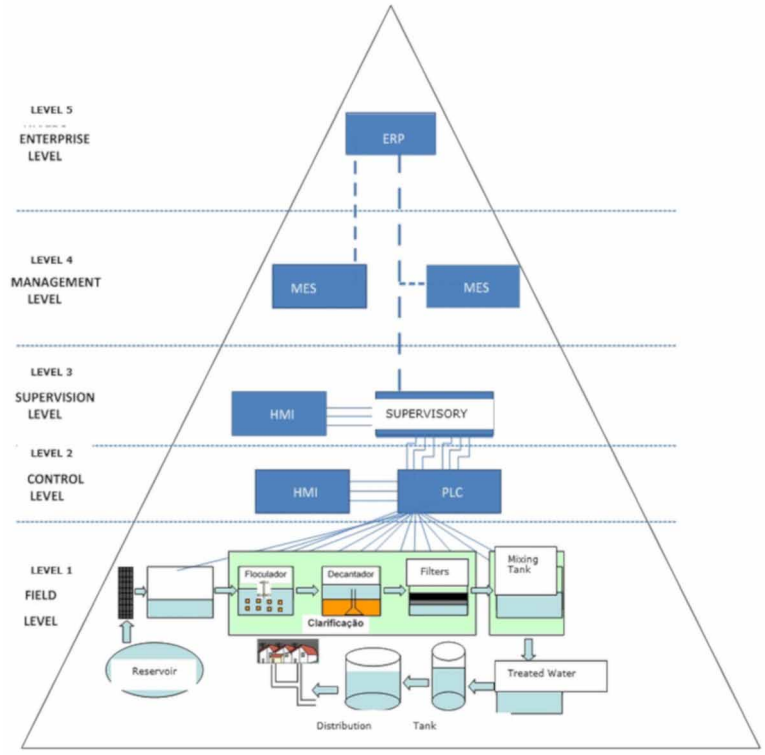
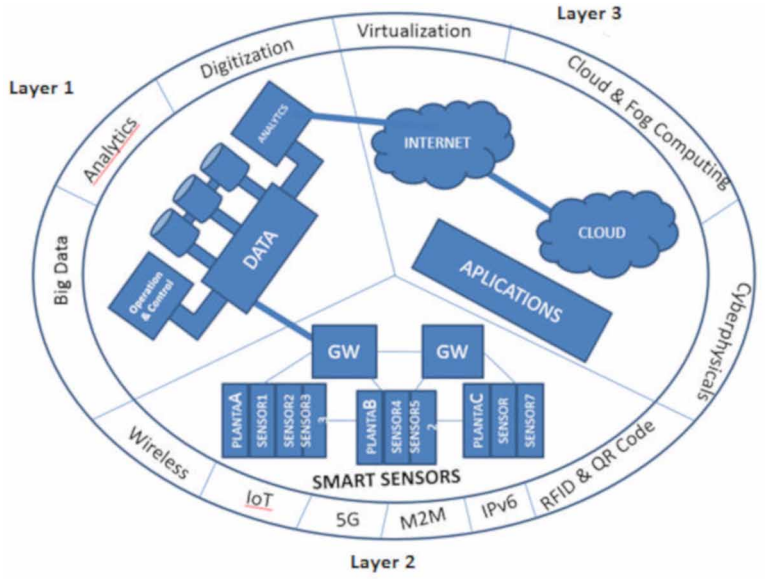


Figure 4. New proposed high-level architecture
Source: Author



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Layer 1: The edge layer, called edge computing. This layer contains the cyberphysical and IoT systems, as well as their communication with higher layers.
Layer 2: This layer contains plant operation and control, which can be executed manually – by operator decision – or automatically, by means of a machine learning decision algorithm. This layer also contains the data for managerial decisions.
Layer 3: Applications with real-time interaction on the factory floor and reorganization according to demand or climate conditions.

In order to enable a discussion regarding the new model, migration of the water treatment system to this new architecture was undertaken whilst taking into account the following levels of automation described in Table 4.

Table 4. Activation of the ETA

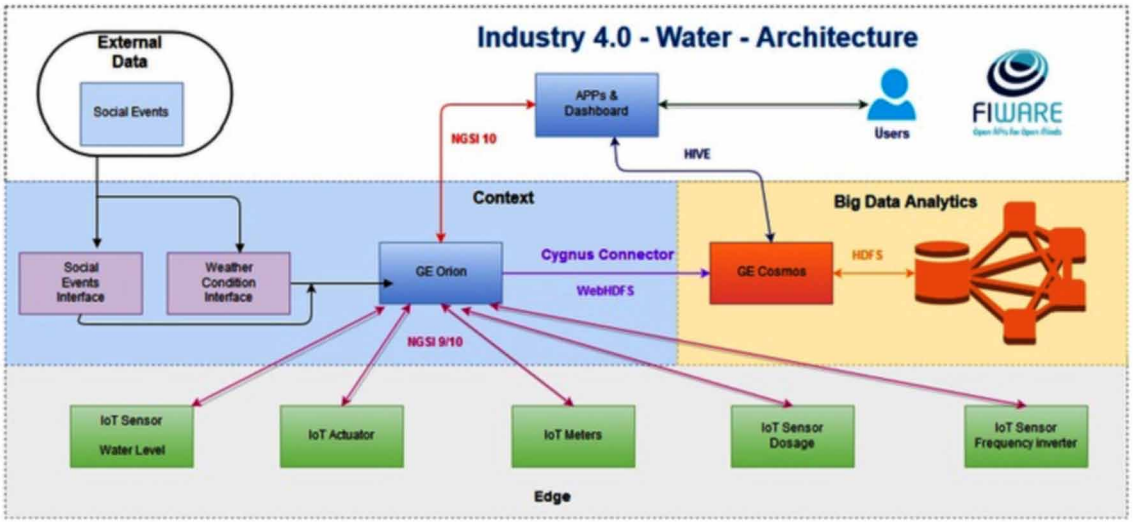
Id	Stages	Physical Action	Analysis	Non-Conformity	Action
01	Catchment	Activation of the pump, valve, level sensor and dosing	Turbidity, pH and DO	Provide a corrective solution	Manage pre-dosing of calcium hydroxide Manage dosing of Aluminum Polychloride Manage pre-chlorination
02	Flocculation	Pump, Level sensor, dosing and frequency inverter	Loss of flocculation	Provide a corrective solution	Apply normalization solution by identifying which dose is required (calcium hydroxide, aluminum polychloride or pre-chlorination)
03	Decanting	Pump, level sensor and dosing	Loss in decanting	Provide a corrective solution	Apply normalization solution by identifying which dose is required (calcium hydroxide, aluminum polychloride or pre-chlorination)
04	Filtering	Pump and level sensor	Filtering within the norm	Wash filter	Stop pump, empty filter and start manual washing
05	Disinfection	Pump, level sensor and dosing	Water quality	Control addition of fluorine and pH	Dose recommended value
06	Distribution	Pump and level sensor	Water loss	Identify leak	Activate maintenance team
07	Consumption	Consumer's meter	Consumption	Identify losses and/or leaks	Activate maintenance team

Source: Author.

The choice of FIWARE among CRYSTAL and SOFIA2 was due to the fact that it is an open-source innovation ecosystem that provides programmers with the functionalities and properties necessary for the development of cloud solutions and applications, and it enables the provision of open data and communication of its specific requirements. Furthermore FIWARE is partnering with the Global City Teams Challenge 2016 programmer, GCTC2016, which is being organized under the lead of the U.S. Department of Commerce's National Institute of Standards and Technology (NIST). Based on these definitions and in the FINESCE energy platform, the following architecture was devised (Figure 5).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Architecture using FIWARE for water treatment based on Industry 4.0
Source: Author



Compared to traditional architecture, the gains from use of this architecture are:

1. Use of historical data to predict necessities, collaborating with the entire supply chain in order to fulfill demands;
2. Management of water sources and exert control and use defined by automated processes from a remote location;
3. Integrate non-water related data sources, such as: government, research and industry, in a general manner, in order to accompany the conservation and continued improvement efforts of the existing operation;
4. Increase the visibility of installations of assets and improve performance and data analysis using dashboards;
5. Use of real-time data regarding climate events in order to anticipate changes in resource availability or requirements;
6. Provide consumers with greater control and visibility of consumption and residential and municipal resources in order to manage resource conservation efforts;
7. Use of data to discover improvements in procedures and thus serve citizens more effectively;
8. Improvement in the accuracy of water meter readings with greater frequency.

5. METHODOLOGY

Methodology is based on the following stages, and research planning includes theoretical and documentary study; consequently, an empirical study with the development of a case study for intelligent water use employing enabling technologies:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Identification of the critical systems and components, assessment, quantification and modeling of a water treatment and distribution plant following the classic 5-layer pyramid model;
- In the theoretical and documentary study, an analysis of the enabling technologies and digital transformation was undertaken in light of Industry 4.0 (Schwab, 2016);
- Definition of the platform of use, with enabling technologies as a reference, visions from around the world for digital transformation and the FINESCE energy platform (Finesce, 2016);
- Validation of the proposal through use of the platform in experiments;
- Risk analysis, proposing a methodology for risk management, with the CORAS method as the main basis. During this research, it was noted that CORAS does not include several important stages for full risk management, especially with regard to the risk estimate, quantitative method and inspection with auditing of the process risk management system.

This study assumes that the concessionaire of the case study has an operational automated sanitation plant; therefore, the methodology for risk and failure management of the process in this environment will be validated, with emphasis on automated technology.

The conventional analysis of reparable system failures establishes the study of two random variables of interest: Time Between Failures (TBF) and repair time (RT). It is assumed in this work that any failure will be immediately repaired, and that this maintenance is capable of returning the item that failed (component or system) back to its original condition, with the same characteristics as a new component. As a consequence, the distribution of the random Time to Failure (TTF) variable will be considered equal to the distribution of the random TBF variable.

The proposed methodology performs the risk/failure analysis based on mathematical modeling for MTBF and the Markov chain, using the history of the existing base in the SCADA system.

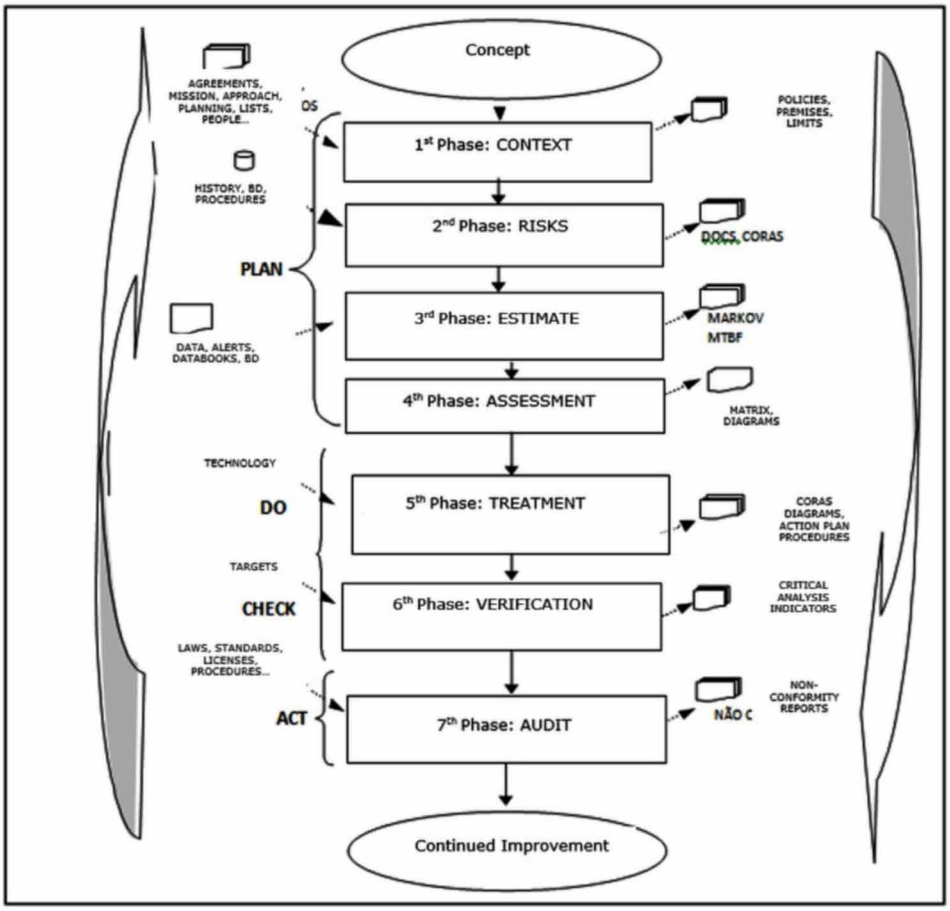
The main point of risk management is to discover problems, and then to diagnose risks, find out where they occur and how to resolve them; finally, they need to be audited, taking into account the entire process as a cyclical flow. Risk analysis starts with a description of the situation, indicating potential threats, their consequences and how they can be avoided. A seven-phase methodology for risk management is considered in this thesis, involving a definition of the context, risk identification, risk estimate, risk assessment, treatment, inspection of outcomes and periodic follow-up audits, in a continuous flow based on the PDCA, according to Figure 6.

The methodology begins with a characterization of the process by describing the environment it is linked to, its mission, cultural issues and its requirements. Phase one (1st Phase) is the context definition stage, the time point at which the basic parameters are defined, through which risks that need to be managed and the scope of the rest of the risk management process will be identified. The criteria to be used in the identification, assessment, impact and acceptance of the risks will also be defined. The definition of the context takes into account all the relevant information about the organization that is relevant for defining the context of safety risk management.

The main step towards obtaining the context is the correct application of techniques such as HAZOP, which enable a description of the objectives, premises and criteria of the environments that will be used to determine the risks pertaining to the process. These criteria involve determining the safety consequences and the methods used for risk analysis and assessment.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 6. Risk management methodology cycle
Source: Author



The next step (2nd Phase), pertains to identification of the risks, according to Brandão and Fraga (2008) and this is one of the most critical stages, because any risks that are not identified will not subsequently be analyzed or treated. The purpose of this stage is to determine the events that may cause potential losses and it should be clear how, where and why a loss may occur. Identification must include the risks that are and are not under control of the study process. In practice, risk identification is much more complex, because the information is almost always based on subjective experience and criteria of those responsible for conducting the project. (Brandão & Fraga, 2008). Risk identification involves identifying threats, existing controls, vulnerabilities and consequences. It was in this phase of the project that the CORAS method made the most significant contribution to the development of the risk analysis, as outlined in Section 4.4 of this thesis.

The third phase (3rd Phase) of the methodology pertains to estimates; in this stage, data are produced that will support the decision about which risks will be treated and the treatment methods to be adopted, taking cost efficiency into consideration. Accordingly, it involves considerations regarding the origin of the risks, their consequences and their probability of occurrence, as well as a reliability study and process availability. The estimate may be either qualitative or quantitative, or even a combination of the two.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The qualitative estimate uses a scale with qualifying attributes that describe the magnitude of the potential consequences and the probability that these consequences will occur, and they are duly represented in the CORAS tool, while the quantitative estimate adopts mathematical modeling in order to determine risks, with failure and process reliability estimates and an analysis of the availability of process components. A combination of two types of estimates is adopted for this study. Outputs from this phase of the risk management methodology are recorded in FMEA forms, MTBF spreadsheets, Markov models and consolidation in the CORAS, as detailed in the following sections.

The fourth phase (4th phase) of the methodology pertains to assessments; the purpose of the risk assessment is to facilitate decision making, based on outcomes of the risk analysis in phases 2 and 3 of the methodology. It is necessary to define the priorities and the real necessity for treating the risks analyzed. This assessment involves a comparison of the risk levels encountered, with the criteria established when the context was considered. In this phase, it is relevant to evaluate corporate security, the impacts of the decision made on the selection of the accepted risks. However, nothing will prevent a new assessment from being made at any time and new risks being treated, because the risk management process is a dynamic one.

The fifth phase (5th phase) pertains to the risk treatment, including identification of the treatment options, assessment of the options and the costs of preparing for implementation of the treatments in the study scenario. This stage is equivalent to the state of risk mitigation of the SP800-30 specification or even the ISO/IEC 31000. Treatment is identified in the CORAS treatment diagram, associated with the possible scenarios of incidents that cause them. Treatment options are related to each of the risks. There are four potential options for the risk treatment: reduction, retention, prevention and transfer. The residual risks are identified at the end of the treatment process. If these risks are not acceptable, treatments may be reworked or, alternatively, the entire risk management process may be revised. (Brandão & Fraga, 2008). The implementation of treatment may or may not involve the acquisition of technologies, or it may simply involve the creation of standards, training of personnel and development of internal rules to be followed.

The verification phase (6th phase) involves monitoring and verification of the outcome; therefore, it is essential for the risk management process, because risks are not static and must be monitored in order to ensure the efficacy of implementation strategies and the outcome of the management mechanisms used in risk treatment. Thus, the monitoring process must be ongoing and dynamic. In addition to continuous monitoring, organizational or external changes may alter the context of the analysis, leading to the necessity for a full revision of risk management.

The last phase of the methodology (7th phase) pertains to the audit, which we consider to be very important for ensuring the efficacy of the risk management and that the process is kept up-to-date. The audits may be periodically initiated by an internal team or undertaken by third parties. The purpose of internal audits is to verify, based on objective evidence, whether the following conditions occur satisfactorily:

- The operational procedures and instructions are adequate and effective;
- The areas have been acting in accordance with the instructional documents and checklists have been completed;
- The alert reports and logs are being assessed.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Any non-conformities (real and potential) detected must be recorded in accordance with a specific procedure, including initiatives for registration and actions to conclude them. A critical analysis of the non-conformities is indicated and, if necessary, their causes are investigated, corrective actions are defined and implemented and amendments to procedures are recorded. After the implementation of corrective actions, their efficacy must be evaluated before they are concluded.

Therefore, the first four phases are actually sufficient to determine the impact of risks and they are included in the CORAS method, or even by making an analogy with the PDCA quality cycle, pertaining to the planning phase, while phases five and six (execution) correspond to the process of implementing treatment, risk mitigation and verification of the outcome, and in the last phase, periodic auditing is indicated, which must be performed in order to ensure that the risk analysis system is always up-to-date and that it reflects the actual status of the operational system.

Each stage of the risk management process must be properly documented. Suppositions, methods, origins of data, analyses, outcomes and rationale for decisions made must be recorded. The reports produced must be as succinct and objective as possible. (Brandão & Fraga, 2008).

The suggested cycle in this work, if implemented, will lead to true risk management, and not just to a one-off assessment of the risk in a system. The difference is that, in a one-off risk assessment, normally a risk is only identified and estimated, whereupon its existence is considered, whereas, in risk management, in addition to being identified, the risk is treated and efforts are made to prevent it from happening.

6. OUTCOMES AND CONCLUSION

This research project was based on the necessity for assessing digital transformation in order to implement improvements in the traditional automation and control architecture of Utilities industries and the associated risk analysis. Up-to-date bibliographical research was undertaken in order to implement this proposal, covering a wide range of subjects related to digital transformation; accordingly, enabling technologies were studied that allow for this paradigm shift. It has been concluded that the new technologies that enable this change must work in a collaborative and integrated manner, because the complete solution for digital transformation depends on correct functioning of enabling technologies, including: Internet of Things, Machine Learning, Cloud and Fog Computing, cyberphysical systems, M2M, 5G and big data analytics. The approaches that guide this digital transformation around the world have also been studied, as well as research into work related to the subject in question. Special attention was paid to the Industry 4.0 approach, due to its pioneering and unique nature.

Based on this initial analysis, it was decided to apply the concepts of digital transformation to the Utilities industry. The choice of this segment was due to the fact that water treatment and distribution is more widespread among citizens, rather than being restricted to a segment of traditional industry. Additionally, and during this study, a platform was encountered for energy, where the concept of intelligent cities was the starting point; however, no platforms were found for the processing and/or management of water consumption. Accordingly, this study intends to contribute to the issue of water treatment and distribution in intelligent cities, combining with other equally important priorities.

Based on this lack and the need for contribution, a visit was made to a water treatment and distribution unit. The purpose of this visit was to conduct interviews regarding the process of generating the documentation, flow charts and steps for a correct understanding of the entire water treatment and distribution cycle. The study is intended to contribute to knowledge regarding the operation of a water distribution

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

station and the characterization process enables knowledge to be gained regarding industrial equipment and the system for managing and acquiring data, as well as the protocols used.

The classic 05-layer architecture has been improved based on this research regarding water treatment and distribution linked to studies of enabling technologies and approaches to digital transformation, and it now comprises 03 layers employing enabling technologies by means of an open-source innovation ecosystem called FIWARE, which provides the functionalities and properties necessary for the development of cloud solutions and applications, permitting the availability of open-source data and communication of its specific necessities.

The improvement in the architecture was put to the test within the concept of intelligent cities and the improvements outlined below were attained:

- All decision making was automated, based on decisions made by machines with known values as parameters;
- Integration of the different components and manufacturers, because this is an open-source architecture with an equally open communications protocol;
- Use of historical data to predict necessities, collaborating with the entire supply chain in order to fulfill demands;
- From a remote location, plant management, control and use was defined by automated processes;
- General integration of data sources not related to water, such as: government, research and industry, in order to keep up with conservation efforts and continued improvement of the existing operation;
- Using dashboards, it is possible to increase visibility of the asset installations and improve data performance and analysis;
- Use of real-time data regarding climate events in order to anticipate changes in resource availability or requirements;
- Provide consumers with greater control and visibility of consumption and residential and municipal resources in order to manage resource conservation efforts;
- Use of data to discover improvements in procedures and, thus, provide better services to citizens;
- Accuracy improvements by more frequent water meter readings.

Risk management in a sanitation plant focused on process safety, information security and continued improvement has been applied to the new model. However, it was ascertained that use of the CORAS method alone was not sufficient for the development of risk management, because CORAS is limited to a diagnosis of risk analysis and documentation of the treatment; i.e., it is very occasional and it does not permit monitoring, verification and auditing of risk management in the environment.

However, for the purpose of risk diagnosis, CORAS provided excellent outcomes, enabling a reduction in analysis time due to ease of use of the tool and standardization of process implementation. In addition, CORAS permitted documentation with the use of several techniques to be consolidated in a single tool.

The development of a seven-phase risk management methodology enabled implementation of a targeted, objective and ongoing risk management program without any complications, in addition to facilitating the consolidation of several characteristics of already existing tools.

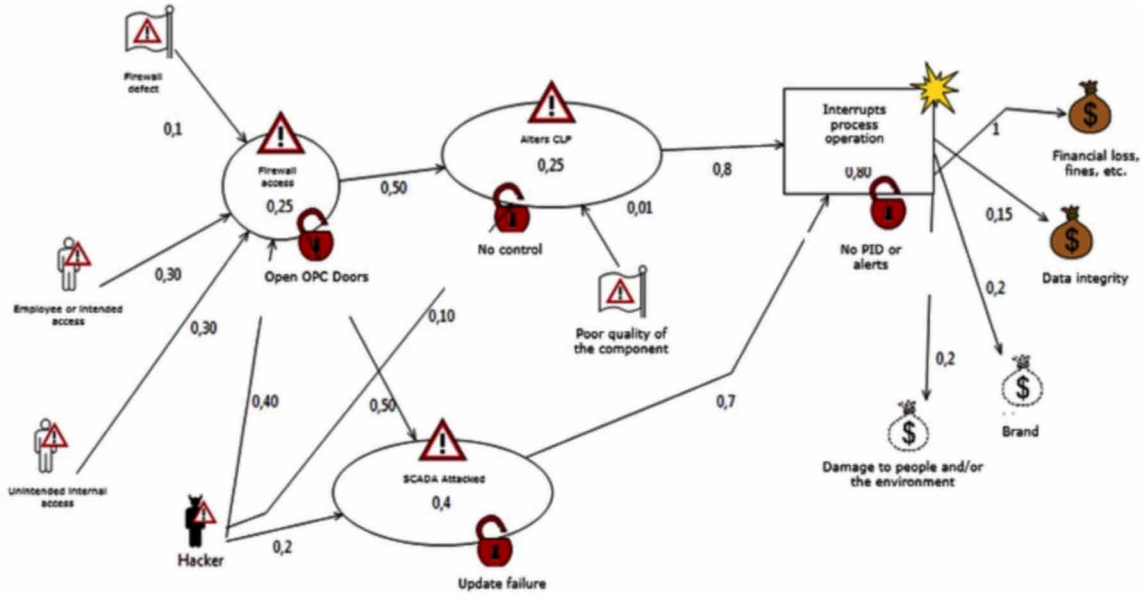
The operational safety and efficiency of sanitation systems are significantly affected by their automation bases and consequently the availability and vulnerabilities of their equipment. Understanding the interface between information technologies (IT) and automation technologies (AT) was of particular

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

relevance in achieving the conclusions obtained in this study, because the risk management developed included the different stages of the plant process, with security and safety analysis.

It was ascertained that a basic vulnerability could cause major losses to an organization or even to the community surrounding a plant; however, these risks are predictable and quantifiable in a risk management project, as presented in the Figure 7, during one of the stages of implementation of the methodology.

Figure 7. Risk analysis
Source: Author



The simulation of reliability of several plant components was relevant for decision making, especially for maintenance management regarding the list of replacement parts or even the technology replacement process, such as the change in the CLP model, because the studies of wear failures and failures that occur before wear present a mathematical model that quantifies the unavailability time of equipment in hours.

Modeling with the Markov chain for verification of the state of components and the behavior of the process, developed during validation of the methodology, presented favorable outcomes, because the flexibility in executing the simulation including new states, and consideration of the interdependence between plant equipment favored comprehension and quantification of the connection between field instruments and the pumping system, including in terms of stoppage time and the frequency quantification process, through the execution of probability analyses.

A positive outcome was also ascertained in the use of tools such as the CARMS software program for simulation of the Markov chain, enabling use of this mathematical modeling in systems of greater complexity, and in many states, as well as providing the necessary information regarding the idle period for the environment under analysis in the risk management methodology.

The FMEA stages executed consolidated in CORAS were relevant in the verification of the subjective items and in the qualitative analysis of the operational process of the sewage treatment station.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

With the application of the risk management methodology, it was easy to ascertain in the simulations executed by the mathematical models that small investments can produce significant returns, in large part due to a reduction in costs with operational unavailability or even reduced billings (which, in this case, due to the evaluable QID grade, enables higher financial penalties to be levied under the agreement). One of the outcomes of the implementation of the risk management methodology was precisely the improvement of performance indicators over the last 12 months, because a considerable margin of progression has been recorded in this indicator with a mean increase of 22% in plant availability, resulting solely from one improvement program defined by risk management.

Among the outcomes ascertained during validation of the methodology, the supply of quantitative information that aids in decision making was observed; for example, in the case study, there was a necessity to assess the time information between failure, criticality and repair time in order to aid in decision making, with regard to the option for treatment architecture adopted in the risk mitigation of harmonics in the study environment. Another favorable attitude observed in risk management was the flexibility that the methodology offers in emphasizing the most relevant phase according to the profile of the study scenario, and including a social risk analysis. It should also be emphasized that the methodology flow is continuous, thus favoring revisions of maintenance, safety and quality, as well as supervision and control efforts, without forgetting the motivational and cultural aspects that, as is well known, induce a potential for continued improvement that is difficult to quantify.

Therefore, the risk management flow developed throughout this study demonstrates that it is also able to assess systems dominated by uncertainty and scarcity of reliable data. It is also apparent that there is a window of possibilities to conduct risk management in similar plants using analysis codes, reusing models defined for equipment and diagrams developed in the CARMS and CORAS, thus facilitating the reliability analysis process of the different processes in sanitation plants.

Finally, it is possible to use the new platform obtained in this study to generate benefits with regard to conscientious consumption and management of water resources. It may be extended, with adaptations, to other equally critical environments, such as energy supply, nuclear power plants and the petrochemical industry, among others.

REFERENCES

Almeida, J. R., Jr. (2003). Segurança em sistemas críticos e em sistemas de informação: um estudo comparativo [Doctoral dissertation]. Escola Politécnica, Universidade de São Paulo, São Paulo.

Ashton, K. (2009). That ‘internet of things’ thing. *RFiD Journal, 22*(7), 97-114. Retrieved from http://www.rfidjournal.com/articles/view?4986

bism@rt. (2017). Oldest Internet Of Things Objects In The World. Retrieved from https://bismart.com/en/oldest-internet-of-things-objects-in-the-world/

Bounfour, A. (2016). *Digital Futures, Digital Transformation, Progress in IS: From Lean Production to Acceluction.* Cham, *Switzerland*: Springer International Publishing. doi:10.1007/978-3-319-23279-9

Brandão, J. E. M. S. (2008). *FRAGA.J.S. Gestão de risco. In SBSEG2008 VIII Simpósio Brasileiro em Segurança da Informação de Sistemas Computacionais.* Santa Catarina: UFSC.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Collin, J., Hiekkanen, K., Korhonen, J. J., Halén, M., Itälä, T., & Helenius, M. (2015). *It leadership in transition-the impact of digitalization on finnish organizations*. Helsink-Finland: Unigrafia Oy.

Fiaschetti, A., Pietrabissa, A., & Delli Priscoli, F. (2015). Towards manufacturing 2.0: An innovative architecture for the Factory of the Future. In *2015 European Conference on Networks and Communications, EuCNC 2015* (pp. 450-454). 10.1109/EuCNC.2015.7194116

FINESCE. (2016). The FINESCE Smart Energy Platform Seventh Framework (n. 604677).

Wang, S., Wan, J., Li, D., & Zhang, C. (2016). Implementing Smart Factory of Industrie 4.0: An Outlook. *International Journal of Distributed Sensor Networks*, *12*(1).

International Electrotechnical Commission (IEC). (2009). *31000: general guidelines for principles and implementation of risk management*. Switzerland: ISO/IEC.

Key Enabling Technologies. (2016). European Commission. Growth. Internal Market, Industry, Entrepreneurship and SMEs. Retrieved from https://ec.europa.eu/growth/industry/key-enabling-technologies_en

Khan, S. (2016). *Leadership in the Digital Age - a study on the effects of digitalization on top management leadership*. Shahyan Khan.

Lee, J., Bagheri, B., & Kao, H. A. (2015). A Cyber-Physical Systems architecture for Industry 4.0-based manufacturing systems. Manufacturing Letters, *3*, 18–23. doi:10.1016/j.mfglet.2014.12.001

Lee, J., Kao, H. A., & Yang, S. (2014). Service innovation and smart analytics for Industry 4.0 and big data environment. *Procedia CIRP*, *16*, 3–8. doi:10.1016/j.procir.2014.02.001

Loural, C. de A. (2014, June 26). Um panorama de novas tecnologias e seus impactos na indústria. Retrieved from https://www3.eco.unicamp.br/neit/images/stories/arquivos/Novas_tecnologias_e_seu_impacto_na_industria_-_v140626.pdf

Companhia Ambiental do Estado de São Paulo. (2003). Manual de orientação para a elaboração de estudos de análise de riscos. São Paulo, Spain: Companhia Ambiental do Estado de São Paulo.

Mcnabb, D. E. (2005). *Public utilities: management challenges for the 21st century*. Edward Elgar Publishing. doi:10.4337/9781845426811

Mitchell, T. M. (1997). *Machine Learning*. New York, NY: McGraw Hill.

Moraes, C. C., & Castrucci, P. D. L. (2007). *Engenharia de automação industrial*. Rio de Janeiro: LTC.

Mounce, S. R., Pedraza, C., Jackson, T., Linford, P., & Boxall, J. B. (2015). Cloud based machine learning approaches for leakage assessment and management in smart water networks. *Procedia Engineering*, *119*, 43–52. doi:10.1016/j.proeng.2015.08.851

Muhammad, S. Y., Makhtar, M., Rozaimee, A., Aziz, A. A., & Jamal, A. A. (2015). Classification Model for Water Quality using Machine Learning Techniques. *International Journal of Software Engineering and Its Applications*, *9*(6), 45–52. doi:10.14257/ijseia.2015.9.6.05

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

NIST. (2011). The NIST Definition of Cloud Computing Recommendations of the National Institute of Standards and Technology.

Chang, W. L. (2015). NIST Big Data Interoperability Framework: Volume 1. *Definitions.*

Oren, G., & Stroh, N. Y. (2013). Mathematical Model for Detection of Leakage in Domestic Water Supply Systems by Reading Consumption from an Analogue Water Meter. *International Journal of Environmental Sciences and Development*, *4*(4), 386–389. doi:10.7763/IJESD.2013.V4.377

Public Utilities Board Singapore. (2016). Managing the water distribution network with a Smart Water Grid. *Smart Water*, *1*, 1-13. Retrieved from http://smartwaterjournal.springeropen.com/articles/10.1186/s40713-016-0004-4

Sadeghi, A. R., Wachsmann, C., & Waidner, M. (2015). Security and privacy challenges in industrial internet of things. In *2015 52nd ACM/EDAC/IEEE Design Automation Conference (DAC)* (pp. 1-6). IEEE. 10.1145/2744769.2747942

Samuel, A. L. (1959). Some Studies in Machine Learning Using the Game of Checkers. *IBM Journal*, *3*(3), 535–554. doi:10.1147/rd.33.0210

Schwab, K. (2016). The Fourth Industrial Revolution (VINT research report).

Shrouf, F., Ordieres, J., & Miragliotta, G. (2014). Smart Factories in Industry 4.0: A Review of the Concept and of Energy Management Approached in Production Based on the Internet of Things Paradigm. In *2014 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)* (pp. 697-701). IEEE.

SMART CITY. (2016). Plataforma para transformação digital. Retrieved from http://www.pad.lsi.usp.br/ptd

Soldatos, J., Gusmeroli, S., Malo, P., & Di Orio, G. (2016). Internet of Things Applications in Future Manufacturing. In *Digitising Industry-Internet of Things Connecting the Physical* (pp. 153–183). Digital and Virtual Worlds.

SWSS. (2018). Smart Water Supply Systems. Retrieved from http://www.adp.pt/pt/sustentabilidade/inovacao-e-desenvolvimento/life-swss/?id=51

Tamaki, H., Sanches, G., & Gonçalves, O. (2006). A medição setorizada como instrumento de gestão da demanda de água em sistemas prediais – Estudo de caso: programa de uso racional da água da Universidade de São Paulo. Associação Nacional de Tecnologia do Ambiente Construído.

Torres, J. M. (2008). Analyzing risk and uncertainty for improving water distribution system security from malevolent water supply contamination events [Master's Thesis]. Office of Graduate Studies of Texas A&M University, TX.

Verma, P., Kumar, A., Rathod, N., Jain, P., Mallikarjun, S., Subramanian, R., ... & Sundaresan, R. (2015, October). Towards an IoT based water management system for a campus. In *2015 IEEE First International Smart Cities Conference (ISC2)* (pp. 1-6). IEEE.10.1109/ISC2.2015.7366152

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Weiser. (1992). Ubiquitous Computing. Retrieved from http://www.ubiq.com/hypertext/weiser/UbiHome.html

Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading Digital: Turning technology into business transformation*. Boston, MA: Harvard Business Press.

This research was previously published in Technological Developments in Industry 4.0 for Business Applications; pages 304-330, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 43
The Transformation of the Public Administration in the Multi-Level Governance Era

Elif Yucebas
Dokuz Eylul University, Turkey

ABSTRACT

The speed of transformation and development in information and communication technologies is an important fact triggering the restructuring process of public administration. The developing countries have become integrated into this process through public administration reform methods presented by international institutions. Transfer of information and communication technologies have become important for modernizing public administration organizations of developing countries and adapting them to the global system. In multilevel governance, use and implementation of the information technologies enabling network structuring between institutions have a particular importance. In this sense, the purpose of this study is to present the process followed by Turkey for adapting information and communication technologies to public administration organization and provision of public services in the frame of a multilevel governance approach.

INTRODUCTION

Beginning from the second half of the 20th century, production processes have begun developing jointly with the information and communication technologies. Especially, this process has evolved towards the information society in developed countries. Increasing importance of research and development activities in production processes and creating added value has revealed the important function of information. Particularly considering the connection of information with technology, it has carried both the public administration organizations and economical developments to different direction. This difference has influenced the forms of service provisions, production processes, employment structures and development of sectors in economical sense.

DOI: 10.4018/978-1-7998-7297-9.ch043

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Multilevel governance is a concept focusing on integration of Europe as well as sharing of authority and policy making processes between supranational, national, local and regional actors. The concept which was among several disciplines during 1990s is a frame for member states through the White Book "EU Governance" prepared by the European Commission in 2001. In this report including fundamental principles of European governance is not only important for the member states but also has a particular importance for nonmember states. Openness, participation, accountability, coherence and efficiency principles basically emphasize the need for transformation in decision making processes between the public, private, citizen and non-governmental organizations.

The rapid development and transformation in information and communication technologies beginning from the second half of the 20th century has caused changes in the ways that states providing public services as well as lives of individuals. Low-cost and rapid access to services has forced the states to change their structure. This situation caused by the information and communication technologies has made it necessary to reorganize the relation between states and citizens. Especially the developing countries have amended several plans and programs in order to adapt their countries to this change and transformation process. Turkey is one of these developing countries which have been influenced from this process and trying to change its public administration structuring. There have been several changes in public administration of Turkey due to the impact of international institutions especially during and after 2000. The candidacy of Turkey in the European Union has accelerated the reform process in public administration.

In the first chapter of this study, restructuring process of public administration is taken into consideration by carrying out a literature scan on governance, multilevel governance and e-Government concepts. In the second chapter, transfer process of information and communication technologies into public administration field of Turkey is explained in the frame of national and international plans and documents. Finally, in the third chapter, the e-Government projects implemented in Turkey are taken into consideration.

BACKGROUND

Restructuring in Public Administration

One of the processes causing restructuring of governments in the 20th century is rapid development and expansion of information and communication technologies and the other one is transition from fordism to post-fordism which has reflections in production processes. The production processes shaped in the frame of Keynesian economy have revealed the functions of a government in the field of economy (Yucebas & Cobanoglu, 2017, p.746). The concept of restructuring can be described as radical changes of economic, politic and cultural institutions as well as transformation of the ways of thinking or paradigms assumed to be valid for these fields" (Şaylan, 2000, p.3). Another definition of restructuring concept is changing roles of a state and organizing accordingly in governance extent (Bayramoğlu, 2006, p.33). One of the principal developments in restructuring of a state is the welfare state practices. Functionalities of states have shaped in this frame and practices penetrating all aspects of society have been implemented. In this process, state is positioned through Keynesian economical policies as "having the capacity to intervene the economy as the regulator, producer and spender" (Şayan, 2000, p.10). In this process, state is a character personally undertaking production function and directing and intervening economy.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In the frame of restructuring of state, transition from fordism to post-fordism has caused changes in functions and functionalities of state. Fordism has been effective in international field as an accumulation regime shaping the society, culture, production and labor processes between 1914-1973 (Yucebas, 2014, p.8). The process began in 1914, accelerated in 1945 and continued its influence until the 1973 oil crisis. Fordism concept does not only indicate restructuring process in production sense but also for political, ideological, social and economical sense (Belek, 1999, p.59). According to Lipietz, fordism is correlated with modernity, bureaucratic system and rationality as well as being an accumulation regime (Lipietz, 2006, p.239). Technological developments have increased liquidity of capital and improved its capacity to reach new markets and enter new production fields and speed and competitiveness have become the fundamental conditions for sustainability of capital (Finkelstein, 2003, p.251). While the process of globalization has been transforming the structure and functions of state, development of new production sectors and production methods has increased liquidity of capital and the capital has rapidly become globalized and turned the world into a single market (Dunn, 1999, pp.189-190). On the other hand, state has become a corporate tool facilitating accumulation of global capital (Farazmand, 2001, p.445).

One of the impacts of structural crisis of fordism was upheaval of neo-liberal ideology (Tickell & Peck, 1995, p.368) and intervention of state on economy has begun to be questioned during that process. In the frame of neo-liberal policies, state has undertaken a passive role rather than an effective one and it has been requested from it to act to ensure distribution and reproduction of sources.

While, post-fordism has been taking place of fordism as a capital accumulation regime, it has become a process which does not only influence production but also the place and functionalities of state (Yucebas, 2014, p.11). The structural crisis of fordism began at the end of 1970s has changed accumulation regime and flexible production systems rather than global production have become prominent. Therefore, post-fordism is also called as "flexible accumulation". According to Harvey, flexible accumulation is emergence of new production sectors, new methods and new markets in financial service and significant acceleration in tempo of commercial, technological and organizational innovations (Harvey, 2003, p.170). In 1980s, capitalism has gone into a comprehensive economical and organizational restructuring process in this process where new information technology has undertaken an important role (Castells, 2005, p.77).

From Government to Governance

In the process of globalization, transformation of production processes along with the development of information and communication technologies have changed social state approach. States have lost their regulating powers in the fields such as transfer expenses, education and healthcare services related with redistribution of income which were a part of their social functions (Hobsbawn, 1996, pp.424-425). The functions of state in economical field have been discussed and its influence on the field of economy desired to be restricted through integration of capitalism in the process. While, the welfare state practice rapidly increases scope and diversity of public services and increasingly more sources are used through public bureaucracy, organization theory and operational approaches have begun increasing their importance within public administration discipline (Şaylan, 2000, p.11). Need for restructuring has especially revived searches for new organizational structures especially as a result of deficiencies of bureaucracies and restrictions on making innovations and showing flexibility (Özer, 2005, p.371). This restructuring become concrete in "new public operation" approach covering management of public sector in accordance with market mechanisms (Christiansen, 1998, p.273).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

At the first phase, the reforms in public administration have been implemented on unit and sector level in the fields as personnel and financing and during the second half of 1980s, have been tried to be implemented in a holistic approach in all public sector institutions as the "managerialist model" and this new approach has been identified as "new public management" (Osborne & McLaughlin, 2002, p.10). According to this approach, the public policies involving the whole society are determined in accordance with customer preferences and competitive conditions rather than through a pursuit for social conciliation. During 1980 and post-1980 period, new public operation approach which supports techniques and practices and growth and strengthening of private sector has been prevailing in public administration field.

During the era of social state, state has played an active and efficient role in economical and political fields. Economical interventions and market regulations have been implemented by states. Neo-liberal ideology has affected after the Oil crisis in 1973. During this era, the "small state, strong market" formulation was recommended and accordingly, it has become necessary to redefine the role of state (Güzelsarı, 2004, p.2). In this sense, state has withdrawn from its active economical and political role and turned into a tool ensuring permanence of order. Along with new public operation approach, traditional public administration approach has begun to be left behind and a market-oriented administration approach have become prevailing. New public administration approach includes efforts for downsizing government through reducing expenditures for public personnel and public services, localization of public services and functionalities (Wise & Szücs, 1996, p.43). According to Dreschler, especially along with the effect of Anglo-American impact, this approach has been imposed by International Financial Institutions such as the World Bank and UPF. Neo-liberal policies implemented by Thatcher and Reagan beginning from the 1980s and crisis of social welfare state have played a significant role in emergence of this approach and it has completed its evolution in 1990s (Dreschler, 2005, p.2). The key factor of new public operation approach is assigning functions of central government to departments and regulatory institutions acting as enterprises and implementing the "corporate governance" model of private sector by regulatory commissions (James, 2001, p.234).

While, governance describes the changing role and form of state, on the other hand it is a concept showing the entirety of mechanisms and new rules to ensure that change (Bayramoğlu, 2005, p.33). Some institutions have played part in forming and developing governance concept such as; DB, OECD and the United Nations Development Program (UNDP). The World Bank is important with regards to establishing the foundation of governance concept in corporate perspective. The concept has been used firstly in the Africa report of the World Bank, in 1989 (World Bank, 1989). The essential elements of the model have been determined in the World Bank's "1992 Governance Report" as; "public operation" (establishing a public administration mechanism governed as an enterprise), "accountability" (accountability against the served communities/clients), "transparency and informing" (World Bank, 1996, p. xiii). Governance confronts us as a coordination method based on mutual dependence of organizations, institutions or actors. Governance model denies the state-society contrast in the form of governing and governed. Instead, it expresses a "cooperative management" including mutual dependency at equal status (Bayramoğlu, 2005, p.31). Osborne and Gaebler have defined the government model they develop as the "entrepreneur government". An entrepreneur government should be privatized, have market orientation and undertake risks, employ its personnel in an enterprise approach and focus on performance measurement (Osborne & Gaebler, 1992, p.18). An entrepreneur government is a "competitive" government which is embraced by "societies". In order to become a government embraced by societies, it should enable societies "able" (Osborne & Gaebler, 1992, p.44). In this model, government is conceptualized as government acting in a competitive environment while it is also considered to assign some public services to communities and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

civil society for making societies able. The third sector segregation has been brought into the separation of public and private sector and a new network method called as public-private-civil partnership has been developed. Smith considers governance as a search for an identity and management model for the form of a new government with diminished social extent which has been segmentalized through neo-liberal reforms of 1980s and lost its global aspect and sovereignty (Smith, 1998, p.59).

Governance is established on ensuring participation of communities and non-governmental organizations and capital in public administration as stakeholders. The non-governmental organizations undertaking the function of providing public services conceptually undertake the function of supervising public administration through the principles of "accountability" and "transparency". However, in practice, some problems have arisen with regards to "accountability" and "transparency" of non-governmental organizations which have become a source user and service provider, therefore, the legitimacy and representation capacity of them have become an object at issue (Polidano & Hulme, 2001, p.300).

In the public administration reforms recommended by international institutions, government will adapt technological changes within the global economic system and reconfigure them in the frame of an efficiency, productivity and economy. In the report titled as the European Governance which has been prepared by the European Commission and published in 2001, five principles of good governance are as: Transparency, participation, accountability, efficiency and consistency. The purpose is to expand the governance mechanism in international, national and local level in the frame of these principles (Commission, 2001, pp.7-8). The World Bank defining good governance as the form of implementing political power in developing a country and managing social resources, describes the concept through administrative and managerial elements by emphasizing a technical aspect of governance expression (Güzelsarı, 2004, p.14). Good governance means a political and economical order with representation, participation and supervision in government, rule of law, decentralization, responsibility for transparency and accountability in administration, quality and ethics, rules and restrictions, alternative service provision methods in accordance with competition and market economy and finally an adaptation with the digital revolution of the world (Aktan & Özler, 2008, p.182). Specific processes and mechanisms in accordance with new functions of decentralization have been developed within the sense of "good governance". The management approach established based on domestic and foreign competition and functioning within the system of multiple networks has been structured on indigenization, making communities able and high-level financial decentralization (Pickvance, 1997, p.130).

In the frame of the principles (openness, participation, responsibility, effectiveness and coherence) indicated in the report titled as the European Governance, multilevel governance allows implementation, sustainability and development of these principles (EU, 2009, p.13). These principles:

Openness means more open operation of institutions. Especially, it covers explicitly communicating the decisions made by the EU and the member states to the public and making them accessible and understandable by citizens.

Participation: The EU should have an approach to cover the participation of central governments while developing and implementing its policies. This is considered as a factor determining the quality and efficiency of EU policies.

Accountability means, making the roles clear in legislative and executive processes. Each of EU institutions must explain and take responsibility for what it does in Europe.

Effectiveness is presenting required policies in accordance with clearly determined targets by considering their future impacts and past experiences if possible.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Coherence: The policies and the actions for implementing them should be coherent and easy to understand (Communities, 2001, p.7).

MLG aims that all local, national and supranational actors participate in the decision making process in accordance with their knowledge and abilities. According to the multilevel governance model, decision-making competencies are shared by actors at different levels rather than monopolized by state executives (Marks, Hooghe, & Blank, 1996, p.346). MLG theory derived frames have been applied to a wide set of issues spanning from political mobilization (politics) to policy-making (policy), to state restructuring (polity) (Ongaro, 2015, p.3). According to Piattoni, in multilevel governance, government focuses on the center and region, government and society and local and international relations (Piattoni, 2009, p.163).

The White Paper on European Governance (CEC 2001) started with force this reading of the complementarity between regional and local authorities, on the one hand, and civil society organizations, on the other, in the formulation, implementation, monitoring and evaluation of Community policies (Piattoni, 2009, p.174). Multi-level governance actually serves the fundamental political objectives of the European Union: a Europe of citizens, economic growth and social progress, sustainable development and the role of the European Union as a global player (EU, 2009, p.9).

MLG can be defined as a type of policymaking arrangements characterized by the simultaneous activation of governmental and non-governmental actors at different jurisdictional levels and such that the interrelationships thus created defy existing hierarchies and rather take the form of non-hierarchical networks (Piattoni, 2015, p.327). In this sense, multilevel governance is the form of cooperation institutionalized on network structuring of government with other actors in local, national and international fields.

Technological transformation is accompanied with organizational transformation and redesign of processes. Organizational transformation is emergence of new institutions for new forms of interaction between public institutions. The transformation in public service approach is formation of new processes in new service provisions. In addition, personnel should be educated and trained for adapting new technologies (Valdes, et al., 2011, p.177). In multilevel governance, use and implementation of the information technologies enabling network structuring between institutions have a particular importance.

E-Government

Since the middle of the 1990s, the internet has been carrying out for everyone a fundamental role in the access, dissemination and communication of information and knowledge (Gandia & Archidona, 2008, p.35). The developments in information and communication technologies have made the relations of government with its citizens, public institutions and organizations, central and local administrations different. Carrying out the services and duties for which local governments are responsible and citizens' duties and services to the state have gained importance in the sense of being fast, economic, uninterrupted and secure electronically (Yucebas, Bulut, & Dogan, 2017, p.412).

New public administration approach features performance measurement, accountability, productivity, effectiveness, result-orientation and transparency aspects of the relations between the government and the citizens, government and the private sector and government and other international institutions. E-Government faces us as a tool of governance for reforms in public administration. In the last few years, the use of IT in government has also responded to the need of a policy framework involving better public services and government operations, but also citizen engagement and interorganizational collaboration with public and private organizations, involving then the themes of democracy and governance as key results of IT implementations (Luna, Duarte-Valle, Picazo-Vela, & Luna-Reyes, 2015, p.167). As a result

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of technological advancement and economic changes, policy makers have had further incentive to shift the focus of information technology usage from internal managerial needs to external linkages with the public (Ho, 2002, p.436).

In the literature, e-Government concept is defined in different aspects by researchers and international institutions. Although, their order varies, the OECD basically gathers e-Government definitions in 3 categories in accordance with the strategies and objectives (OECD, 2003, p.63):

- E-government is defined as internet (online) service delivery and other internet-based activity such as e-consultation.
- E-government is equated to the use of ICTs in government. While the focus is generally on the delivery of services and processing, the broadest definition encompasses all aspects of government activity.
- E-government is defined as a capacity to transform public administration through the use of ICTs or indeed is used to describe a new form of government built around ICTs.This aspect is usually linked to Internet use.

  In 2003 report of the EU, e-Government is defined as; "the use of information and communication technologies in public administrations combined with organizational change and new skills in order to improve public services and democratic processes and strengthen support to public policies" (Communities C. o., 2003, p.7).

Chadwik defines e-Government as; E-government (electronic government) refers to the impact of information and communication technologies, particularly the Internet, on the values, processes, and outcomes of public bureaucracies. Chadwick also refers to three aspects while describing the e-Government concept which change the relations between the government and public institutions and organizations, the government and the private sector and the government and its citizens. (Chadwick, 2006):

- Government-to-government interactions are concerned with the use of technologies to enhance the internal efficiency of public bureaucracies, through, for example, the automation of routine tasks and the rapid sharing of information between departments and agencies.
- Government-to-business interactions typically involve the use of the Internet to reduce the costs to government of buying and selling goods and services from firms.
- Government-to-citizen interactions involve using the Internet to provide public services and transactions online, and to improve the design and delivery of services by incorporating rapid electronic feedback mechanisms, such as instant polls, Web surveys, and e-mail.

Ziemba gathers the e-Government concept under four titles in accordance with the definitions in the literature (Ziemba, Papaj, Zelazny, & Jadamus, 2015, p.88);

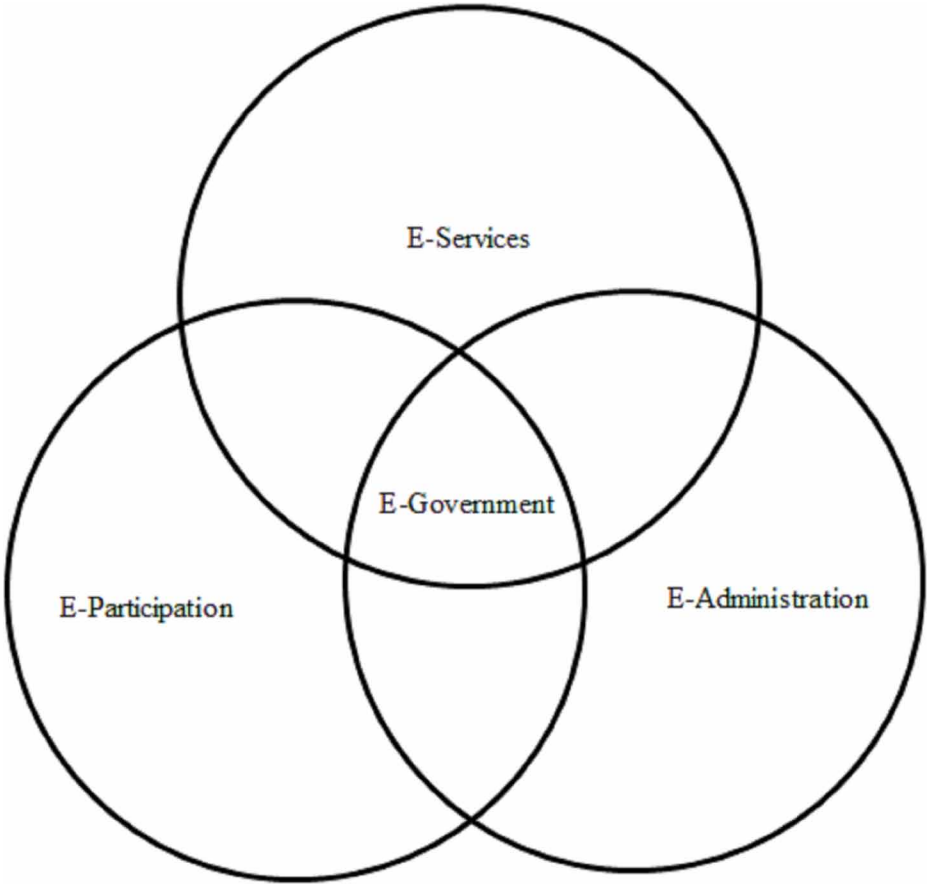
- Improving government processes by using ICT and government process management (e-administration)
- Providing government services electronically for citizens, businesses and employees and other stakeholders (e-government services)
- Improving transparency and democratic decision making as well as citizens' participation (e-democracy)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Developing cooperation, networking and partnership between government units, citizens and business (e-governance)

As it is seen, there are several definitions in the literature related with the e-Government concept. These definitions have common or different characteristics in the frame of the field they are related. A key reoccurring theme, however, centers on the transformational aspect of government in using technology (Curtin, 2007). In this sense, it can be said that the related fields of the E-Government concept are e-services, e-administrations and e-participation.

Figure 1. Relationship of e-government spheres (Curtin, 2007)



E-administration refers broadly to the internal mechanisms, processes, and structures of government. While the most immediate goal of most e-administration initiatives is to increase efficiency of administrative processes, a longer term and potentially more important goal is that of government transparency, one of the key hallmarks of democratic societies (Curtin, 2007). According to Torres; e-administration refers to back-office information systems that support the management and administrative functions of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

public institutions. It includes data and information management, electronic records maintenance, and the cross-departmental flow of information (Torres, Pina, & Royo, 2005, p.535).

E-Services: The delivery of public information and direct services to citizens via electronic channels has revolutionized the way many governments deliver and think about public services (Curtin, 2007).

E-Participation encompasses the range of engagement between citizens, as individuals and as members of groups, and their governments. This participation includes formal interaction, including e-voting, formal participation tools such as electronic input on policies, regulations and legislation, as well as informal participation mechanisms such as online citizen forums, direct access to government officials and policymakers (Curtin, 2007).

In the frame of these definitions, e-Government approach faces us an important stage in restructuring of public administration. This process has especially influenced developing societies more and e-Government policies and mechanisms have been transferred due to the influence of international institutions. In order to depart classical public administration approach and establish an accountable and participatory government structuring within an open cooperation, e-Government projects and practices have gained importance for developing countries. Turkey, as a developing country, has been influenced from the transformation in public management approach after the post 1980 era. During this era, Turkey has tried to change the organization and functions of the government through public administration reform formulas presented by international institutions in accordance with the development of information and communication technologies.

THE TRANSFORMATION OF PUBLIC ADMINISTRATION IN TURKEY

1980s and 1990s have caused a transformation in public administration paradigm as a reflection of changes in economic policies. While, the government used to be in the center of processes for establishing economic policies and decision-making processes, it has transformed into a structuring where citizens, private sector and non-governmental organizations participate in decision-making processes. Turkish public administration has been influenced from this change and it has gradually become coherent with the system by making changes on organization and operation and duties of public administrations.

Both the internal and external dynamics have influenced the process of restructuring public administration in Turkey. Necessity of restructuring Turkish public administration derives from deficiency of the public administration system to meet developing needs of the current age and public administration related expectations of society either through its organizational frame or its functional structure (Saran, 2005, p.39). The global effects experienced in international field are the external dynamics of restructuring process of Turkish public administration. The developing countries have been taken within the scope of this change in public administration field through the post-1980s "Structural Harmonization Programs" of international institutions (IMF, DB, OECD and UN). Turkey is one of the countries participated in the structural harmonization programs of international institutions for overcoming financial crisis. The reforms in public administration have been accelerated as Turkey has become a candidate to EU membership and establishing integration with the EU. In the frame of harmonization to the EU acquis, restructuring liabilities in social, economical, political and administrative fields were in question (Saran, 2005, p.40). Changes and innovations in information and communication technologies have influenced societies and administrations at global scale and have caused differentiations in provision of public services.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The reasons considered to be necessary for Turkey to participate in this process are indicated as below in the Ninth Development Plan, the Report of Specialization Commission of Information and Communication Technologies of the Ministry of Development (Ministry of Development, 2007, p.10):

- Limited resources allocated for public services,
- General displeasure in public opinion on Public Services,
- Reflections of managerial changes in private sector on public sector,
- New technologies which can increase service quality,
- Increasing expectations and demands of citizens due to improving quality in education and developments in communication technologies.

Global effectiveness of new public administration approach and rapid changes and developments in information and communication technologies have forced changing the central and local level organizations of public administration established for meeting these needs as well as social requirements (Ministry of Development, 2000, p.42). In the Report of Specialization Commission on Improving and Restructuring Public Administration included in the Eight Five-Year Development Plan, it is emphasized that the activities and methods for performing functions and tasks for establishing an efficient and productive public administration within administrative transparency should be determined in detail through task and activity directives (Ministry of Development., 2000, p.44). In the same Report, it is indicated that simplicity of processes should be ensured within institutions through regulated and fast information flow and "electronic information" management should be considered important for preventing bureaucracy, paperwork and filing and archive problems (Ministry of Development, 2000, p.42).

It is necessary to use information and communication technologies for making public administration efficient and productive. One of the aspects accelerating this process in Turkey is the policies of the EU for establishing an e-Government structure. With its Lisbon Strategy determined in 2000, the EU has set the goals of being competitive and coherent with the information economy and initiated the e-Europe initiative, the first action plan on this purpose. The goal of Lisbon Strategy is to ensure transition to a society based on information economy. Parallel to the e-Europe Initiative, the e-Europe+ Initiative covering Turkey and other EU candidate countries has been initiated in 2001 (Ministry of Development, 2007, p.1). During 2000 and later, a series of action plans covering both the member states and the candidate states have been prepared and put into practice by the EU. These plans are the e-Europe Initiative, e-Europe 2002 Action Plan, e-Europe+ Action Plan, e-Europe 2005 Action Plan and i2010: A European Information Society for Growth and Employment. The common goals of the reports prepared by the EU are as below (EU, 2000) (EU, e-Europe 2002, 2000) (EU, 2004) (Information Society Department, 2014) (EU, 2005):

- Affordable internet access
- Accelerating e-commerce
- Fast internet for researchers and students
- Secure electronic access and secure information database
- Online government services (e-Education, e-Health)
- Smart Transportation
- Investing in human resources
- Encouraging use of Internet

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Widespread broadband access through competitive prices
- R&D investments and increasing resources allocated for innovativeness

It has been indicated that the candidate countries should modernize their corporate organization in compliance with the information economy in order to achieve these goals. Parallel to the process of establishing information society in Europe by the EU, Turkey has prepared plans determining the frame of e-Government policies and then begun implementing them (Table 1). In the Report of Specialization Commission on Well Governance in Public Administration in the Ninth Development Plan, it is indicated that the e-Government applications will be expanded and consequently participation of citizens in public services will be facilitated. By this means, access to information and transparency will be provided for public services (Devlet Planlama Teşkilâtı, 2007, p.44).

Table 1. Plans and documents determining the frame of e-government policies in Turkey

1993	Information and Economic Modernization Report
1999	Main Plan for National Information of Turkey
2002	e-Turkey Initiative Action Plan / Action Plan for Shifting PublicNet e-Government
2003	e-Transformation of Turkey Project 2003-2004 Short-Term Action Plan
2005	e-Transformation of Turkey Project Action Plan
2006	2006-2010 Information Society Strategy and Action Plan
2015	2015-2018 Information Society Strategy and Action Plan
2016	2016-2019 National e-Government Strategy and Action Plan
2017	2017-2020 National Broadband Strategy and Action Plan

(Ministry of Transport, Maritime and Communications, 2016, p.2)

The Information and Economic Modernization Report has been prepared in 1993 with the cooperation of Turkey and the World Bank. The World Bank has stated action plans in computer use, software market, human resources in information economy, communication networks and legal infrastructure for establishing the information society in Turkey (World Bank, 1993). The purpose of this report is to ensure technological development and economic modernization in the frame of new industrial policies of Turkey. These action plans could not be implemented because the credit agreement between Turkey and the World Bank was not completed.

Another plan considered for developing technological infrastructure of Turkey is the National Information Modernization Report of Turkey (TUENA) completed by the Ministry of Transportation and TÜBİTAK in 1999. In this report, the global development of information and communication technologies are taken into consideration and a situation determination is done for Turkey. According to this, use of new information and communication technologies, especially internet is very low in the transition process of Turkey to information society. While, the rate of households with a computer is 6.5%, the rate of internet use by businesses is at 1.9% (Ministry of Transportation, 1999). In this frame, it is emphasized that infrastructure activities for using information and communication technologies in public and private sector should be done and it should be ensure that the citizens participate in new communication networks. As the supplementary of TUENA considered on long-term basis, PublicNet e-Government

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Transition Action Plan of the Primer Ministry covering 1998-2002 and e-Turkey Initiative Action Plan have been prepared in 2001.

The purpose of PublicNet e-Government Transition Action Plan is to ensure that e-Institutions are established through efficient, transparent, secure, fast and uninterrupted services by the government by taking advantage of information and communication technologies during the transition process to information society and establish the State e-Gate (portal) for transferring the relations between the government and its citizens to electronic environment (DPT Yönetim Bilgi Merkezi Dairesi, 2002). E-Europe Action Plan covering the member states and directing the candidate countries of the EU has been effective in development of the e-Government process. In 2001, e-Turkey Initiative Action Plan has been prepared in Turkey in the frame of the goals of the e-Europe Action Plan. Within this sense, bringing the developing internet technology into conformity with the system in order to establish the infrastructure of information society is ensuring creation of a competitive and dynamic information based economy (Prime Ministry, 2002). Within the scope of e-Turkey, there are real and corporate entities as well as public, private and non-governmental institutions. It was not possible to implement both plans due to economical and political crisis in Turkey.

In 2003, e-Turkey Transformation Project is included in the Emergency Action Plan of the Prime Ministry for determining information society-oriented strategies and ensuring institutionalization in that field. The Ministry of Development is charged with coordinating, monitoring, evaluating and directing the project. The Information Society Department has been established within the Ministry of Development (Information Society Department, 2018). In the frame of e-Europe+ Initiative and benefiting from the activities conducted up to that era, e-Transformation Turkey Project 2003-2004 Short-Term Action Plan has been put into practice.

The objectives of the Project have been described in the frame of eight topics (Ministry of Development, 2003):

- Information Society Strategy
- Technical Infrastructure and Information Security
- Education and Human Resources
- Legal Infrastructure
- Standards
- e-Government
- e-Health
- e-Commerce

In this sense, the Project will be tried to be implemented by covering all parts of society for improving national benefit and added value.

In the frame of the e-Transformation Turkey Project Action Plan in 2005, the 2006-2010 Information Society Strategy and Action Plan has been prepared. The strategies which will be executed by Turkey until 2010 in the process of transformation into an information society are included in this plan. These are (Devlet Planlama Teşkilâtı, 2006);

- Social Transformation
- Penetration of Information and Communication Technologies in Business World
- Citizen-Oriented Service Transformation

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Modernization in Public Administration
- Global Competitive Information Technologies Sector
- Competitive, Prevalent and Affordable Communication Infrastructures and Services
- R&D and Strengthening Innovativeness

The strategies mentioned in the plan show parallelism with the i2010: A European Information Society for Growth and Employment Plan of the EU. Thus, according to the EU, the international competitive capacity of governments are effective for producing, using and expanding information. Therefore, Turkey has emphasized in its action plans that it is necessary to develop the information technologies sector and make it competitive. On this sense, 2015-2018 Information Society Strategy and Action Plan focuses on the following topics based on growth and employment (Ministry of Development, 2015):

- Information Technologies Sector
- Broadband Infrastructure and Sectoral Competition
- Qualified Human Resources and Employment
- Penetration of Information and Communication Technologies in Society
- Information Security and User Safety
- Innovative Solutions Supported by Information and Communication Technologies
- Internet Entrepreneurship and e-Commerce
- User-Orientation and Efficiency in Public Services

2016-2019 National e-Government Strategy and Action Plan has been prepared in the frame of the 10th Development Plan and Information Society. In this sense, 2016-2019 the goal of the National e-Government Strategy and Action Plan is to strengthen efficiency, participation, transparency and accountability in public administration by using information and communication technologies (Ulaştırma & Denizcilik Bakanlığı, 2016). Another significance of the Action Plan which has caused a change in e-Government strategy of Turkey is that the government has redefined all relations between all other stakeholders. This new strategy is called as "Effective e-Government Ecosystem". According to this, e-Government will be a facilitator of transition to information society and sustainable development in an integrated, technological, participating, innovative and qualified way (Ulaştırma & Denizcilik Bakanlığı, 2016). It will be ensured that the government and the stakeholders accommodate to changing conditions by providing efficiency in presentation of e-Government services. The contents of an efficient e-Government Ecosystem are making dynamic infrastructure of technology suitable for needs, participation in e-Government system in a citizen-oriented way and using a high-quality service which can adapt itself, access and have information security. Communication, coordination and cooperation of all stakeholders will be ensured permanently in the activities carried out for determining e-Government policies and developing, presenting and using services. Within the scope of the e-Government Ecosystem strategy; it is aimed to establish an interactive structure where universities, central and local governments, non-governmental organizations, professional chambers, citizens, private sector, international institutions and other states take an active role in e-Government activities (Ulaştırma & Denizcilik Bakanlığı, 2016).

In 2017, under the coordination of the Ministry of Transport, Maritime and Communications, the National Broadband Strategy and Action Plan (2017-2020) has been prepared with the cooperation of the Ministry of Development, the Information Technologies and Communications Authority, non-governmental organizations and related sector representatives (Ulaştırma & Denizcilik Bakanlığı, 2017,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

p.33). One of the goals of the EU covers development of infrastructure systems for fast and widespread internet access. Developing broadband access throughout the country, expanding fiber access, increasing the capacity and speed of broadband connections, ensuring competition-based sectoral development in accordance with Market requisites and increasing demand on broadband internet services have been adopted as principles (Ulaştırma & Denizcilik Bakanlığı, 2017, p.33).

E-GOVERNMENT PRACTICES OF TURKEY

In Turkey, there are series of plan and document based practices related with using information and communication technologies in public services. The e-Government practices in Turkey serve by providing introductory information to citizens on institutions and services through the web pages of central and local management agencies. Use of information and communication technologies for providing public services has differentiated the relation between the government and citizens throughout the process. E-Government portal has been established for ensuring sustainability, transparency, openness and quality in public services of Turkey. Within this scope, there are series of projects of the central government and the local administrations for providing services to citizens, central and local units, public institutions and organizations and private sector (Table 2).

Use of internet in Turkey beginning from 1993 and transferring e-Government related action plans executed by the EU to Turkey have accelerated e-Government process and increased number of practices. The investments on information and communication technologies made by public institutions during this era have increased both on sectoral basis and allowances of institutions.

Analyzing the investments of public institutions and organizations in Turkey on information and communication technologies, while the allowance allocated in 2002 was 848 million of TRY, this has become 4 billion and 444 million of TRY in 2017. The allowance allocated in 2017 is for 256 projects.

The ICT investments of the public covers agriculture, mining, energy, transportation, communication, tourism, education and health sectors and the public services of central institutions. As of 2017, considering the cross-sectoral distribution of public ICT investments, e-Government projects of the central institutions (the Ministry of Internal Affairs, the Social Security Agency, the Ministry of Justice, the General Directorate of Security) take the first place with 49% and the e-Government projects of the Ministry of National Education and universities take the second place with 29% (Ministry of Development, 2017, p.1-2). In this sense, e-Government projects and practices executed by Turkey in the process of transformation into an information society will be present in next processes.

CONCLUSION

For the 20th century, there are two significant developments influenced the change and transformation of public administration. These are developments in information and communication technologies and changes in economic policies. With the impact of post-1980s neo-liberal policies, governments' intervention on economic field has been criticized and it has been emphasized that it should undertake a regulating and supervising role. This process has especially been executed by international institutions as the World Bank, IMF and OECD. International institutions have prepared a series of public administration reform formulae for aligning developing countries with the system. As is known, there are differences

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

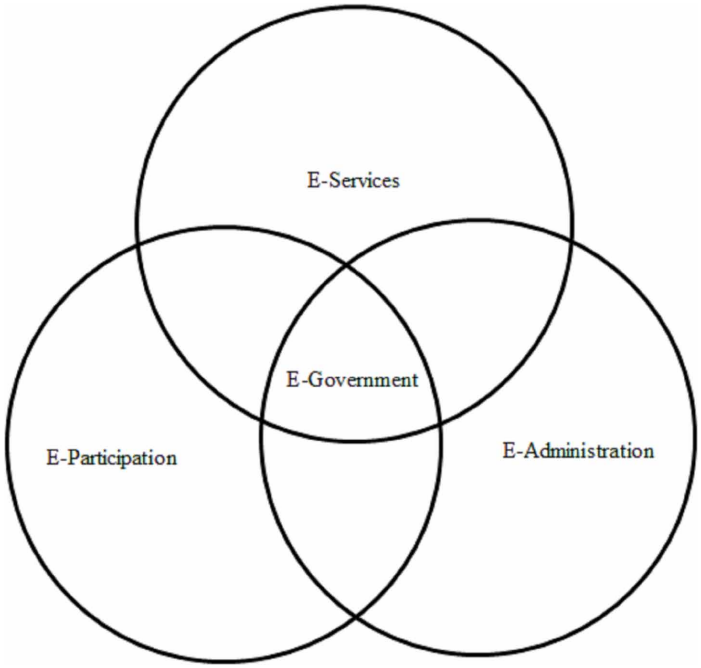
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Edited from the report on e-government projects and practices in Turkey

INSTITUTION	PRACTICE	CONTEXT	USER GROUP
The Ministry of Justice	National Judiciary Network Project (UYAP)	Began in 2000 as a two-phase project. In 2001, the UYAP I project ensuring automation of Central Units of the Ministry of Justice and in 2005, the UYAP II covering automation of legal and administrative judiciary units and penitentiaries have been completed and become operational (National Judiciary Network Informatics System, 2018). Currently, all judiciary and administrative activities of all legal units in Turkey are executed in electronic environment.	The central and local units of the Ministry of Justice, citizens, business world
The Ministry of Internal Affairs The General Directorate of Population and Citizenship Affairs	Central Population Management System (MERNIS)	The idea of MERNİS project was based on 1972 dated and 1587 numbered Population Law. It has been designed by the SPA in 1976. Although, the project design activities continued almost for 20 years, they gained momentum in 1997 through financing of the World Bank and computer systems were established (The Republic of Turkey, the Ministry of Internal Affairs, the General Directorate of Population and Citizenship Affairs, 2018). Currently, the services of keeping and collecting birth records in computer environment and the informatory services related with the collected records to the public institutions and citizens in electronic environment are provided.	Institution employees, the public institutions and organizations, citizens
The Ministry of Internal Affairs The General Directorate of Local Administrations	Local Administrations Information Database Project (LOCAL DATA)	Collecting corporate information on local administrations and the enterprises, floating capital funds, companies and foundations established by them and basic data related with the services executed by them through internet technology and evaluating at institutions, provinces and country level.	Institution employees, the public institutions and organizations, citizens
The Ministry of Internal Affairs General Directorate of Security Affairs	POLNET	The application opened to the use of the Law Enforcement Agency since 2002 has been used by the whole Law Enforcement Agency and its units and mechanisms. It ensures fast access to any information needed for the duty of the police and allows inquiring all national and international information networks and banks. PolNeT includes communication and infrastructure related information systems.	Institution employees and citizens
The Ministry of Customs and Trade	The Project for Modernization of the Customs Authority (GİMOP) Computerized Customs Activities (BILGE) Customs Data Warehouse System (GUVAS) The Customs Gates Security Systems Project (GÜMSIS)	GİRMOP is a project financed by the World Bank. The purpose is to modernize and dynamize all customs services, facilitate legal trade and automate all customs transactions. Conducting all customs procedures in computer environment on full-time basis. It is a system enabling fast and health communication of information to the decision-makers by collecting the information on import, export, transit and smuggling events in all customs authorities of Turkey in a database to be established at the General Directorate of Customs. This is a project executed for efficient management with smuggling. Data exchange with national and international intelligence agencies is among its objectives.	Institution employees, business world Institution employees, related public institutions and organizations, business world Institution employees, public institutions and organizations, business world Institution employees, related public institutions and organizations
The Ministry of Finance The General Directorate of National Estate	National Estate Automation Project (MEOP)	MEOP which has been active since 2001 enables establishing the real-estate information bank and National Estate information systems and conducting all processes through computers.	Institution employees, the public institutions and organizations, citizens
The Ministry of Finance The Revenue Administration	Tax Office Full Automation Project (VEDOP)	VEDOP consists of VEDOP I began in 1998 and VEDOP II began in 2004. Reducing work-load by conducting all tax office processes by computers, increasing efficiency and productivity in tax office activities and establishing a healthy decision support and management system from the information collected in computer environment.	Institution employees, citizens, business world
The Ministry of National Education	The Ministry of National Education, Integrated Management Information System (MEBBIS)	Covers ensuring flow of information between the central and local units of the Ministry and providing services by utilizing information technologies. In addition, the information management systems of MEBBİS execute processes related with personnel, institutions, students and administrations.	Public and private institutions, institution employees
The Ministry of Labor and Social Security, The Institute of Public Administration for Turkey and the Middle East (TODAİE)	Local Administrations Portal (YerelNet)	It is an interactive network structuring where local administrations and other public institutions and organizations can directly access information and regulations related with this field and exchange information and experience(YerelNet Local Administrations Portal, 2018).	Central and local administration units, citizens, business world
The Minister of Environment and Urban Planning: The General Directorate of Land Registry and Cadastre	The Information System of Land Registry and Cadastre (TAKBIS) TAPUNET	Analyzing the land registry and cadastre services throughout the country in the frame of the Geographical Information Systems and Land Information System, determining problems, presenting current information and conducting services in electronic environment. Citizens can access their own land registry and cadastre information of their real-estates through their user code and password automatically generated during a process in units where TAKBİS is implemented.	Institution employees and other related public institutions and organizations Citizens
The Ministry of Health	The Health Information System of Turkey (e-Health)	This is the health information system covering the public institutions and organizations, private sector, universities and non-governmental organizations in health sector and the citizens utilizing from health services. Aims to establish a standard on health informatics in the frame of the European action plans.	Institution employees, the related public institutions and organizations, citizens

(Devlet Planlama Müsteşarlığı, 2005)

Figure 2. ICT Investments of public (2002-2017) (Ministry of Development, 2017, p.1)



between the developed and developing countries with regards to use and expansion of information and communication technologies. Therefore, developing countries have gone into a transformation process of public administration for using and expanding information and communication technologies. In this sense, e-Government process has caused a transformation in organizations and service provision methods of public administrations.

Turkey is a developing country involved in changes in economic policies as well as the process of utilizing information and communication technologies. Beginning with the use of internet in Turkey in 1993, for almost 25 years, information and communication technologies have caused changes in presenting public services and organizational structure of public administration. The plans prepared and implemented in Turkey between 1993-2017 for transforming into an information society have not only intended to use and expansion of information and communication technologies but also for transforming public administration into a management structure ensuring participation of other actors as well as the government. In this regard, e-Government practices have been a means of governance for the reforms made in public administration. This study describes the implementation process of information and communication technologies in public administration field of Turkey within the frame of a multilevel governance approach. The Department of Information Society which has been established in 2003 within the Ministry of Development and integration of information and communication technologies in services of public institutions and organizations are important developments. Especially, the e-Government portal established within this process is an important milestone for providing and coordinating of public services and providing cooperation. As of 2017, 4 billion and 444 million of TRY allowance has been allocated in Turkey for 256 projects covering citizens, private sector, non-governmental organizations and public institutions and organizations. The allowance allocated for public ICT investments has gradually increased

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in years. In Turkey, the activities for using and improving information and communication technologies have been continued. Turkey aims to establish an interactive structure of public administration through its e-Government activities which will include its citizens, private sector, non-governmental organizations, central and local administrations, universities, international institutions and other countries.

REFERENCES

Aktan, C. C., & Özler, H. (2008). Good Governance: A New Public Managerialism. *Uluslararası Hukuk ve Politika*, *4*(14), 165–187.

Başbakanlık. (2002). *e-Türkiye Girişimi Eylem Planı.* Academic Press.

Bayramoğlu, S. (2005). *Yönetişim Zihniyeti Türkiye'de Üst Kurullar ve Siyasal İktidarın Dönüşümü*. İstanbul: İletişim Yayınları.

Chadwick, A. (2006). *E-Government. In Encyclopedia of Governance*. SAGE Publications.

Chun, S.A., Shulman, S., Sandoval, R., & Hovy, E. (2010). Government 2.0:Making Connections Between Citizens, Data and Government. *Informatıon Polity,* (15), 1-9.

Commission of the European Communities. (2003). *The Role of eGovernment for Europe's Future*. Brussels: Author.

Curtin, G. G. (2007). *E-Government. In Encyclopedia of Political Communication*. SAGE Publications.

Devlet Planlama Müsteşarlığı. (2005). *e-Devlet Proje ve Uygulamaları.* Bilgi Toplumu Dairesi.

Devlet Planlama Teşkilatı. (2006). *Bilgi Toplumu Stratejisi (2006-2010).* Author.

Devlet Planlama Teşkilatı. (2007). *Dokuzuncu Kalkınma Planı Kamuda İyi Yönetişim Özel İhtisas Komisyonu Raporu.* Author.

Devlet Planlama Teşkilatı Yönetim Bilgi Merkezi Dairesi. (2002). *e-Devlet'e Geçiş Sürecinde KamuNet Çalışmaları.* Author.

Dreschler, W. (2005). The Rise and Demise of the New Public Management. *Post-autistic*. *Economic Review (Federal Reserve Bank of Atlanta)*, *33*(2), 17–29.

European Commission. (2001). European Governance - A White Paper. *Official Journal of the European Communities*.

European Union. (2000). *e-Europe 2002*. Author.

European Union. (2000). *e-Europe An Information Society for All*. Author.

European Union. (2004). *e-Europe+ 2003 Progress Report.* Retrieved April 01, 2018, Bilgi Toplumu-Dairesi: http://www.bilgitoplumu.gov.tr/wpcontent/uploads/2015/02/010600_eAvrupa+EylemPlani.pdf

European Union. (2005). *i2010 - A European Information Society for Growth and Employment.* Author.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gandia, J. L., & Archidona, M. C. (2008). Determinants of Web Site Information by Spanish City Counsils. *Online Information Review*, *32*(1), 35–57. doi:10.1108/14684520810865976

Güzelsarı, S. (2004). *Kamu Yönetimi Disiplininde Yeni Kamu İşletmeciliği ve Yönetişim Yaklaşımları*. Retrieved April 04, 2018, yonetimbilimi.politics.ankara.edu.tr

Ho, A. T.-K. (2002). Reinventing Local governments and the E-Government Initiative. *Public Administration Review*, *62*(4), 434–444. doi:10.1111/0033-3352.00197

İçişleri Bakanlığı Nüfus ve Vatandaşlık İşleri Genel Müdürlüğü. (n.d.). Retrived April 01, 2018, from https://www.nvi.gov.tr/hakkimizda/projeler/mernis/dunden-bugune-mernis

Information Society Department. (2014). *Information Society Department*. Retrieved April 04, 2018, http://www.bilgitoplumu.gov.tr/uluslararasi-calismalar/avrupa-icin-sayisal-gundem/eavrupa-2005/

James, O. (2001). Business Models and the Transfer of Businesslike Central Government Agencies. *Governance: An International Journal of Policy, Administration and Institutions*, *14*(2), 233–252. doi:10.1111/1468-0491.00159

Kalkınma Bakanlığı. (2000). *Sekizinci Beş Yıllık Kalkınma Planı kamu Yönetiminin İyileştirilmesi ve Yeniden Yapılandırılması Özel İhtisas Komisyonu Raporu.* Author.

Kalkınma Bakanlığı. (2003). *e-Dönüşüm Türkiye Projesi Kısa Dönem Eylem Planı (2003-2004).* Author.

Kalkınma Bakanlığı. (2007). *Dokuzuncu Kalkınma Planı Bilgi ve İletişim Teknolojileri ÖZel İhtisas Komisyonu Raporu.* Author.

Kalkınma Bakanlığı. (2015). *2015-2018 Bilgi Toplumu Stratejisi ve Eylem Planı*. Bilgi Toplumu Dairesi.

Kalkınma Bakanlığı. (2017). *Kamu Bilgi ve İletişim Teknolojileri Yatırımları.* Author.

Luna, D. E., Duarte-Valle, A., Picazo-Vela, S., & Luna-Reyes, L. F. (2015). Digital Governance and Public Value Creation at The State Level. *Information Polity,* (20), 167-182.

Marks, G., Hooghe, L., & Blank, K. (1996). European Integration from the 1980s: State-Centric v. Multilevel Governance. *Journal of Common Market Studies*, *34*(3), 341–378. doi:10.1111/j.1468-5965.1996.tb00577.x

OECD. (2003). The Case for e-Government: Exerpts from the OECD Report "The e-Government Imperative". *OECD Journal on Budgeting*, *3*(1), 61–97. doi:10.1787/budget-v3-art5-en

Official Journal of the European Communities. (2001). *European Governance - A White Paper.* Author.

Ongaro, E. (2015). Multi-Level Governance: The Missing Linkages. *Critical Perspectives on International Public Sector Management*, *4*, 1–14. doi:10.1108/S2045-794420150000004001

Osborne, D., & Gaebler, T. (1992). *Reinventing Government.* A William Patrick Book.

Osborne, S. P., & McLaughlin, K. (2002). The New Public Management in Context. In K. McLaughlin (Ed.), New Public Management: Current Trends and Future Prospects (pp. 7-12). Author.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Piattoni, S. (2009). Multi-level Governance: A Historical and Conceptual Analysis. *European Integration*, *31*(2), 163–180. doi:10.1080/07036330802642755

Piattoni, S. (2015). Multi-Level Governance: Underplayed Features, Overblown Expectation and Missing Linkages. *Critical Persperctives on International Public Sector Management*, *4*, 321–342. doi:10.1108/S2045-794420150000004013

Pickvance, C. (1997). Decentralization and Democracy in Eastern Europe: A Sceptical Approach. *Environment and Planning. C, Government & Policy*, 15.

Polidano, C., & Hulme, D. (2001). Towards a Post-New Public Management Agenda. *Public Management Review*, *3*(3), 297–303. doi:10.1080/14616670110058347

Regions, E. U. (2009). *The White Paper on Multi-Level Governance.* Author.

Republic of Turkey Ministry Development. (n.d.). *Information Society Department*. Retrieved March 03, 2018 Information Society:http://www.bilgitoplumu.gov.tr/en/

Saran, U. (2005). Türk Kamu Yönetiminde Değişimin Genel Çizgisi: Reform Arayışlarının Karşısındaki Beklentiler ve Güçlükler. In A. Nohutçu & A. Balcı (Eds.), Bilgi Çağında Türk Kamu Yönetiminin Yeniden Yapılandırılması-I (pp. 37-53). İstanbul: Beta Basım Yayım.

Smith, M. J. (1998). Reconceptualizing The British State: Theoretical and Empirical Challenges to central Government. *Public Administration*, *76*(1), 45–72. doi:10.1111/1467-9299.00090

Torres, L., Pina, V., & Royo, S. (2005). E-Government and The Transformation of Public Administrations in EU Countries: Beyond NPM or Just A Second Wave of Reforms? *Online Information Review*, *29*(5), 531–553. doi:10.1108/14684520510628918

Ulaştırma Bakanlığı. (1999). *Türkiye Ulusal Enformasyon Altyapısı Anaplanı Sonuç Raporu*. Ankara: Author.

Ulaştırma ve Denizcilik Bakanlığı. (2016). *2016-2019 Ulusal e-Devlet Stratejisi ve Eylem Planı.* Author.

Ulaştırma ve Denizcilik Bakanlığı. (2017). *Ulusal Genişbant Stratejisi ve Eylem Planı (2017-2020).* Author.

Ulusal Yargı Ağı Bilişim Sistemi. (n.d.). Retrieved April 04, 2018. http://www.uyap.gov.tr/Tarihce

Valdes, G., Solar, M., Astudillo, H., Iribarren, M., Concha, G., & Visconti, M. (2011). Conception, Development and Implementation of an E-Government Maturity Model in Public Agencies. *Government Information Quarterly*, *28*(2), 176–187. doi:10.1016/j.giq.2010.04.007

Wise, L. R., & Szücs, S. (1996). The Public/Private Cleavage in a Welfare State: Attitudes Toward Public Management Reform. *Governance: An International Journal of Policy, Administration and Institutions*, *9*(1), 43–70. doi:10.1111/j.1468-0491.1996.tb00233.x

World Bank. (1989). *Sub-Saharan Africa:from Crisis to Sustainable Growth*. Washington, DC: Author.

World Bank. (1993). *Turkey Informatics and Economic Modernization*. Washington, DC: Author.

World Bank. (1996). *Governance The World Bank's Experience.* Author.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

YerelNet Yerel Yönetimler Portalı. (n.d.). Retrieved April 01, 2018 from https://www.yerelnet.org.tr/genel/hakkimizda.php

Yucebas, E. (2014). *Yeni Bölgeselleşme Paradigması ve Sanayisizleşme: İzmir Örneği* (Unpublished doctoral dissertation). Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü, İzmir, Turkey.

Yucebas, E., Bulut, Z. A., & Dogan, O. (2017). Digital Presence of Municipalities: Evidences from City of İzmir. *23rd International Scientific Conference on Economic and Social Development*, 412-422.

Yucebas, E., & Cobanoglu, S. A. (2017). Yeni Bölgeselleşme Çerçevesinde İzmir Sanayisindeki Mekânsal Değişimin Dönemsel Analizi. *Ankara Üniversitesi SBF Dergisi*, *72*(3), 745–764. doi:10.1501/SBFder_0000002466

Ziemba, E., Papaj, T., Zelazny, R., & Jadamus, M. H. (2015). Building and Evaluating Classification Framework of Critical Success Factors for e-Government Adoption. *European Conference on e-Government*, 341-350.

This research was previously published in Multi-Level Governance in Developing Economies; pages 23-51, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 44
Measuring Business-IT Alignment in a Digitally Revolutionized Economy

Pablo Alfonso Gajardo
University of Lleida, Lleida, Chile

Ariel I. La Paz
University of Chile, Lleida, Chile

ABSTRACT

Although the concept of business-IT alignment was once considered one of the most important concerns of organizations, in terms of IT administration, the attention it has received has decreased significantly over the years. This article postulates that strategic alignment initiatives still have the same relevance—in particular for non-IT companies—which means that digital transformation strategies should consider the strategic alignment as a critical issue for their success. Therefore, the persistent relevance of this concept and the need to measure it with updated instruments capable of assessing the degree of maturity reached and feeding back the results to the organizations remains a key topic in IT administration. Based on an updated instrument, adequate for a digital framework, our study surveyed a sample of mostly large Chilean companies. The results obtained reveal the importance to count with an improved model that captures the changes this new digital scenario imposes.

INTRODUCTION

No company, no industry, no market can avoid the impact of the pervasive force of technology, changing the business models and processes, as they have traditionally been known and applied.

The digital revolution has changed the rules of business. With the constant diffusion of digital technologies, each industry faces its own challenges and threats. New players enter the market, leveraged by cutting-edge technology that shakes up the solid and recognized companies. (Herbert, 2017; Peppard & Ward, 2016; Rogers, 2016; Venkatraman, 2017).

DOI: 10.4018/978-1-7998-7297-9.ch044

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To be successful in the digital world, companies must think of technology not only as a support function, but also as a strategic and competitive weapon, so it is not just about applying technology to the business as a commodity, but rather creating new business models and operational models, leveraged by the innovative use of technology. When raising this point, it is assumed that the concept of business-IT alignment is still valid, for non-IT companies, in the process of becoming a digital entity. And while, for a long time, the IT units have been treated as subordinate to the commercial strategy, in light of the literature surveyed, we coincide with scholars and practitioners, emphasizing the importance of the alignment between business and IT, and the value that it brings to the organizations.

Even though the number of papers published on strategic alignment between business and IT has declined markedly since the appearance of the Digital Transformation concept, some authors continue to reveal the benefits it generates for organizations, with new approaches or extensions of the traditional concept. (CIO Wiki, 2019; Horlach, Drews & Schimer, 2016; Tejada-Malaspina & Un Jan, 2019; Wan & Ge, 2018).

The need for a strategic alignment between the business and IT is vital for the functional areas and IT departments to work together and reach mutual understanding. This synergy means that both, functional and IT units must be partners in the development and execution of the organizational business strategy, recognizing that IT and business strategy are closely related, and companies are not competitive if both strategies are not strongly linked and aligned (Aversano, Grasso, & Tortorella, 2016; Avison, Jones, Powell, & Wilson, 2004; Coltman, Tallon, Sharma, & Queiroz, 2015; Johnson & Lederer, 2010; Fonstad & Robertson (2006); Luftman, Lyytinen, & Zvi, 2015; Reich & Benbasat, 2000), among others.

Having revealed the need to bring the concept of business-IT alignment to the center stage once more, especially for non-IT companies, under the current conditions, it is critical to go a step beyond simply understanding the importance of the concept and the factors that impact it. This implies the necessity of measuring the degree of alignment reached in this process, understanding that the alignment between the business and IT, is not maintained in a passive state, but a dynamic and permanent process. This requires updated tools with the capacity to capture the changes that this new scenario imposes, feeding organizations with the results of its measurements in a continuous improvement process.

Granting the importance of measuring the alignment and its implications for the success of the aforementioned organizations, now in a digital environment, the research question of this article is: What aspects need to be updated in a model whose purpose is to measure the maturity of the strategic alignment between the business and the IT function in this digital scenario? In order to answer the research question, the authors analysed seminal papers and models, and ultimately contributed an updated model for measuring the business-IT alignment maturity level, and a digital transformation strategy framework, under which the updated model operates.

BACKGROUND

The alignment between business and IT has been an important topic in the IT administration literature for more than three decades (Kappelman, McLean, Johnson & Gerhant, 2014), nevertheless, studies on the subject consistently indicate that the alignment of information technology with the business is an unsolved problem. As it is commented by Luftman et al., (2015): “While significant progress has been made to understand alignment, research on IT alignment is still plagued by several problems”. (p.1). Despite the existing awareness about the need for alignment, and the evidence documented in academic

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and professional publications, companies spend most of their time aligning the IT services and operations with corporate objectives instead of figuring out innovations and improvements for the business performance. (IT Web Brainstorm CIO Survey, 2014; Peppard & Ward, 2016). The latter could indicate that the concept of strategic alignment between business and IT is still managed at the operational level. In that sense: "The challenge is, as it has always been, to harness these technologies in support of enterprise objectives and to create new high value strategies." (Peppard & Ward, 2016, p. 16). In other words, to harness digital technologies for achieving alignment with enterprise objectives and co-creating innovative strategies and new business capabilities.

In order to provide a context to this research and its objectives, an extensive literature review was conducted on the concept of business and IT alignment – based on the Scopus database - from its origins to the present. In this regard, by tracing a timeline in the theoretical evolution of this topic, we can see how the concept of business-IT alignment began to acquire general interest since the mid-1980s, based on the works of Benjamin, Scott-Morton and Wyman (1983), Scott-Morton and Rockart (1984), McFarlan (1984), Wiseman and MacMillan (1984), Keen (1986), among others, however, it was Scott-Morton who gave the initial impulse to this new field of academic interest. As described by Coltman et al. (2015), research on the strategic alignment of IT and its relationship with business strategy emerged in the 80s as part of the "MIT90s" project, led by Michael Scott-Morton at the Information Systems Research Center (CISR) at MIT.

Since the end of that decade, this topic began to be strongly promoted by new researchers who fed this new body of knowledge. (Chan, Huff, Barclay and Copeland, 1997; Henderson & Venkatraman, 1990; Henderson & Venkatraman, 1993; Lederer & Mendelow, 1989; Luftman, Lewis & Oldach, 1993), to name just a few of the seminal works. From all of them, Henderson and Venkatraman were the ones who achieved greater notoriety in the academic community, with the proposal of the SAM framework – Strategic Alignment Model, which is cited in most of the research articles referring to the concept of business-IT alignment, and in many of the later publications.

At that time, academics and company managers were called to think about the conditions under which the IT strategy should support the business strategy, so that IT becomes a facilitator and co-participates in the formulation of the business strategy.

Bughin, Catlin, Hirt, & Willmott (2018), more than 30 years later - in a more technologically turbulent and dynamic environment, reinforce the need for a comprehensive vision of the organization, which translates into the need for this alignment. In this regard, they point out that when talking to business leaders about what they understand by digitalization, some see it as the improved version of what the IT function does, others focus on digital marketing or sales, but very few have a broad and holistic vision of what a digital proposal really means. Providing a strong support for these authors, Herbert (2017) points out: "I speak a lot about digital transformation, from keynotes at conferences with thousands of attendees to leadership retreats with an organization´s executive suite. I've never once witnessed instant consensus on what digital transformation means" (p. 2).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

A NEED FOR AN UPDATED MODEL IN A DIGITAL AGE

A Baseline for an Updated Model

In the review of maturity models created for measuring the business-IT alignment, the authors chose to include only those works published since 2000. This exclusion criterion was intended to consider only those models formed after having the opportunity to consider all of the information published on the topic during the 90s when the academic community began focusing very heavily on the concept of business-IT alignment. This was done, in order to ensure a minimum maturity of the concept amongst scholars and their ability to understand the factors that positively and negatively influence this type of implementation.

After completing a thorough review of several models, the SAMM framework, Strategic Alignment Maturity Model, (Luftman, 2000), and subsequent publications, was chosen as the baseline for this work, because of its greater recognition among academics and the business community. SAMM stands out from those analyzed, because of its theoretical support and a clear methodology to assess the level of maturity, aspects that are not well developed in other models of maturity measurement analyzed.

SAMM considers a total of six components or dimensions, as constructs in its structure: 1) Communications, 2) Measurement of the competence and value of IT, 3) IT governance, 4) Partnership between the IT and business, 5) Scope and architecture of the IT infrastructure, and 6) skills. The instrument that operationalized the model consists of a questionnaire with 39 questions, distributed in the six dimensions indicated. Each question has five possible answers, from which the interviewee chooses the most representative. SAMM postulates that alignment between the business and IT is the result of these six dimensions acting together, which in turn has a positive impact on the performance of the company, while none of these dimensions acting separately has such an effect. According to this, each dimension is presented with the hypotheses of positive impact on business and IT alignment. This model allowed the authors to construct an updated model by integrating new components, which fill in the gaps that according to the research need to be covered.

In order to avoid confusion, it is important to note that Luftman denominates his model as SAM, nevertheless, the authors had referred to it above as SAMM (Strategic Alignment Maturity Model), differentiating it from SAM (Henderson & Venkatraman, 1990). Now that SAMM has been chosen as the baseline and formally introduced, the authors will refer to it as the original model or the reference model, interchangeably.

Fundamentals of the Updated Model Proposed

Having reviewed the fundamentals of the original model, the constructs that compose it, and the instruments that operationalize it, the authors considered that in the scenario with large-scale digital transformations, the model needs to be improved to adequately capture such changes, and although it has been an effective instrument to measure and align IT, it needs to be updated in order to more efficiently capture the state of maturity of the strategic alignment in this new scenario.

Based on this model, an improved one is proposed, echoing Luftman's words, when he points out that efficient tools are required with the capacity to provide useful and updated information to the organization in those aspects that should improve. "A tool that can provide both a descriptive assessment and a prescriptive roadmap on how to improve" (Luftman & Kempaiah, 2007, p. 167).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In this regard, when confronting the reference model with the key pillars for driving a successful digital strategy (which will be discussed in detail in Driving a digital transformation section), it was found that four aspects, considered critical for a tool whose purpose is to measure the business-IT alignment level in this new environment, where absent. These aspect, are: 1) Engagement of the personnel and its contribution to the organizational goals and objectives, 2) Innovation as an engine for the future of any organization, 3) A rewards systems in concordance with an innovation culture, and 4) The necessary planning of the information systems, in a collaborative work, involving the whole organization. Once the aspects that complement the reference model, to achieve a more efficient measurement of the level of strategic maturity between the business and the IT function in a digital scenario were defined, names were selected for those aspects that were absent in the reference model, which in turn become four new dimensions. In this way, the authors, proposed an updated model that maintains the first five dimensions of the original model, adding four new dimension, building, in this way a stronger tool. Table 1 summarize the aspects that complement the reference model, with names assigned.

Table 1. Aspects complementing the reference model

	Aspect Description	Name/Dimension Assigned
1.	Engagement of the personnel and its contribution to the organizational goals and objectives.	People
2.	Innovation as an engine for the future of any organization, ensuring new initiatives come from anywhere in the company.	Innovation
2.	Reward systems, in concordance with an innovation culture.	Rewards
4.	Necessary planning of the information systems, in a collaborative work, involving the whole organization.	Strategic planning of information systems

In the proposed model, the new dimension "people", took the place of the dimension skills (sixth dimension in the reference model), which was eliminated. The decision to replace the skills dimension was adopted because the reference model concentrates in this construct a wide range of categories, impeding the appropriate and independent measurement of each. Under this consideration, a new construct was introduced, in order to capture how the company involves their personnel and endows them with the appropriate tools for contributing to reach the organizational objectives and goals. (Kane, O'Palmer, Nguyen, Kiron & Buckley, 2015; Kane, Phillips, Copulsky & Andrus, 2019; Mokhber, Tan, Vakilbashi, Zamil & Basiruddin, 2016).

Upon further investigation, another point that caught the author's attention, was that three more important constructs were absent in the reference model. They are: 1) Innovation, 2) Rewards, and 3) Strategic planning of information systems.

In regard to innovation and rewards, it is true that a couple of questions are isolated from other dimensions of the reference model, but the existence of independent dimensions that specifically measure the state of the organization in these areas is considered vital. Such dimensions, although closely related to each other, measure different aspects, so it is necessary to define a specific set of questions in each case to operationalize these constructs.

Innovation and reward systems that promote a culture of innovation can be considered as the engine of the future development of any company that aspires to remain current and competitive. (Davenport,

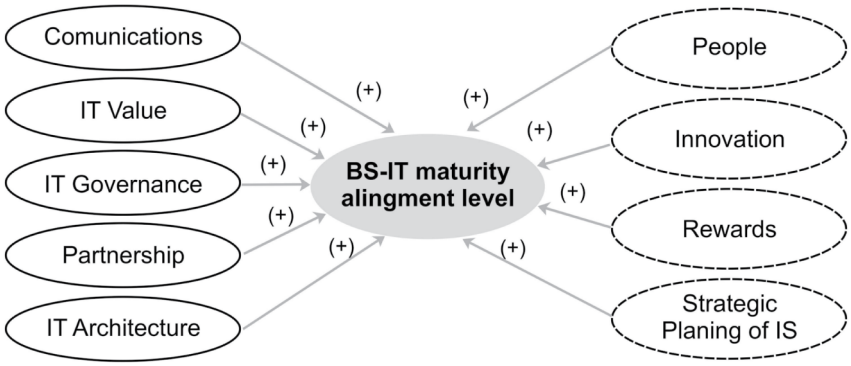
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Leibold & Voelpel, 2006; Fichman, Dos Santos & Zheng, 2014; Jehanzeb, Rasheed, Rasheed A. & Aamir; 2012, Mokhber, et al. 2016).

In reference to the strategic planning of information systems dimension, which by definition, aims to align the business with IT (Altameen, Aldrees & Alsaeed, 2014; Amrollahi, Ghapanchi & Talaei-Khoei, 2014), providing users with appropriate tools at their disposal through a formal and systematic process, cannot be absent in a model of maturity measurement. Such updating - in accordance with the new scenario – is considered to contribute greatly to a better measurement of the level of maturity of the strategic alignment between the business and the IT function.

As it is possible to observe in Figure 1, the updated model - containing the four new dimensions, postulates - in the same way- a positive relationship of each construct on the Business-IT maturity alignment.

Figure 1. Updated SAMM



A New Approach in the Operationalization of the Construct

After reviewing the way in which the questions are formulated in the construct that operationalizes the reference model, the authors decided to propose a simpler and easier to understand structure for the interviewee, noticeably different from the structure of the first one. The original questionnaire, according to the analysis conducted, presents questions - to some extent - confusing and complex, which tried to measure more than one characteristic with the same question, technically known as double-barreled questions. While in the reference questionnaire, each question has 5 possible answers, the new instrument uses a 5-level Likert scale, in consistency with the 5-level maturity scale of the reference model. Doing this, the interviewee chooses the level - from 1 to 5 - that best represents the practices of their organization for each question formulated, with 5 being the best possible result to reach theoretically.

It is considered that the aforementioned changes, in reference to the format of the new construct, make it easier for the interviewee to interpret, while at the same time, make it easier for the interviewer to apply.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

DRIVING A DIGITAL TRANSFORMATION

Digital Transformation Concept: Implications to the Organizations

According to Herbert (2017), everyone has a different definition of the conditions, extent, and purpose for digital transformations (DT). This lack of clarity is one of the reasons why these programs fail. In the recent increase in DT processes, we have witnessed failures, where more than two thirds of these processes fail or do not reach the expected potential (Baculard, Colombani, Flam, Lancry & Spaulding, 2017; Remes, Manyika, Bughin, Woetzel, Mischke, & Krishnan, 2018; Robinson, 2019; Walker, 2017). Regarding this, Davenport & Westerman (2018), indicate that such initiatives do not end well, in part because digital is not just something that can be bought and connected to the organization. This is a multidimensional process, which not only involves technology, but is a continuous process that changes the way of doing business.

In the author's point of view, the different interpretations about what DT really means, entails two considerations, which are not always explicitly commented in the literature. First, the lack of maturity of DT initiatives, does not allow for a better understanding of this phenomenon in all its dimensions. As Venkatraman says: "We are in the early stages of this digital transformation" (Venkatraman, 2017, p. 8). In this regard, we can argue that DT - as a new concept – is not mature enough. Second, the need for strategic alignment between the business and the IT function, regardless of the levels of integration that the IT function has in the organization, understanding that the speed of fusion between business and IT will depend on the type of firm, industry, and market in which it develops.

In reference to these points, it is necessary to establish a difference in two aspects: On one hand, the necessary digitalization of all key processes in an organization, together with the creation of new business models and operational models to be successful in the digital era, and on the other hand, the complete fusion between business and IT. According to this, a distinction is established between companies where the entire business uses technology for the execution of its operations, and those that need to harness the technology to be more competitive, while striving to avoid obsolescence and extinction.

When explaining the points above, the authors intend to give support to the distinctions that exist among different types of companies, such as "tech giants", "tech entrepreneurs" and "legacy or incumbent companies". While tech giants and tech entrepreneurs are digital-driven companies, the opposite can be said about non-IT companies, that continue operating by old playbooks (Rogers, 2016, Venkatraman, 2017). This produces a continuous and ever-increasing gap among these companies, giving the former a huge advantage over the latter. If these non-IT companies are aware of this reality and conscious of the towering disadvantages they face, they can change the way that they conduct their business, preparing themselves to utilize the digital resources they have available, introducing new business models and processes, making themselves more competitive, ultimately closing the gap between them and the other types of companies. Paraphrasing Gupta's words (Gupta, 2019), strengthening their core business while simultaneously facing this turbulent environment, in order to become an entirely digital company. When presenting these points, the authors are making the argument for focusing on non-IT companies when applying this updated model and DT Strategy framework.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Digital Transformation Strategy Framework

Having proposed an updated model for measuring the business-IT alignment maturity level in a digital scenario, it is necessary to define a digital framework under which the updated model will operate. In this regard, based on a review of the most recent publications about the concept of DT and other closely related concepts, a framework was developed by the authors, which considers three fundamental pillars for executing a DT strategy. They are: 1) Building digital capabilities, 2) Building an innovative organizational culture, and 3) Strong leadership and a shared vision. (Herbert, 2018; Kane et al, 2019; Jansson & Andervin, 2019; Sacolick, 2017; Venkatraman, 2017; Vial, 2019; Weill & Woerner, 2013; Westerman, Bonnet & McAfee, 2014). These three pillars work together allowing non-IT companies to face this digital environment successfully.

These pillars contain in themselves all of the key necessary factors for driving a successful digital strategy, which means products, services and processes become digitally supported (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2016; Venkatraman, 2017), putting the customers at the center stage, focusing on the "pain points of the consumer" while driving any digital initiative. (Gupta, 2018). All three pillars work together in a digital ecosystem. Figure 2 shows the DT strategy framework proposed for non-IT companies, working to achieve an entire digitalization of their business.

Figure 2. DT strategy framework (transit of non-IT companies on the path to becoming a digital entity)

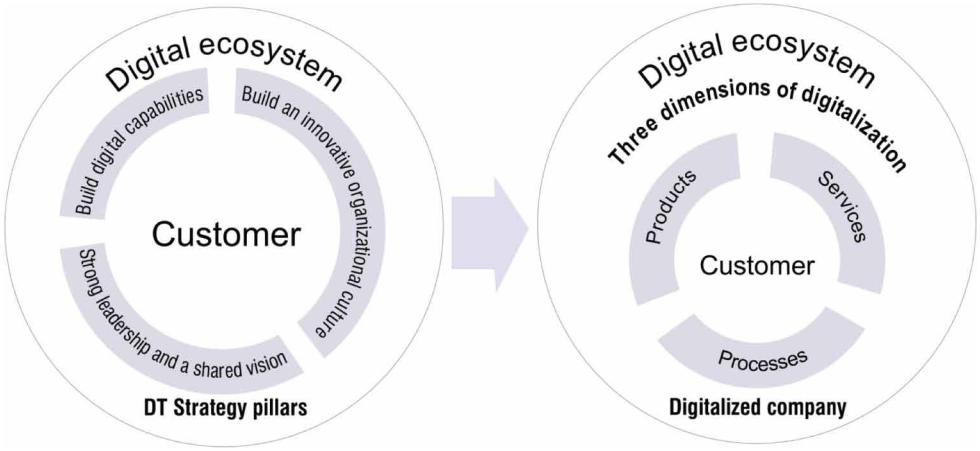
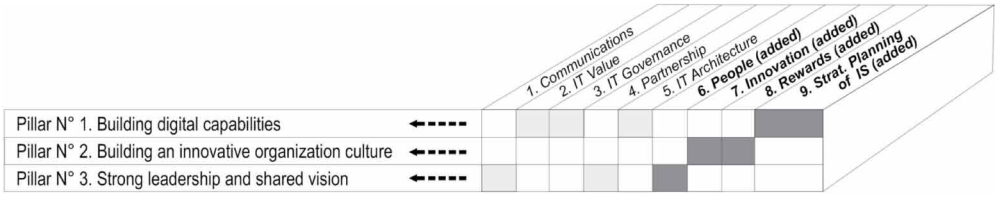


Figure 3. Dimensions of the updated model fill in the gap of the DT Pillars framework



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTEGRATING THE UPDATED MODEL INTO THE DT STRATEGY FRAMEWORK

When the updated model is integrated to the TD Strategy framework, it is possible to observe how the fundamental aforementioned pillars, are now complemented with previously absent aspects, that allow us to have an even stronger and more complete measurement of the phenomena studied. Figure 3 shows how DT pillars contain the relevant aspects necessary for being successful when implementing a DT strategy.

Figure 4. Dimensions supporting each DT strategy pillar

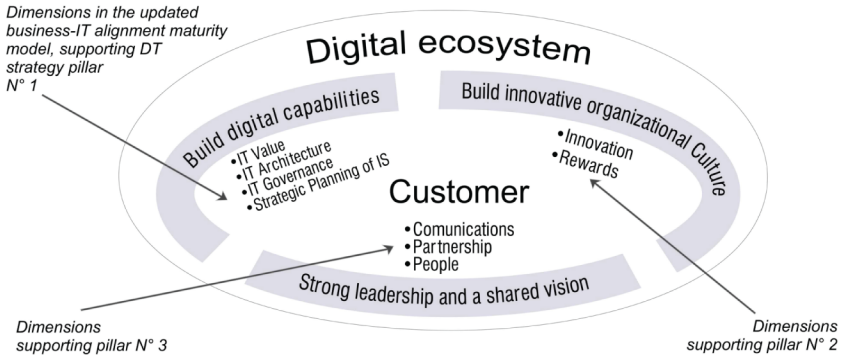


Figure 3 demonstrates how pillar N° 2 was not supported by any of the previously existing dimensions, leaving us with an important gap in the reference model, that we close by adding dimensions 7 and 8. On a smaller scale, similar gaps were identified in pillars N°1 and N° 3, where we added new dimensions to fill in existing gaps.

Now that the updated model and the newly proposed DT strategy framework have been integrated, a company is now better equipped to measure the business-IT alignment maturity level and form a roadmap of how to further improve. Having this in place, the company must now work to complete two tasks simultaneously: 1) Strengthening their core business, and 2) Preparing the whole organization to initiate a complete transformation in the three dimensions that the digitalization involves. Complementing the previous figure, Figure 4 shows the factors (dimensions) that each pillar in the proposed DT strategy framework contains.

RESEARCH METHODOLOGY

General Aspects

An exploratory research was carried out for conducting the investigation. The study considered two phases: 1) Application of the new construct to the pilot sample, 2) In-depth interviews of the same sample, once the questionnaire was completed. The sample was composed of executives from IT and non IT areas in same proportions. The purpose of having two groups of respondents, from IT and operational areas, was to explore differences or similarities of perception in the measurement of maturity of business-IT alignment, which enriches the results of the study.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pilot Sample

The pilot sample consisted of 30 interviewees, 15 of them from the IT areas, and 15, from areas related to the business operations, who expressed their opinions regarding the business IT alignment organizational practices. The interviewees came from mostly large and renowned Chilean companies from industries such as non-metallic manufacturing companies, hotels and restaurants, financial intermediation, real estate activities, social and health services, transportation, storage and telecommunications, and companies classified as other activities.

Data Collection Instruments

Two instruments were used for the implementation of the investigative process. First: A structured questionnaire, which purpose was to operationalize the updated model. The questionnaire consisted of 54 questions, all of them posed as statements. Second: A semi-structured protocol, acting as a guide for in-depth interviews, in order to contrast the results obtained after the subsequent analysis of the new construct, and to enrich the investigative process itself, with new findings, which are not possible to capture with the sole application of a structured questionnaire.

Validity and Reliability Testing of the New Construct

In relation to the questionnaire applied, and considering that it corresponds to a new instrument, evaluations were carried out using correlational techniques (Cronbach's Alpha for reliability analysis) and multivariate techniques (Exploratory factor analysis for validity test, based on the principal components analysis - PCA). (Corral, 2009; Meraz & Maldonado, 2015; Morales, 2007).

Thematic Analysis

With respect to the data collected from the in-depth interviews, the thematic analysis method was chosen, characterized by its flexibility and practicality when analyzing results from unstructured information. The method allowed the construction of taxonomies according to the criteria of significance inherent to the nature of the research, and to establish the essential ideas that guided this work (Braun & Clarke, 2006).

RESULTS AND DISCUSSION

Validity and Reliability Tests

After having tested the new construct, validity and reliability tests were applied. As a result, the evaluation of the construct concluded that the new instrument is stable, showing internal consistency, obtaining a general result of 0.984 (Cronbach alpha index), which leads in the first instance to indicate that the test is reliable in its entirety. Technically, to a high degree the individual differences of the scores are attributable to real differences and not to random measurement error. As a complement to the previous coefficient, a reliability analysis was added to analyze each dimension of the instrument separately, by

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

inquiring about the high overall value obtained. As a result, the coefficients decrease while maintaining a sufficient value to maintain the internal consistency by dimension, which makes it possible to conjecture that the greater overall value in this respect is attributable to the complementation of these dimensions when they are integrated to form the construct.

In the validity test (PCA), six components captured more than 80% of the heterogeneity of the data, representing almost all of the variables. In the same way, a deeper analysis suggested to eliminate five questions from the questionnaire, considering that they do not provide more information to explain the variability of the construct. Tables 2 and 3 summarize the results of the reliability and validity tests.

In reference to the validity test (Table 3), a search for underlying concepts was carried out, with the purpose of explaining the theoretical grouping of questions in these six components suggested by the test. As a conclusion, the authors decided to maintain their original design, considering that the instrument better segments those aspects which it desires to emphasize, by measuring its status and evolution.

Table 2. Cronbach's alpha values

Dimensions of the Updated Model	Cronbach Index	No. Elements	Item-Test Correlations		
			Min	Ave	Max
D1: Communications	0.898	6	0.62	0.73	0.81
D2: IT Value	0.937	8	0.63	0.78	0.90
D3: IT Governance	0.932	6	0.73	0.81	0.87
D4: Partnership	0.885	5	0.59	0.73	0.83
D5: IT Architecture	0.850	7	0.49	0.61	0.75
D6: People	0.909	7	0.47	0.73	0.90
D7: Innovation	0.945	5	0.67	0.85	0.93
D8: Rewards	0.887	4	0.63	0.76	0.89
D9: Strat. Plan. of IS	0.946	6	0.76	0.84	0.92

Table 3. Summary of principal components

Component (PCA)	Total	% Variance Explained	% Accumulated	No. Questions
1	30.151	55.834	55.834	14
2	3.873	7.172	63.006	9
3	3.273	6.062	69.068	10
4	2.663	4.931	73.999	6
5	1.800	3.333	77.332	6
6	1.540	2.853	80.185	4

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Preliminary Descriptive Score

With favorable results in the validity and reliability evaluations of the new construct, we proceeded to analyse the results of the scores obtained by the interviewees with the new instrument. To carry out this task, were calculated the scores at the consolidated level, in the 9 dimensions that compose the construct, adding to the results, the scores of the two groups of interviewees. The first part yielded a weighted average consolidated score - including all dimensions, and all respondents, of 3.22, with significant differences between scores by dimensions, innovation and rewards being the weakest. In the separation by groups of interviewees, the average IT score exhibited a higher value, with 3.39, while, for business executives, it was 3.06. Within the dimensions by groups of respondents, an important variability was observed, which was measured through the Standard Deviation - SD (Business Executives) / SD (IT executives) ratio. This ratio was very useful to measure the level of variability of the responses of the interviewees from the Business (BS) and IT areas, subject to the same questions for each dimension of the construct. Table 4 presents a preliminary descriptive summary of the scores obtained from the entire sample submitted to the pilot test.

Table 4. Summary of preliminary descriptive scores

Dimensions	Weighted Averages	Min	Max	Average IT Executives (TI)	Average Operational Areas (BS)	(SD BS)/(SD IT)
D1: Communications	3.33	2.90	3.73	3.59	3.07	1.00
D2: IT Value	3.08	2.60	3.40	3.37	2.80	1.14
D3: IT Governance	3.29	2.97	3.63	3.43	3.16	0.75
D4: Partnership	3.45	3.10	3.70	3.65	3.24	1.23
D5: IT Architecture	3.56	3.07	3.80	3.69	3.43	1.23
D6: People	3.29	2.90	3.50	3.51	3.06	0.43
D7: Innovation	2.95	2.80	3.23	2.88	3.02	1.29
D8: Rewards	2.30	1.87	2.80	2.32	2.28	0.72
D9: Strat. Plan. of IS	3.43	3.27	3.67	3.57	3.30	1.57
All dimensions	**3.22**	**1.87**	**3.80**	**3.39**	**3.06**	**0.83**

Regrouping Companies According to Their Scores

After reviewing the results at the aggregate level, a criterion of segmentation was applied, in order to differentiate the behaviour of the different companies submitted to the study. The criteria used to segment the companies consisted of grouping them according to the scores obtained in the questionnaire. For scores above this average, the companies were considered with a greater development in the level of alignment between the business and IT. Following this criterion, the companies with a score above the weighted average of the whole sample were assigned to group 1, while the companies with scores below this average, were assigned to group 2. The regrouping procedure gave as a result 16 companies with scores above the weighted average and 14, below. The procedure also meant separating the scores between the two types of executives subject to the process (IT and operational areas).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

After calculating the new scores, the variability presented in the first approach to the scores (Table 4), decreased significantly, not only between dimensions, but also between type of executives. It was possible to observe this behavior amongst both the scores of group 1, and group 2, which are represented partially in Figure 5.

At the same time, it was possible to observe that the ratio (SD BS) / (SD IT), obtained for companies in group 1, was closer to 1 for each dimension, compared to the same calculation shown in the preliminary scores, a fact that indicates that the variability in the responses of the reporting units for this group is smaller. In other words, there would be less discrepancy in how the practices of the organization are perceived from the point of view of each reporting unit, for each of the dimensions evaluated.

Treatment of the In-Depth Interview Phase

The answers obtained in the application of the semi-structured interview protocol were tabulated, seeking spontaneous answers from the interviewees, which were not possible to obtain by applying the new construct alone. as a result of this phase, and following the methodology of thematic analysis, the different responses were categorized. After that, the resulting categories were characterized as facilitators (+) or inhibitors (-) of strategic alignment processes between the IT function and the business. This categorization and characterization was carried out separately, both for the responses of IT informants, and for informants coming from functional areas, as is possible to observe in Table 5.

Table 5. Facilitating and inhibitory categories

Facilitating Categories (+)						**Inhibitory Categories (-)**		
IT Executives			**Business Executives**			**IT Executives**	**Business Executives**	
IT-1	IT-8	IT-18	BS-1	BS-12	BS-23	IT-12	BS-2	BS-22
IT-2	IT-9	IT-22	BS-4	BS-13		IT-16	BS-3	
IT-3	IT-10	IT-23	BS-5	BS-14		IT-17	BS-6	
IT-4	IT-11	IT-24	BS-7	BS-15		IT-19	BS-9	
IT-5	IT-13	IT-25	BS-8	BS-17		IT-20	BS-16	
IT-6	IT-14	IT-26	BS-10	BS-18		IT-21	BS-20	
IT-7	IT-15	IT-27	BS-11	BS-19			BS-21	

According to Table 5, out of 98 spontaneous responses from IT interviewees, 27 categories were identified, 21 of them as enablers in business-IT alignment process, while 6, as inhibitors. In the same way, a total of 86 spontaneous responses were reduced to 23 categories, 15 of them, as enablers in business-IT alignment process, and 8, as inhibitors.

Perceptions of New Dimensions According to the Interviewees

Among the multiple responses of the interviewees, which support the inclusion of the 4 new dimensions that update the reference model, we can mention the following.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In reference to the people dimension, an IT executive from an air transport company commented: "As a result of involving personnel, giving them knowledge of organizational objectives and goals, and understanding their needs, we use new applications that promote collaborative work and the efficiency of operations". In contrast, the following quote, was made by an executive from a functional area of a company, classified under other services, regarding the lack of more active involvement of the people in the progress of the company. "There is some degree of understanding between IT and the business at the managerial level, but this does not reach the operational level. The operating personnel do not have the vision of the business, because the management does not share it with them".

In reference to the innovation dimension, which together with the rewards dimension, presented the lowest score in the applied instrument, we find this spontaneous answer: "As a technology company, the contribution of IT to the business is fundamental. Without IT the company could not operate, however, innovation is lacking to be more competitive" - comment indicated by a commercial executive of a technology company. In the same sense, an executive of a company of the retail sector said: "The company does not have a budget to innovate without guarantee of results, and if that were not the case, it would encourage the IT area and its personnel to be more proactive in the search for new solutions for the final and internal clients".

Regarding the rewards dimension, closely linked to the innovation dimension, but measuring different variables, the interviewees did not directly express spontaneous answers regarding the degree of conformity or disagreement with the reward system in their organizations, which encourages an innovation culture. Therefore, the results for this new dimension are based on the findings obtained after applying the new instrument, and the analysis of the questions associated with it. According to that, is possible to observe a lack of a reward system that encourages innovation as the engine of future development of the companies.

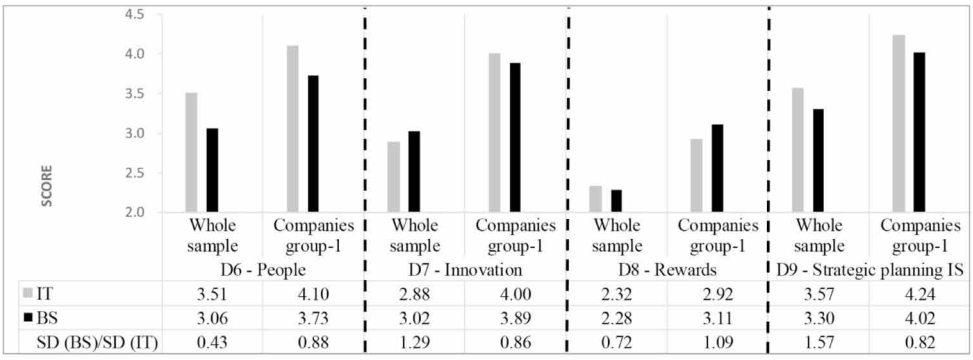
Lastly, in reference to the dimension strategic planning of information systems, an interviewee from an IT unit whose company participates in the real estate sector said: "Different areas of the company were equipped with information systems according to their needs and requirements, with which the productivity of the employees improved. This initiative has been encouraged by the management committee of the holding, as a generalized practice for all companies in the group."

Behaviour of New Dimensions Separately

As a summary of the behaviour of the 4 dimensions that complement the reference model, Figure 2 shows the scores of these dimensions, and the variability ratio used as a measure of discrepancies among responses of the interviewees. As it is possible to see, in all cases the scores increased when grouping the interviewees, both from the IT as well as the functional areas, in companies that present a greater development in processes of alignment between the business and the IT (Group 1 as criterion of segmentation). At the same time, the degree of variability of the answers decreases notably among groups of respondents, as demonstrated by an SD ratio closer to 1. A fact that demonstrates a greater alignment between both groups, faced with the same set of questions in the dimensions that modify the original model. Figure 5 shows only the results of group 1 in comparison with result of the whole sample, for these 4 dimensions.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Behavior of new dimensions in the updated model



	D6 - People		D7 - Innovation		D8 - Rewards		D9 - Strategic planning IS	
	Whole sample	Companies group-1	Whole sample	Companies group-1	Whole sample	Companies group-1	Whole sample	Companies group-1
IT	3.51	4.10	2.88	4.00	2.32	2.92	3.57	4.24
BS	3.06	3.73	3.02	3.89	2.28	3.11	3.30	4.02
SD (BS)/SD (IT)	0.43	0.88	1.29	0.86	0.72	1.09	1.57	0.82

The score levels of these new dimensions are found in the average scores of the dimensions that were not modified, which provides consistency to the updated model as a whole, with the additional contribution of these 4 new dimensions, filling in the gaps of the original model. However, the low score shown by dimension 8 (rewards) - regardless of the group in which it was measured - is undoubtedly a concern, revealing that this dimension is not well perceived by IT and non-IT executives alike.

Combined Analysis After Regrouping (Scores and In-Depth Interviews)

Based on the previous segmentation by score and the findings of the interview phase, a combined analysis was made. The results reveal consistency between scores considered high for this analysis, with categories of responses considered as facilitators (+) in alignment processes of this nature. In the same way, consistency was evidenced between scores considered low, with categorizations of responses characterized as inhibitors (-) in strategic alignment processes.

The response categories of the in-depth interview phase, revealed by the reporting units, gave broad support to what was previously reviewed in the literature, in reference to such processes. Table 6 represents the segmentation described above, combining scores gotten from the new construct, with spontaneous answers.

Table 6. Summary of combined analysis (scores and in-depth interviews)

Group According Score	No. Informants	Consolidated Average Score	IT Average Score	BS Average Score	Categories In-Depth Interview IT (+)	Categories In-Depth Interview IT (-)	Categories In-Depth Interview BS (+)	Categories In-Depth Interview BS (-)
Group 1	16 (9 IT - 7 BS)	3.91	4.00	3.79	IT1, IT2, IT3, IT4, IT5, IT6, IT7, IT8, IT10, IT11, IT13, IT14, IT8, IT22, IT23, IT24, IT25, IT26	IT12, IT17, IT21	BS1, BS4, BS5, BS7, BS8, BS10, BS11, BS12, BS13, BS14, BS15, BS17, BS18, BS19, BS23	BS6, BS9, BS20, BS21
Group 2	14 (6 IT - 8 BS)	2.37	2.34	2.39	IT2, IT6, IT9, IT10, IT11, IT15, IT17, IT27	IT16, IT19, IT20, IT21	BS5, BS7, BS13, BS14, BS17, BS23	BS2, BS3, BS6, BS9, BS16, BS20, BS22

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Summarizing the findings of both phases, the questionnaire and in-depth interviews, we can conclude that there is consistency between the scores and the answers obtained from the interviewees, i.e. high scores equal positive answers, demonstrating good perception and conversely, low scores paired with negatives answers, demonstrating poor perception. Practices such as those indicated, have a positive impact on the scores obtained, and therefore a desirable impact on any organization that aspires to align the business with the IT function.

Furthermore, the results obtained through the empirical approach of this investigation have revealed underlying correlations to all of the information provided by the academic community that was studied during the preliminary stages of this investigation.

Business-IT Alignment Maturity Level in Chilean Companies - Implications

Once the results obtained for each of the dimensions provided by the updated model were known - at an aggregate level - the calculation of the average scores for each pillar of the proposed DT strategy framework was calculated. The purpose of this task was to know first: The level of maturity of the alignment between the business and the IT function, achieved by Chilean companies - part of the sample - in a digital context provided by the framework. Second: Know the robustness (or weakness) of each of the three pillars that make up the framework, such that it guarantees a successful transition towards a digitalization of the Chilean companies submitted to this evaluation, but also strengthening their core business while making such transition.

As it can be seen in Table 7, pillar 1 - *build digital capabilities* and pillar 3, *strong leadership and a shared vision* - are very similar in their scores, with an average of 3.34 for pillar 1 and an average of 3.36 for pillar 3. On the other hand, pillar 2 - *build an innovative organizational culture* - appears as the weakest of the three, with an average score of 2.63.

Table 7. Scores by dimensions of the updated model integrated in the DT strategy framework

Pillar N° 1	Ave. Score	Pillar N° 2	Ave. Score	Pillar N° 3	Ave. Score
IT Value	3.08	Innovation	2.95	Communications	3.33
IT Governance	3.29	Rewards	2.30	Partnership	3.45
IT Architecture	3.56			People	3.29
Strat. Plan. of IS	3.43				
Average by Pillar	**3.34**		**2.63**		**3.36**

As a result of this analysis, it is possible to observe that a general score of the sample under evaluation, with an average score of 3.22 (which was previously presented in Table 4), conceals an important point, which is possible to observe by means of the analysis of the pillars of the proposed framework. This finding, in the context of an exploratory study, indicates that Chilean companies, part of this sample, would show a notoriously low development in a pillar closely related to the ability of organizations to innovate in new and more creative ways of conducting their operations.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Therefore, the results obtained for pillar N° 2, would make evident the lack of innovation of Chilean companies, and a reward system consistent with this dimension. This issue directly affects companies in their capacity of achieving the alignment with enterprise objectives and co-creating innovative strategies and new business capabilities.

Since a comparative study with similar characteristics to the present investigation does not exist, it is not possible to evaluate or compare the evolution or involution - among other aspects - of the Chilean companies when interpreting the overall score of 3.22 for the sample as a whole.

Because of this limitation, it is useful to refer back to the results of the study presented in Table 6. When interpreting this table, we can conclude that there are companies with better results when compared with their peers, in the evaluation of almost all dimensions that the updated model contains. This indicates that differences do exist among companies when analyzing the level of maturity reached. In this way, when comparing the overall maturity level reached by companies in the sample, it is possible to appreciate companies with greater development in reaching the higher levels of alignment.

At this point, it is necessary to emphasize that, the score obtained in this process is an indication of the maturity level at a certain point in time, representing a measurement of a dynamic process in constant change, but in no case, a passive state desirable to reach and maintain.

RESEARCH SCOPE

Approach to the Investigation

The research was proposed and implemented in a sequence of formal stages, following a traditional approach when testing a new instrument, adhering to the precepts of the scientific method, until arriving at the application of a pilot test of the instrument to a subset of the population of interest, in order to test the updated model in a first "staging". The purpose of applying this sequence was to explore how the model can be operationalized by means of this new instrument, allowing the contextual adjustment and balance of its content, showing a preliminary version of its scope through its results. The exploratory results would give us an advanced look at its massive application to firms in the industry, and a firsthand knowledge of potential conclusions about the degree of maturity in the business-IT alignment processes.

Limitations

Considering the nature of the investigation, with a non-probabilistic conformation of the sample, it is understood that the results of the study exploring the modifications to SAMM are limited by such definition; therefore, this study is neither predictive nor confirmatory. Accordingly, it is not possible to make inferences about the results, despite the application of an empirical, rational and analytical method.

Future Improvements

The authors recommend to test the updated model with a larger sample, by means of a sample design that allows confirmatory conclusions, as well as to reinforce this application with qualitative techniques that can suggest revisions to the alignment maturity measurement model proposed. Also leaving open the possibility of adding new elements to modify the dimensions already incorporated in the updated model.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

In order to answer the research question, the authors made a thorough review of the information available by the academic community on the topic of business-IT alignment and the tools for measuring the degree of maturity reached in this process. After this investigation, a conviction existed that the SAMM model, proposed by Luftman (2000), was the most efficient in measuring the alignment before the emergence of the new digital environment. For this reason, it was chosen as a baseline for constructing a new model that could integrate the aspects determined to be absent for measuring the business-IT alignment in a more efficient way, considering the new digital scenario.

Since, the reference model was created under different conditions, it was necessary to construct a digital transformation strategy framework, under which it could operate. In order to do this, the authors turned once more to the information published by the academic community on this topic and identified three key pillars necessary for non- IT companies to be successful on the path to becoming a digital entity.

Once the reference model was updated, and the DT strategy framework was built, an investigative process was applied to a relevant sample of companies.

Having therefore evaluated the behavior of the updated model, and the construct that operationalizes it, in a relevant sample of companies, it is possible to observe that the new construct obtained favorable results in the validity and reliability tests. Therefore, the results obtained from it—measured in scores—are relevant when establishing exploratory conclusions from its implementation, which, combined with the in-depth interview phase of this investigation, reinforces the results obtained by the application of the new questionnaire. This demonstrates consistency with the literature reviewed, that deals with these kinds of processes, getting positive results when contrasting both phases. In this regard, it is possible to conclude that the decision to use two data collection tools, is considered a valuable contribution to the research.

By explicitly observing the four dimensions that update the reference model, it is possible to point out that they are an important contribution to these kinds of tools, so it is suggested that they should be incorporated into models whose objective is to measure the degree of maturity of alignment between the IT function and the business.

In the author's opinion, these elements cannot be absent in models that aspire to capture changes in the new environment, aligning the IT function with the operational areas. The lack of an updated business-IT alignment maturity level tool will limit the chances of being successful when carrying out a DT Strategy.

Regarding the business-IT alignment maturity level obtained in this study, for companies operating in Chile, which could possibly reflect the level of alignment in companies with similar characteristics to the sample, with a large number of them showing a concerning misalignment between the business strategy and the IT function, limiting their chances of success in this digital environment.

When integrating the scores obtained by the application of the updated model with the DT strategy framework, an important finding emerges. This finding reveals that Chilean companies, would show a notoriously low development in the pillar N° 2 of this framework - in the context of an exploratory study - impeding at the same time companies from strengthening their core business, on the path to becoming a digital entity, constraining the results of technological transformation initiatives.

Therefore, the results obtained in regard to pillar N° 2, could be a recurrent issue, making the lack of innovation and congruent reward system, evident. This issue directly affects companies in their ability to achieve alignment with enterprise objectives and co-creating innovative strategies and new business capabilities.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Findings like the ones presented by this investigation, applied to a single company can be enriched by cross analyzing the available data at different levels, for example: The score as an overall result integrated with the DT strategy framework, magnitude of the scores obtained, splitting the scores and dimensions by grouping the interviews, etc. Then, this information can be fed to organizations highlighting the aspects where the companies need to improve.

In this way, one of the main purposes of the authors, when looking for an updated tool, with the capacity to capture in a better way the changes in this digital environment has, in the author's opinion, been achieved, by a tool that can detect the weaknesses of the alignment, providing a continuous improvement process and acting as a roadmap for the entire organization.

Finally, after a theoretical review on the concept of strategic alignment between the business and IT, and having carried out an empirical implementation of an updated model to measure the maturity of this alignment, the results of the research are placed at the disposal of the academic community and practitioners for its evaluation and consideration.

REFERENCES

Altameen, A. A., Aldrees, I. A., & Alsaeed, A. N. (2014). Strategic Information System Planning (SISP). *Proceedings of the World Congress on Engineering and Computer Science – WCECS,* San Francisco, CA (*Vol. 1*, pp. 22-24). Academic Press.

Amrollahi, A., Ghapanchi, A., & Talaei-Khoei, A. (2014). Three decades of research on strategic information system plan development. *Communications of the Association for Information Systems*, *34*(6), 1439–1467.

Aversano, L., Grasso, C., & Tortorella, M. (2016). Managing the alignment between business processes and software systems. *Information and Software Technology*, *72*(C), 171–188. doi:10.1016/j.infsof.2015.12.009

Avison, D., Jones, J., Powell, P., & Wilson, D. (2004). Using and validating the strategic alignment model. *The Journal of Strategic Information Systems*, *13*(3), 223–246. doi:10.1016/j.jsis.2004.08.002

Baculard, L.-P., Colombani, L., Flam, V., Lancry, O., & Spaulding, E. (2017). *Orchestrating a Successful Digital Transformation*. Retrieved from https://www.bain.com/insights/orchestrating-a-successful-digital-transformation

Benjamin, R., Scott-Morton, M., & Wyman, J. (1983). *Information Technology: A Strategic Opportunity*. Sloan Center for Information Systems Research.

Bharadwaj, A., El Sawy, O., Pavlou, P., & Venkatraman, N. (2016). Digital Business Strategy: Toward a Next Generation of Insights. *Management Information Systems Quarterly*, *37*(2), 471–482. doi:10.25300/MISQ/2013/37:2.3

Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. doi:10.1191/1478088706qp063oa

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bughin, J., Catlin, T., Hirt, M., & Willmott, P. (2018). *Why Digital Strategies Fail*. McKinsey. Retrieved from https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/why-digital-strategies-fail

Chan, Y., Huff, S., Barclay, D., & Copeland, D. (1997). Business Strategic Orientation, Information Systems Strategic Orientation and Strategic Alignment. *Information Systems Research*, *8*(2), 125–150. doi:10.1287/isre.8.2.125

Coltman, T., Tallon, P., Sharma, R., & Queiroz, M. (2015). Strategic IT Alignment Twenty-Five Years on. *Journal of Information Technology*, *30*(2), 1–10. doi:10.1057/jit.2014.35

Corral, Y. (2009). Validez y Confiabilidad de los Instrumentos de Investigación para la Recolección de Datos. *Revista Ciencias de la Educación*, *19*(33), 228–247.

Davenport, H.T., Leibol, M., & Voelpel, S. (2006). *Strategig Management in the Innovation Economy*. Publicis Corporate Publishing and Wiley-VCH Verlag GmbH & Co.

Davenport, T., & Westerman, G. (2018). Why so Many High-Profile Digital Transformations Fails? Retrieve from https://hbr.org/2018/03/why-so-many-high-profile-digital-transformations-fail

Fichman, R., Dos Santos, B., & Zheng, Z. (2014). Digital Innovation as a Fundamental and Powerful Concept in the Information Systems Curriculum. *Management Information Systems Quarterly*, *38*(2), 329–353. doi:10.25300/MISQ/2014/38.2.01

Fonstad, O., & Robertson, D. (2006). Transforming a company, project by project: The IT engagement model. *MIS Quarterly Executive*, *5*(1), 1–14.

Gupta, S. (2018). *Driving Digital Strategy. A Guide to Reimaging your Business*. Boston, MA, USA: Harvard Business Review.

Henderson, J., & Venkatraman, N. (1990). *Strategic Alignment: A Model for Organizational Transformation via Information Technology*. Sloan Center for Information Systems Research.

Henderson, J., & Venkatraman, N. (1993). Strategic Alignment: Leveraging Information Technology for Transforming Organizations. *IBM Systems Journal*, *32*(1), 472–484. doi:10.1147j.382.0472

Herbert, L. (2017). *Digital Transformation: Build Your Organization's Future for the Innovation Age*. Ingland and USA/London and New York: Bloomsbury Publishing Plc.

Horlach, B., Drews, P., & Schirmer, I. (2016, March). Bimodal IT: Business-IT alignment in the age of digital transformation. *Paper presented at the meeting of the Multikonferenz Wirtschaftsinformatik (MKWI)*, Germany. Academic Press.

IT Web Brainstorm CIO Survey. (2014). Retrieved from http://v2.itweb.co.za/index.php?option=com_content&view=article&id=138332

Jansson, J., & Anderwin, M. (2019). *Leading Digital Transformation: You Can't Stop the Waves but you Can Learn to Surf* (Special ed.). Amazon Kindle.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Jehanzeb, K., Rasheed, M., Rasheed, A., & Aamir, A. (2012). Impact of Rewards and Motivation on Job Satisfaction in Banking Sector of Saudi Arabia. *International Journal of Business and Social Science*, *3*(21), 271–278.

Johnson, A., & Lederer, A. (2010). CEO/CIO Mutual Understanding, Strategic Alignment, and the Contribution of IS to the Organization. *Information & Management*, *47*(3), 138–149. doi:10.1016/j.im.2010.01.002

Kane, C. G., Phillips, N. A., Copulsky, R. J., & Andrus, R. G. (2019). *The Technology Fallacy. How People are Real Key to Digital Transformation*. Cambridge, MA: MIT Press.

Kane, G., O'Palmer, D., Nguyen, A., Kiron, D., & Buckley, N. (2015). *Strategy, Not Technology, Drives Digital Transformation*. MIT Sloan Management Review and Deloitte University Press.

Kappelman, L., McLean, E., Johnson, V., & Gerhart, N. (2014). The 2014 SIM IT Key Issues and Trends Study. *MIS Quarterly Executive*, *13*(4), 237–263.

Keen, P. (1986). *Competing in Time: Using Telecommunications for Competitive Advantage*. Cambridge, MA: Ballinger Publishing Co.

Lederer, A., & Mendelow, A. (1989). Information Systems Planning: Incentives for Effective Action. *Newsletter ACM SIGMIS Database*. *The Data Base for Advances in Information Systems*, *20*(3), 13–20. doi:10.1145/86227.86233

Luftman, J. (2000). Assessing Business-IT Alignment Maturity. *Communications of the Association for Information Systems*, *4*(14), 1–51.

Luftman, J., & Kempaiah, R. (2007). An Update on Business-IT Alignment: "A Line" Has Been Drawn. *MIS Quarterly Executive*, *6*(3), 165–177.

Luftman, J., Lewis, P., & Oldach, S. (1993). Transforming the Enterprise: The Alignment of Business and Information Technology Strategies. *IBM Systems Journal*, *32*(1), 198–221. doi:10.1147j.321.0198

Luftman, J., Lyytinen, K., & Ben-Zvi, T. (2015). Enhancing the Measurement of Information Technology (IT) Business Alignment and its Influence on Company performance. *Journal of Information Technology*, *32*(1), 1–21.

McFarlan, F. (1984). Information Technology Changes the Way You Compete. *Harvard Business Review*, *62*(3), 98–103.

Meraz, L., & Maldonado, S. (2015). Validez y Confiabilidad de un Instrumento de Medición de la Competitividad de las Pequeñas y Medianas Vitivinícolas de la Ruta del Valle de Guadalupe. *Investigacion y Ciencia*, *23*(65), 40–47.

Mokhber, M., Tan, G., Vakilbashi, A., Zamil, N., & Basiruddin, R. (2016). Impact of Entrepreneurial Leadership on Organization Demand. *International Review of Management and Marketing*, *6*(3), 415–421.

Morales, P. (2007). *La Fiabilidad de los Tests y Escalas*. Madrid, Spain: Universidad Pontificia Comillas, Facultad de Ciencias Humanas y Sociales.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Peppard, J., & Ward, J. (2016). *The Strategic Management of Information Systems: Building a Digital Strategy. Ingland*. John Wiley & Sons Ltd.

Reich, H., & Benbasat, I. (2000). Factors That Influence the Social Dimension of Alignment Between Business and Information Technology Objectives. *Management Information Systems Quarterly*, *24*(1), 81–113. doi:10.2307/3250980

Remes, J., Manyika, J., Bughin, J., Woetzel, J., Mischke, J., & Krishnan, M. (2018). *Solving The Productivity Puzzle: The Role of Demand and the Promise of Digitization*. Brussels, Belgium: McKinsey.

Robinson, H. (2019): *Why do most transformations fail?* McKinsey. Retrieved from https://www.mckinsey.com/business-functions/transformation/our-insights/why-do-most-transformations-fail-a-conversation-with-harry-robinson

Rogers, L. D. (2016). *The Digital Transformation Playbook: Rethink Your Business for the Digital Age*. New York: Columbia Business School Publishing. doi:10.7312/roge17544

Sacolick, I. (2017). *Driving Digital. The Leader's Guide to Business Transformation Through Technology*. New York: Amacom Books.

Scott-Morton, M., & Rockart, J. (1984). Implications of Changes in Information Technology for Corporate Strategy. *Interfaces*. *Sloan School of Management at MIT*, *14*(1), 84–95.

Tejada-Malaspina, M., & Un Jan, A. (2019). *An Intangible-Asset Approach to Strategic Business-IT Alignment*. Lima, Peru: System-MDPI, National University of Engineering. doi:10.3390ystems7010017

Venkatraman, N. (2017). *The Digital Matrix. New Rules for Business Transformation Through Technology*. Canada: LifeTree Media Book.

Vial, G. (2019). Understanding digital transformation: A review and a research Agenda. *The Journal of Strategic Information Systems*, *28*(2), 118–144. doi:10.1016/j.jsis.2019.01.003

Walker, J. (2017): *9 out of 10 Digital Transformation Projects Will Fail*. Digital Journal. Retrieved from http://www.digitaljournal.com/tech-and-science/technology/9-out-of-10-digital-transformation-projects-will-fail/article/499314

Wan, N., & Ge, S. (2018). Business-IT Alignment Literature Review: A Bibliometric Analysis. *Information Resources Management Journal*, *31*(3), 34–53. doi:10.4018/IRMJ.2018070103

Weill, P., & Woerner, S. (2013). Optimizing Your Digital Business Model. *MIT Sloan Management Review*, *53*(3), 70–78.

Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading Digital. Turning Technology into Business Transformation*. Boston, MA: Harvard Business Review Press.

CIO Wiki. (2019). *Business IT Alignment*. Retrieved from https://cio-wiki.org/wiki/Business_IT_Alignment

Wiseman, C., & MacMillan, I. (1984). Creating Competitive Weapon from Information Systems. *The Journal of Business Strategy*, *5*(2), 42–49. doi:10.1108/eb039057 PMID:10269062

This research was previously published in the International Journal of IT/Business Alignment and Governance (IJITBAG), 10(2); pages 1-19, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 45
Measuring the Digital Transformation of Education and Teaching

Christian Glahn
Leiden-Delft-Erasmus Center for Education and Learning, Switzerland

ABSTRACT

The digital transformation has reached higher education and many faculty members find teaching in the digital environment hard. A key question for educational institutions is whether the uptake of blended learning within their digitization strategies matches the pace of technological innovation. This chapter discusses a model for monitoring the progress of educational digitization that has been in use throughout four years at HTW Chur, Switzerland. The model connects technologies to practices rather than abstracting technologies from them. This helps identifying performance indicators in campus-wide information systems for understanding the diffusion of technology uses among the faculty, and it helps categorizing new technologies towards their organizational innovation potential. The combined use of these performance indicators with the model supports tailoring faculty development activities for digitization strategies that are based on the actual development needs within the institution.

INTRODUCTION

This chapter is based on a journey of digitalizing higher education programs from traditional face-to-face teaching to blended learning at the level of an entire university. It is a response to the uphill struggle between expectations, assumptions, scale, and impact on the one hand, and organizational culture, practices, technologies, and budgets on the other. In this process, the role of faculty development is to prepare and empower the professors and lecturers for the efficient use of digital technologies and infrastructures for teaching. Conventional approaches to these challenges are training sessions, information events, competitions on innovative teaching, communities of practice or communities of inquiry (Garrison & Vaughan, 2008). However, these approaches require a good knowledge of the development needs, are

DOI: 10.4018/978-1-7998-7297-9.ch045

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

hard to scale with the pace of technological innovation, are resource intensive, or have a limited impact on the organization as a whole.

The present work is rooted in combined investments in digital technologies and faculty development in relation to changing organizational practices from traditional university teaching to blended learning. Development interventions are a crucial success factor for this process because the transformation from primarily analog to digitally incorporated teaching practice also changes the faculty's development needs. Aiming these interventions too low, creates the impression among the faculty that they surpass the expectations of the transformative process, while aiming too high, creates the impression that the actual development needs are not respected. Both cases lead to tensions and to frustration in the organization that can endanger the transformative process and challenge faculty development as an organizational change agent if the organization's uptake of new practices is tied to ambitious timeframes and implementation plans. This raises questions on the nature and speed of transitions from traditional teaching to blended learning.

Responding to such questions requires faculty development units to be aware of the dynamics within their organizations while digitalizing education. This turns out to be a difficult problem because many activities are not communicated or are hidden, because the activity has been shifted into the digital realm.

The present research started from the fundamental question about the changing practices during transformation projects: *What data accounts for the organizational adoption of digital technologies and blended learning?*

Answers to this question help to choose appropriate supportive strategies for the different groups among the faculty. Such answers are also crucial for managing the complexity of digital transformation projects. This chapter addresses this question by presenting a meta-framework for planning and monitoring the dynamics and progress of faculty development interventions during the digital transformation of universities, in which blended learning practices are no longer considered as educational innovation but as non-optional elements of the teaching practice.

The framework presented in this chapter strives to structure the transformative process, to communicate progress, and to support the in-situ identification of barriers and bottlenecks as well as to guide the decisions to overcome them. Such transformations are closely related to the adoption of innovation (Rogers, 2003). Therefore, this chapter analyses the driving factors of the adoption of innovation that influence the cascades of smaller adoption processes that structure the overall transformation. From the viewpoint of faculty development, each adoption process is related to the mastering of different competencies, which in turn define the development needs. Moreover, adoption models represent the dynamics of the faculty's uptake of new practices by predicting the quantities within a cohort and a timeframe. This makes these models particularly useful for faculty development as these models help to identify competence gaps, barriers, bottlenecks, or diversions *during* the transformation process as well as provide performance and cost indicators for strategic decisions.

This chapter discusses the rationale of the framework in three parts: The first part focuses on the background of university scale transformation from conventional teaching to blended learning. This includes the present body of research as well as the environment that frames faculty development activities as part of the digital transformation of an organization. The second part links innovation adoption to the transformative process towards blended learning. This leads to a generic innovation cascade for transforming towards blended learning and explains the rationale that can guide faculty development interventions. The last part presents a case study in which the model has been applied and demonstrates the application of the indicators for monitoring the transformation process and selecting faculty development interventions.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

This part demonstrates that faculty development must not constrain itself to conventional approaches but has to address technological factors that accelerate or limit the empowerment of the faculty.

BLENDED LEARNING IN HIGHER EDUCATION

Despite the rise of massive open online courses (MOOCs) and years of institutional, national, and multinational innovation initiatives, the higher education sector as a whole appears relatively unaffected by the digital shift that otherwise touches all aspects of contemporary societies. Consequently, university boards set new digitization objectives, which are as high and ambitious as they create tensions and fear among the faculty. Faculty members typically use digitalization as a homogeneous and yet fuzzy concept that often grounds on a dichotomy between non-digitized and digitized, in which physical environments and social presence are either absent or ignored.

The physical environment and social presence are essential characteristics of campus-based institutions in higher education and most institutions do not seek to transform into distance teaching universities. Therefore, many campus universities invest in developing blended learning practices that connect the benefits of on-campus interactions with those of digital tools.

The understanding of the institutional intentions behind the digital transformation requires a definition of "blended learning": *blended learning* is an educational design principle that relies on connecting face-to-face and online learning experiences. "Typically, an onsite course becomes blended when online activities are designed to replace [some] onsite sessions." (Stein & Graham, 2014, p. 12). This definition implies that these learning experiences neither rely only on onsite interactions nor have they organized as fully online distance teaching. "Blended learning is not an addition that simply builds another expensive educational layer. It represents a restructuring of class contact hours with the goal to enhance engagement and to extend access to Internet-based learning opportunities. Most important, blended learning is a fundamental redesign that transforms the structure of, and approach to teaching and learning." (Garrison & Vaughan, 2008, p.5). This definition captures the rationale that is often underpinning the introduction of blended learning at the organizational level.

In order to facilitate blended learning, many institutions host central infrastructures in the form of virtual learning environments (VLE) and learning management systems (LMS). These infrastructures provide complex sets of functions for running and managing online learning experiences. Lecturers can customize online components of their courses by arranging these functions for meeting the requirements of their learning and teaching objectives. Typically, the faculty already has access to at least one LMS with the related faculty development support in place when their institution enters a digital transformation process. These initial activities are often complemented by targeted workshops for advanced features and new practices.

While the primary use case of the LMS is to support educational-administrative processes, these systems are also valuable sources for data that reflects the uptake and intensity of online teaching practices, because every course in these systems represents the digital parts of the educational design of the courses. The following sections explore the background that led to the development of the framework for monitoring the organizational adoption of blended learning practices.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

A Literature Perspective on Digital Transformation of Higher Education

The most recent comprehensive literature review on blended learning in higher education included publications until 2012 (Torrisi & Drew, 2013). Drawing on 827 publications, Torrisi and Drew (2013) identified an emphasis on "how to" contributions mostly made up of program and course cases (65.9%). The second largest group of publications addressed the "student focus" towards using digital tools (25.6%). The review indicated a deficit in the literature regarding the faculty's practice (4.7%) and about the factors that influence the uptake of blended learning in organizations (0.72%).

For capturing the recent state of research, the review of indexed publications in the "web-of-science" database that were published between 2012 and 2018 was replicated. The new literature search returned over 3500 journal publications and conference papers on blended learning in higher education. The majority of these publications report on individual tools, course-level cases, and the student perspective (96%). The faculty's perspective on blended learning (2%) is addressed in 101 publications. The majority of these publications report on case studies around introducing specific tools, small scale interviews on the faculty beliefs towards blended learning, or subject-specific design practices for combining onsite and online communication. Only seven publications (0.2%) address technology acceptance and adoption processes in educational institutions. This distribution shows an increased emphasis on research of tools and the student perspective, while the previously identified deficit on research on the organizational dimension remains. The following paragraphs focus on those recent studies that address the organizational adoption of blended learning in higher education that is not covered by the previous review.

Graham, Woodfield and Harrison (2012) interviewed administrators of six higher education institutions in the U.S. regarding institutional policies that structure and facilitate the development of their blended learning practices. The study used the stages of organizational innovation processes (Rogers, 2003) as a baseline and analyzed the policy frameworks for common strategies. The authors identified three stages of adopting blended learning in the selected institutions:

1. Awareness and exploration,
2. Adoption and early implementation, and
3. Mature implementation and growth.

The authors suggest three main categories that guide the adoption process: *strategy* and advocacy, (infra-) *structure* and governance, as well as technical, educational, and organizational *support*.

Tshabalala, Ndeya-Ndereya and Van der Merwe (2013) interviewed the faculty of a South African university using the technology acceptance model together with concepts of innovation diffusion theory (Rogers, 2003) to identify influencing factors for different adoption strategies. The study put a special focus on negative attitudes towards technological support in higher education. The results show four key factors that influence the non-adoption of blended learning practices: institutional policy, faculty support, computer skills of students and lecturers, as well as inadequate access to computers by students.

Porter, Graham, Spring and Welch (2014) studied institutional strategy, structure, and support markers in relation to factors that influence the awareness and exploration of blended learning practices in 11 U.S. higher education institutions. The study contains interviews with experts from blended learning service centers in their role as change agents. The study reports common approaches for combining management strategies, infrastructure provisioning, faculty support, and development, as well as evaluation of student performance. The relatively low number of blended classes per participating institution reported by the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

study indicates early adoption of blended learning practices among the faculty members. A follow-up study (Porter, Graham, Bodily, & Sandberg, 2016) analyzed the faculty perceptions of their institutional strategies. The results indicate that the lecturers are aware of the integrated aspects of the institutional approaches but find it difficult to implement in their own educational practice. The study revealed a number of non-educational factors that influence technology adoption, such as employment status, time compensation, and monetary incentives.

Martín García, García del Dujo and Muñoz Rodríguez (2014) conducted a survey on the technology acceptance of 445 university lecturers from Spain. The study seeks to verify the utility of the unified theory of acceptance and use of technologies (UTAUT) for measuring the influencing factors of adopting blended learning practices in Spanish higher education. The results suggest three primary drivers: outcome expectancy, facilitating conditions (infrastructure and support), and social influence.

Porter and Graham (2016) compared the self-characterization of adoption strategies with the self-reported blended learning adoption of 214 professors at a U.S.-based higher education institution. The study clustered the responses into the adoption strategy groups of the innovation diffusion theory (Rogers, 2003). The findings reveal that professors characterize their personal adoption strategies more positively than their self-reported blended learning practices would suggest. The study further identified different attributions of factors among faculty members that influence their adoption decisions: professors who report more progressive adoption strategies tend to put more emphasis on factors related to infrastructures, whereas professors who report more conservative adoption strategies tend more towards faculty support and training. Additional findings indicate that professors raise structural and support deficits as highly relevant if the overarching blended learning within their department focused less on the related factors.

Boelens, Voet and De Wever (2018) analyzed the relation of educational design competencies of lecturers to their beliefs towards blended learning. The study involved interviews with 20 participants at two Dutch teacher training centers. The findings indicate that educational design competencies and teaching experiences are positively related to transformative beliefs of blended learning. The study also indicated that the organization of the curriculum and student cohorts in the institution influence the beliefs towards blended learning. The results suggest that blended learning is more positively perceived when the institution already groups students in alignment with their characteristics and interests.

All studies rely on qualitative and quantitative methods. The primary source of these studies is self-reported beliefs and practices that are conveyed through interviews or surveys. This does not reflect the full picture of the actual state of practice and can be doubly skewed as Porter and Graham (2016) indicated.

None of the studies compared the faculty's self-reported blended learning adoption with their actual practice. Moreover, the studies report only on snapshots in the digital transformation and do not cover the transformative process. This is insofar not surprising because the applied methods are not suited for frequent and representative measurements across entire organizations. This limits the evidence that can inform the strategic planning and management of digital transformation in organizations.

The present body of research does not provide methods that can guide the faculty development decisions during digital transformation projects in higher education, which are typically multi-year projects of high strategic value. Therefore, faculty development personnel and university management cannot draw on validated tools for supporting decision-making processes and interventions by monitoring the transformative process.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Information Infrastructures in Educational Organizations

Digital transformation processes target the connection between information systems and organizational practices. Therefore, change agents need to understand how digital infrastructures shape the learning environment and how this transforms the practice of lecturers. Analyzing the existing infrastructures provides insights into the relation of educational practices with other processes and systems within an institution. Therefore, any digitalization strategy in education has to align these systems and build on their role for the educational activities in an institution.

In Swiss higher education, four types of information systems that influence learning and teaching experiences can be identified:

1. Administrative systems,
2. Library information systems,
3. Learning management systems, and
4. External tools and resources.

Administrative systems support the administrative processes of educational institutions. These systems range from financial and accounting through Human Resource management to academic administration. They typically remain in the background of educational and research activities. However, course and student management systems in academic administration often have a direct impact on educational processes, because they channel student trajectories through a curriculum by recording the student enrollment status, participant management, as well as grade and certification management. Because these systems are marginal to educational activities, they are typically not considered by research on educational technologies. Yet, it is the data collected, stored, and managed by these systems that are legally binding for recognizing learning.

Library information systems play a vital role to access the scientific publications that are used in different courses. The most prominent are digital catalogs to locate literature and media resources. Several institutions have started integrating these systems with modern reference managers to replace the traditional lecture readers. Another type of library information system with educational relevance is plagiarism checkers for verifying the authenticity of the scientific artifacts provided by students for grading.

Learning management systems (LMS) are the educational counterpart to the administrative course and student management. LMS are complex process management systems that provide a wide range of tools for common educational tasks and learning activities. An important feature of an LMS is their automation capability for basic educational interventions and for orchestrating learning activities. This automation includes automatic grading, documenting formative performance development, as well as performance-based personalization and adaptive processes.

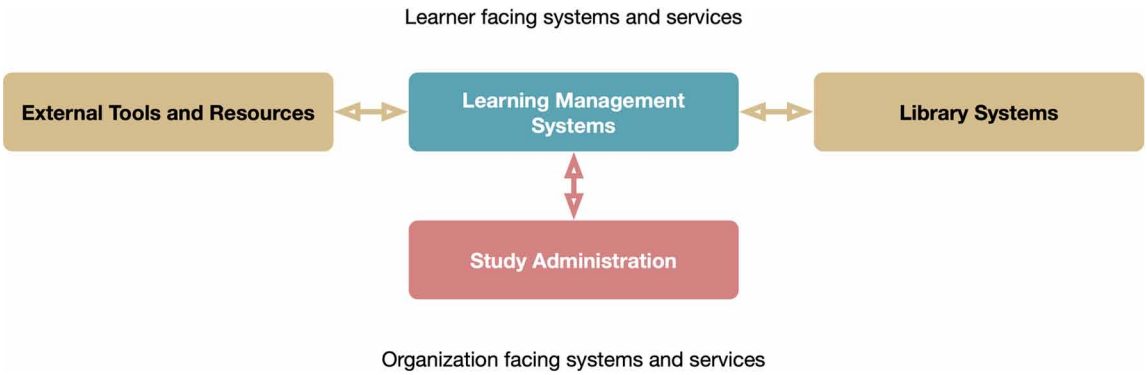
External tools and resources provide optimized solutions for specific tasks. These tools can relate to specific professional practices or provide optimized support for learning processes that are not covered by either of the other system types. This group of information systems includes most prominently mobile apps, video streaming and conferencing tools, collaboration services, and virtual laboratories. These solutions are key components for bridging among face-to-face situations, out-of-class activities, and online learning experiences. Apart from education-specific solutions, this category also includes subject-specific information systems and software. Examples for such solutions are statistics software

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in the social sciences, programming environments in computer sciences, or modeling and CAD systems used in architecture and mechanical engineering.

Together, these systems contribute to shaping the students' learning experiences. The digital transformation in higher education targets particularly the organizational performance and efficiency by integrating the different systems and infrastructures for providing high-quality education to the students. In this transformation, the LMS plays an important role in integrating the different services into the processes that are underpinning the educational experiences (Figure 1). The central role of the LMS for educational processes is evident in their usage that tends to be among the most intensively used systems in academic institutions. Swiss higher education institutions provide an example of this pattern of high usage.

Figure 1. Relations among educational infrastructures and services



The Swiss universities jointly collect data on user authentications to information services provided by the institutions to their members. This data is based on the use of information services that are authorized via the national identity management federation. The dataset contains the statistics about how many times users authenticated to the connected services (Lenggenhager, 2016). The data shows that the most used services within the national higher education area are (web-) mail services and the LMS. Cross-relating this data to the official statistics on enrolled students and faculty (Bundesamt für Statistik, 2016), the data suggests that more than 80% of the Swiss students and faculty access these systems daily.

Most LMS solutions are designed as open systems that can be extended through other services using IMS Learning Tools Interoperability (LTI) (IMS Global, 2015). This standard helps to link external tools and library services into LMS-hosted courses as part of the digital learning experience. Because of this integrative role of the LMS, the data provided by them can serve as indicators for transformative progress.

THE TRANSFORMATION COSTS OF EDUCATIONAL INNOVATION

The transition to blended learning has been recognized as an innovation diffusion process in organizations (Graham, Woodfield & Harrison, 2012; Tshabalala, Ndeya-Ndereya & Van der Merwe, 2013; Martín García, García del Dujo & Muñoz Rodríguez, 2014; Porter & Graham, 2016). The diffusion is guided by individual *adoption* of new concepts, ideas, tools or practices. Faculty development needs to respond

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to the factors that influence or hinder adoption at an organizational scale. However, blended learning with the great variety of digital tools and the complexity of integrating them into educational processes makes blended learning a concept that depends on the mastery of a range of concepts and skills. This makes blended learning hard to adopt across the members of an institution. Therefore, it is the task of faculty development to structure the adoption of new digital practices in a way that reduces perceived and real obstacles for adopting blended learning practices.

Rogers (2003) investigated how new ideas, products, and practices come into markets and organizations which facilitate exchanges and transactions between actors. Rogers' research focused on the conditions when and why market actors and organization members change from an old product or practice to a new one. This transition is called *diffusion of innovation*, which is guided by the individual *adoption* of ideas, tools, and practices. The number of adoptions during a time period is called the *adoption rate*. The adoption rate is typically characterized by starting off slowly followed by an acceleration phase. The acceleration leads to an almost steady growth for a longer period of time and then decelerates when it approaches the full market reach.

Rogers remarks that the phases of adoption processes reflect the strategies of the individual actors. He identifies five actor groups that expose different strategies that are dominant in subsequent phases of the diffusion process: The innovators, the early adopters, the early majority, the late majority, and the late adopters ("laggards"). Moreover, these groups are not evenly distributed within a market: Rogers attributes approx. 68% of the market actors to the early and late majority. The late adopters account for approximately 16%, while the innovators are typically a mere 2.5% of the market actors. The "critical mass" for major market uptake is reached as soon as the adoption rate is above 16% and reaches into the early majority. Other research highlights that the adoption strategies of innovators differ from those of the other groups, which often accounts for the market failure of high-technology innovations (Moore, 2004).

Diffusion theory only describes the external characteristics of the adoption processes, but it does not explain their internal dynamics. One theory that targets the internal dynamics is transaction cost theory. Transaction cost theory is an economic framework that was introduced in the late 1930s (Coarse, 1937, 2000, Williamson, 1998). It addresses performance differences of transactions in free markets, institutions (regulated markets), and organizations (firms). Transaction cost theory analyzes the behavior of market actors or organization members by focusing on the influence of product-specific factors and costs of adoption. Transaction costs refer to the "overhead" costs that contribute to pricing and influence buying decisions. Common forms of transaction costs in market interactions are typically covered by marketing or training budgets. Organizations optimize repetitive market transactions through organizational structures, processes and procedures. Such internalization masks the direct financial costs of market transactions with less obvious investments, such as time for learning or reorganization when adopting new tools or practices. From this perspective, the adoption of new tools or practices is the same as making buying decisions.

Transaction costs may also increase through necessary investments in developing new procedures and practices, competence development and training, as well as infrastructure. In the context of higher education, transaction costs of adopting new practices refer, for example, to the time investments required of the faculty for re-planning existing course designs in a blended learning mode, or for learning how to use the functions of a particular online tool.

The transaction costs increase with "asset specificity." The term refers to the unique features of products, ideas, or practices that differentiate them from other solutions. Asset specificity contributes to uncertainty factors that hinder potential adoption (Geyskens, Steenkemp, & Kumar, 2006). In other

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

words, each product feature that does not relate to existing concepts, practices, or processes adds to the product's relative complexity and increases the related transaction costs.

How transaction costs are perceived is related to "opportunistic" factors that influence "self-conscious attention," "trade-off," and "uncertainty" (Williamson, 1998, 2008). These factors include customer demands, incentives and sanctions, social status, organizational culture, professional attitude, performance benefits, and regulations. Whether or not an actor perceives transaction costs as acceptable depends on the *personal* ranking of opportunistic factors, which are unrelated to the actual solution or its objective benefits.

Applications of Transaction Cost Theory

Transaction cost theory has been applied to adoption processes in which the different factors influence the perceived transaction costs that lead to the adoption or rejection of new designs (Roberts & Greenwood, 1997), practices (Tate, Dooley, & Ellram, 2011), or information services (Yigitbasioglu, 2014). The results of these applications indicate that a reduced level of uncertainty lowers the transaction costs and therefore increases the likelihood for adoption. However, opportunistic factors such as existing practices or alternative solutions contribute to the transfer costs inherent in abandoning old practices or solutions and adopting new ones. This is also known as conversion or switching costs (Beggs & Klemperer, 1992).

Transaction cost theory helps to operationalize and to explain the dynamics of adoption processes because the theory relates opportunistic factors to the adoption strategies of different groups. Therefore, it is important to identify the key factors for the different phases of adoption processes.

The technology acceptance model (TAM) (Davis et al. 1989) and its variant, the unified theory of acceptance and use of technology (UTAUT) model (Venkatesh, 2000; Venkatesh & Davis, 2000), focus on personal factors for accepting technological innovations. These models describe opportunistic factors that guide the adoption process by generalizing technological acceptance among the actors. These concepts are also present in frameworks for the development of blended learning in organizations (Garrison & Vaughan, 2008; Graham, Woodfield & Harrison, 2013). However, it has been remarked that acceptance is not a deterministic process and is different from adoption (Bagozzi, 2007), which suggests that these models are optimized to monitor the *preconditions* for adopting innovative technologies, ideas, and practices.

TAM considers the opportunistic factors, such as usefulness, usability, attitude towards technology, experience, reliability, and demonstrability, quality and relevance, as well as social norms and public image. However, in the context of technology diffusion, additional factors were mentioned, such as novelty, awareness, available support, and innovation consequences (Rogers, 2003). Innovation diffusion theory suggests that the different adoption groups prioritize different opportunistic factors to guide their adoption strategies. Moore (2004) illustrates this for the innovator group who primarily value the novelty factor and are willing to accept additional effort and costs for satisfying this factor.

Levels of Digitizing Education

Educational design concepts are drawn on to estimate the transaction costs of blended learning,. Educational design influences learning processes by structuring and aligning activities and resources across learning contexts. The arrangement of functions and resources in online course components directly reflects the lecturers' educational design decisions. Because these parts of educational designs are expressed

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in the digital environment, they become available for analytical processing that provides insights into the faculty's blended learning practices. Given that these data are automatically generated as part of the educational practice, the data support frequent and non-invasive evaluation. In this section, a structuring attempt for relating the data of online course components to blended learning practices is presented.

Instead of analyzing specific course arrangements and structures, the levels rely on LMS functions as indicators for the adoption of different blended learning practices. The configured course functions relate to the intended complexity of the related learning experiences. Since course designs are part of the lecturers' regular activities, this enables monitoring the adoption of blended learning practices without additional inquiry of the lecturers. Additionally, the course data also includes information about students' performance that indicates which practices contribute to a course's learning experience.

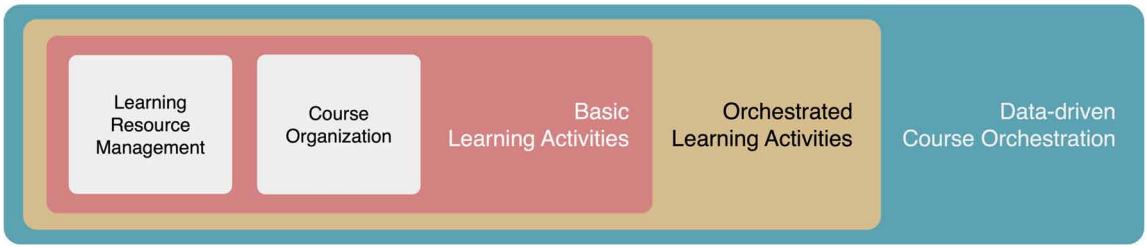
Drawing from the prior work on SCORM (ADL Initiative, 2004) and IMS Learning Design (Koper, Oliver & Anderson, 2003), five functional levels were identified for structuring the practices related to the data:

- Learning resource management,
- Course organization,
- Basic or independent learning activities,
- Orchestrated learning activities, and
- Data-driven course orchestration.

Each category groups different competencies and teaching skills that can be linked to concrete LMS functions. The categories are hierarchically related, so a less complex category forms a subset of functions and practices for the more complex ones (Figure 2). This structure assumes common opportunistic factors that influence the uptake of functions in the same category. Similarly, the hierarchy can be linked to the faculty's development needs.

The most fundamental LMS usage is *learning resource management*. This includes all resource level functions of the LMS, including text documents, images, infographics, HTML text, videos, audio files, as well as links to Internet resources. In their default configuration, these LMS functions are designed for unidirectional information provisioning. Courses that use only resource management functions resemble information collections and are similar to websites or blogs.

Figure 2. Functional categories of LMS features and tools



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Course organization functions support administrative tasks in courses. These tasks include delivering information to students using LMS internal messaging, course scheduling using calendar functions, assignment collection, and group organization. These functions allow lecturers to offload administrative tasks to the online space. The functions in this category require basic procedural considerations but do not affect the educational practice. Courses that use only course organization features typically include an announcement board, use messaging features, calendar dates, and collect student assignments. If the LMS is used to organize group work, the related courses will include group organization functions.

Learning resource management and course organization does not change the actual educational practice but support and structure course administration. Both categories represent fundamental applications of LMS functions starting either from resource-centric or process-centric needs.

Courses at the *basic learning activities* level include some of the LMS activity functions, such as wikis, discussion fora, tests, data inquiry tasks or peer assessments. The definition of online learning activities operationalizes LMS functions towards the requirements of a course's learning objectives and helps to move onsite activities to the online learning environment. The related LMS functions are used in their basic configuration and are not logically arranged or used for orchestrating online activities. Courses that use basic learning activities are expected to combine the activity functions with functions for learning resource management and course organization. These courses are the most basic form of blended learning according to common definitions (Garrison & Vaughan, 2008; Stein & Graham, 2015).

More advanced educational applications fall into the *orchestrated learning activities* level. Courses at this level define learning flows that help lecturers to monitor learning processes and to place interventions, if necessary (Dillenbourg, 2015). Functions in this category include activity and course completion features for setting rules for independent activities. For using the functions of this category, lecturers have to anticipate the learning processes and its outcomes. Courses that use functions of this category allow students to monitor their learning progress through gamification elements such as learning badges.

Data-driven course orchestration includes functions for automated orchestration of connected learning activities. These rules use the outcomes of other activities in a course for controlling and guiding learning processes automatically. Data-driven approaches depend on operationalizing the dependencies between learning activities as a learning process. Courses that use functions at this level include prerequisite rules for learning activities and organizational tasks. This results in automated course orchestration and the definition of personalized learning experiences through alternative activities. Courses that use functions of this category have many similarities with games and simulations (Gruber, Glahn, Specht & Koper, 2010).

Content-centric components with control questions such as interactive SCORM sequences or Moodle "lecture" activities fall in between orchestrated learning activities and data-driven orchestration. These components utilize some features for automated orchestration that are based on the data provided in control questions at decision points. Depending on how these control questions are defined, they mark the completion of a content section or prerequisites for the following resources.

External educational tools may support some or all categories of digital educational processes. Categorizing tools and their features along the lines of these categories are expected to forecast their potential adoption rate within the institution.

Each category of LMS functions enables lecturers to create more complex educational experiences by adding new aspects and functions to their educational designs. While each level increases the possible design decisions, it also requires more explicit educational intentions and performance expectations. Seemingly simple approaches such as the flipped classroom (Gerstein, 2012) or inverted classroom

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(Lage, Platt, & Treglia, 2000) require the mastering of a range of organizational and operational skills before they can be successfully applied with the available tools. This includes

- The organization of learning resources at the content management level,
- Class time management at the course organization level,
- The ability to create active and aligned learning activities at the basic learning activities level, and
- Skills for arranging, connecting and moderating learning activities both in-class as well as online.

Adding personalized or gamified experiences to learning arrangements requires further computational-thinking skills at the level of data-driven orchestration, as these arrangements require partially automated moderation of the students' learning processes (Gruber, Glahn, Specht, & Koper, 2010).

Cost-Sensitive Adoption of Blended Learning Practices

Transaction cost theory suggests that each category with its skill requirements, tools and features adds to the opportunistic factors that influence the adoption of the related practices. Therefore, the adoption of the LMS features should show gradual development that follows these complexity levels, because of the temporal developments of diffusion processes (see Figure 3). The transaction cost theory suggests that fewer opportunistic factors increase the potential for adoption as fewer factors contribute to the *perceived* transaction costs.

The levels for online educational practice are based on the principles of increasing "asset specificity." In this case, each level of the hierarchy follows its own adoption process. This suggests that the less complex categories should receive faster uptake than the more complex ones. As the categories are linked to each other, it is expected that the adoption of lower complexity functions and practices reduces the "asset specificity" of the more complex categories. Consequently, higher level categories should show delayed adoptions of the related functions as the adoption groups progress through the lower level categories. The cascaded dynamic of independent adoptions is depicted in Figure 3.

The dynamics of diffusion theory suggest that a proportion of the faculty members will naturally advance to more complex solutions and novel practices. Therefore, gradual advancement towards more complex functional categories can be expected and overlapping adoption behavior should appear (see. Figure 3).

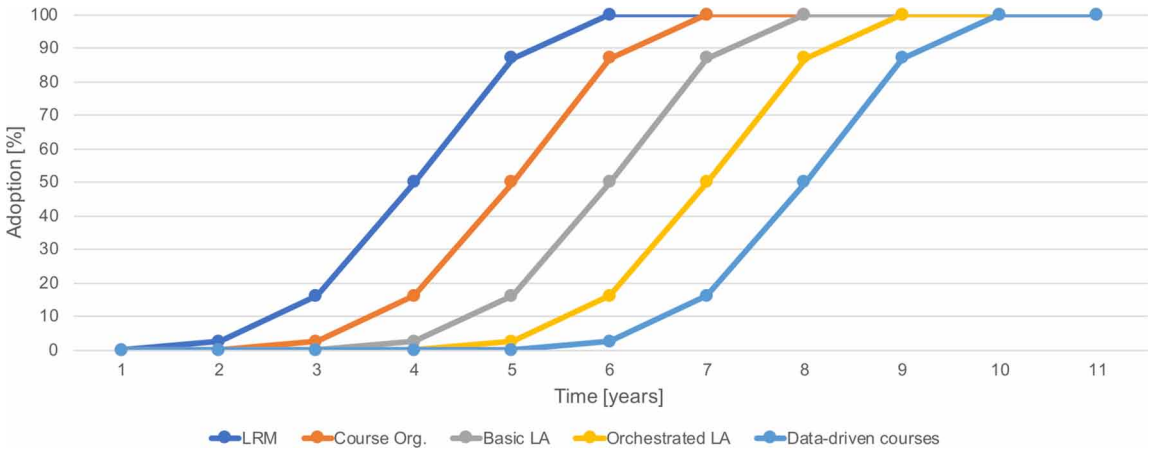
This model is open to "leapfrogging," in which members of the community can move from a lower category to a higher category while bypassing intermediate categories. Leapfrogging is explained through higher individual investments in order to reach a targeted level. This kind of additional investment is characteristically attributed to the group of innovators in diffusion theory. Therefore, this kind of behavior is not expected for the mainstream of the faculty.

A critical strategic question for university management is the speed of the adoption process. Higher education institutions can expect that such developments are tied to the rhythm of the academic year because it structures the educational activities. Additionally, the teaching frequency has to be considered. For courses with a bi-semester rhythm, changes towards new educational practices and technologies are only expected to become visible at an annual rate.

Under ideal conditions, the full adoption of new digital educational approaches in one category would need five years to reach the entire faculty. These conditions would require that all courses are fully reworked every year, the organization has an ideal distribution of faculty members across the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Ideal adoption process (adoption rate in percent over time in years)



adoption groups, and each adoption group fully adopts new concepts during the same year. Under the realistic operational, organizational, and scientific constraints of academic education, these processes would require more time.

A CASE OF INTRODUCING BLENDED LEARNING

The model of increasing complexity of digital learning has been developed over the course of four years in a major digital transformation project at HTW Chur. HTW Chur is a university of applied sciences in the southeast of Switzerland. The universities of applied sciences are young institutions in the national higher education sector with their roots in the Swiss higher professional education system (Bundesamt für Berufsbildung und Technologie, 2009). All Swiss universities of applied sciences are younger than 25 years old and offer bachelor's and master's degree programs for students that achieved professional A-levels. Professional A-levels ("Berufsmatura") require the completion of an apprenticeship in a company with top grades. This opens career trajectories to young professionals that depend on scientific skills and practices. The professional background of the students also leads to a higher degree of students that work alongside their studies.

HTW Chur is among the smaller institutions in the sector with approximately 300 full- and part-time lecturers (State Spring 2018). It offers nine study programs in the domains of economics, information systems, media studies, architecture, engineering, and photonics. Due to its geographic location in the Swiss alpine region, it faces considerable competition from similarly oriented institutions in the more urban regions of the country. To attract students beyond the immediate region, HTW Chur initiated a digital transformation project for its study programs. The objective of this transformation was to combine the benefits of campus-based study programs with the flexibility offered by digital technologies. The project aimed at the digital transformation of strategic courses in all study programs. The strategic courses were selected based on shared learning objectives across study programs in order to maximize the impact on the overall teaching.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The digital transformation of this institution has been accompanied by several faculty development initiatives over the course of four years. These interventions included targeted information and training events, faculty development certificates, personal and group coaching for redesigning strategic courses, on-demand support for individual courses and lecturers, working groups for common needs and practices, as well as general information events and untargeted support in the form of an online blended learning handbook.

The reach of the faculty development activities ranged from as low as 5% of the faculty for targeted information events and training, 10% for course redesign coaching, and 15% for on-demand support and working groups. Additionally, generic information and untargeted online support reached more than 50% of the faculty per year.

The working groups primarily targeted innovators and early adopters. Information and training events, as well as coaching and on-demand support, were designed for supporting lecturers with more conservative adoption strategies. The faculty development was complemented by support for media content development and technical activities for improving the reliability and user friendliness of the LMS as well as its integration with the local academic administration system. The LMS at HTW Chur runs on the Moodle platform. Due to the schedule of the academic calendar, major technical updates are only possible once per year during the summer break.

Method

In order to monitor the diffusion of blended learning practices, the LMS was used to collect information about the course design across all study programs. The monitoring was comprised of course-level data for supporting the faculty transforming courses to understanding the impact of the online activities. Additionally, a baseline and a reference measurement across all courses was conducted. Different from course-level data, the results of the additional measurements needed to be agnostic towards subject-specific educational practices and course structures in order to enable comparison across the different study programs.

The measurements were conducted at the end of the term in order to acknowledge online teaching during the semester. This was necessary because many lecturers exposed manual course orchestrating strategies by uploading complementary course material after the related face-to-face sessions. Therefore, these courses unfolded throughout the semester and the actual adoption of online teaching practices was not fully visible at an earlier state.

The curricula of all study programs are organized annually. Thus, every course runs once per year. Therefore, the baseline was collected in June 2015 at the end of the Spring term and in January 2016 at the end of the 2015 Autumn term. Additionally, a reference measurement was conducted for all courses on the 2017 academic year in January 2018, which was possible with a new course archiving policy starting in Spring 2017. As of 2015, all courses automatically had an online component available, the data includes all courses in all study programs.

The course data was structured into the five complexity categories based on the active functions in the courses at the end of the term. All courses share a basic course structure of an announcement forum and 14 topics. Lecturers can alter this structure to their specific needs.

Courses were considered as unmaintained if they only contained the basic course structure or if all components were inaccessible to the students. These “empty” courses refer to no adoption of digital educational practices.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Learning resource management was considered as adopted if courses used at least one of the resource tools of Moodle. These tools include the following course elements: "file," "folder," "text page," "text block," "lesson," "SCORM," "URL Link," and "glossary."

Course organization functions are counted for courses that post messages in the announcement forum, use calendar events to communicate special events, include the "assignment" activity for collecting study results, and use the "survey" tool or "group select" activity. These activity functions were only considered if student data was also present.

Courses that include basic learning activities utilize Moodle's learning activity functions. Courses at this level typically include functions of the first categories and learning activities with student contributions. Learning activities include the functions "choice," "database," "forum," "LTI-external tool," "quiz," "wiki," and "workshop." The adoption was considered successful if at least one of these activities was configured and used. The activities at this level utilize only the basic functions for configuring the activities, such as the activity description, group access, and deadlines.

Orchestrated learning activities are identified by the use of the automatic task completion feature for learning activities. This feature requires the definition of indicative learning outcomes that mark the minimal completion requirements for an activity. Moodle uses this feature to highlight completed and uncompleted tasks to the students. Lecturers can use this feature for monitoring task completion of preparatory activities. The adoption was recorded for courses in which at least five participants completed the specified tasks. Moodle's task completion rules were not considered for resources, because these rules are triggered by accessing or downloading a resource. However, the adoption was also considered successful if a course used completion rules for organizational activities, such as assignments, group selections, or surveys, as long as other basic learning activity functions were also present.

Data-driven course orchestration utilizes learning outcomes of activities for controlling the flow of the individual learning processes. Courses that expose this level of adoption connect learning activities through prerequisite rules. The successful adoption is marked if courses create valid rule-based connections between learning activities or learning path variants. A valid connection is given if both ends of the connection show student activity. Again, prerequisites for learning resources are ignored.

Results

The baseline measurement included 410 of 422 courses that were present in the LMS during the 2015 autumn term. The reference measurement included 545 LMS courses during the 2017 autumn. The difference in the course number is caused by the launch of four new bachelor programs. Table 1 summarizes the results of the adoption rates.

The baseline measurement indicated that most courses already included an online component: 85% of all courses in the LMS included learning resources, 15% were unmaintained, and 3% made additional use of online learning activities. Functions for course administration were not used. Because 2.3% of the courses of the curricula had no representation in the LMS, this increased non-digitized courses to 16.8%. The baseline data revealed that 80% of courses that used learning resource management functions distributed external files, such as text documents in PDF or Word format, spreadsheets, or presentation slides.

The reference measurement counted for 94% of courses that used learning resource management functions, 27% combined course administration functions, 6% included online learning activities, 2% used the orchestration support of the LMS, and 6% of the courses were unmaintained. Of the courses that used functions for basic and orchestrated learning activities, 2% did not include course administra-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Measured adoption rates

Function category	Baseline measurement 2016 (academic year 2015, n = 410)	Reference measurement 2018 (academic year 2017, n = 545)
No adoption/unmaintained	16.8%[1]	6%
Learning resource management	85%	94%
Course administration	0%	26%[2]
Basic learning activities	3%[2]	8%[2, 3]
Orchestrated learning activities	0%	2%[2, 4]
Data-driven course orchestration	0%	0%

[1]includes courses without LMS components;[2] also counted in learning resource management; [3] partial use of course administration, [4] also counted in basic learning activities and course administration

tion functions. While the relative use of learning resource management functions for external files did not change, the data showed that courses that used course administration functions and learning activity tools also used more embedded resources such as HTML pages, text blocks, and embedded images.

The number of basic learning activities in the baseline suggested that these functions were used by a group of educational innovators. This group matched those faculty members that were already publicly recognized by the University management. The reference measurement showed increased uptake of basic learning activity functions and new applications for orchestration functions that support inverted classroom settings. By comparing the educational innovators at the baseline and reference measurement, the data revealed that the more advanced functions were adopted by an entirely different group of lecturers. This new innovative group included 1/5 of new faculty members. Both measurements showed no uptake of the available functions for data-driven course automation or personalization.

SOLUTIONS AND RECOMMENDATIONS

It was expected to find higher adoption rates in courses related to "strategic modules" that were primarily targeted by the transformation project. Instead, the data indicated an almost homogeneous adoption rate across the different study programs, with the exception of architecture and civil engineering that show lower adoption rates.

Secondly, it was expected to find similar adoption of tools and practices in courses of the same lecturers. With the exception of learning resource management, this was not the case for the other categories. Instead, lecturers choose "experimental" courses before they started using similar practices in their other courses. The data shows that these choices are clearly not courses with the least impact in terms of group sizes, position in the curriculum, or maturity of students. This indicates a rejection of "secure" adoption strategies with small-scale teaching experiments before bringing the new practices into bigger or more relevant courses. Informal feedback by faculty members suggests that the choice is guided by the expected immediate benefit. However, the available data cannot confirm or reject this suggestion.

The baseline indicated that functions for learning resource management were already well established by the start of the project. Innovative practices were also found at the baseline. The high adoption of resource level LMS usage was not expected on the grounds of the available strategic information, whereas

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

finding innovative practices outside the mainstream adoption was predicted by diffusion theory (Rogers, 2003; Moore, 2004).

Despite the high adoption of learning resource management functions, the baseline data documented no functions for course administration. This was partly due to the system's user interface that made these functions hard to identify. After system improvements for the Fall 2016 semester towards better visibility and accessibility of course administration functions, lecturers started integrating these functions into their courses. Because of the low impact of targeted faculty training, these changes were only announced as part of the generic update information. After a short protest by the faculty about the user interface changes, this intervention led to the immediate uptake of these features. This adoption wave became visible in the reference measurement of the following academic year.

Comparing the Ideal Adoption and Measurements

The transaction cost model suggests that the adoption of new technologies and practices depends on the necessary "investment" by the adopting actors for performing a transition of practices. These investments are influenced by opportunistic factors. The complexity of the educational environment of academic institutions and the versatile functions of a modern LMS point towards a cascade of adoption steps, in which some functions have lower transaction costs than others. The categorization of LMS functions into five levels (see Figure 2) is an attempt for structuring and monitoring the complexity of digital transformation processes.

The predicted ideal adoption suggests that the uptake of LMS functions follows along the lines of the functional categories. Diffusion theory predicts that under ideal conditions the adoption groups among the faculty could follow with an annual delay. This process is separate but overlapping for the functional levels.

The baseline measurement indicated that learning resource management functions were well adopted by the late majority at the beginning of the transformation process. This measurement also indicated practices by a group of innovators. The gap between the two groups represents the high transaction costs for moving from learning resource management to online learning activities.

According to the model, the adoption of functions for course administration should have received major uptake among the faculty. The complete absence suggested that the lecturers were unaware of these functions. This was supported by the design of the LMS' user interface, which did not place these functions prominently. By removing this usability barrier, lecturers started adopting these functions although no faculty development activities were conducted to promote these functions. According to the ideal adoption model, an adoption rate of approximately 14% was expected one year after this modification. Instead, the data showed an adoption rate above 25% that indicates uptake from well within the early majority group. This shows that the system usability raised the transition costs to a point that it blocked the adoption of these functions. The high adoption rate without major faculty development interventions suggests that the related functions integrate well with existing educational practices. This lowers the transaction costs and enables faster adoption.

The baseline data showed an initial adoption of basic learning activity functions provided by the LMS. Two years into the project it was expected to find adoption reached the early majority group. Instead, 6% of the courses that utilized basic learning activity functions indicates that the early adopter group has started integrating these functions into their practices.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Following Moore's (2004) line of arguments, the lower adoption rate of basic learning activities is due to the "chasm" that developed between the innovators and the rest of the faculty. The other groups had to bridge the gap of the functional complexity before progress could be made. The adoption within the early adopter group is plausible from the viewpoint of the model because the less "expensive" functions for administering courses have started to reach the early majority. This suggests that the adoption of the different functional categories is connected to each other through the increasing transaction costs. This dependency is also supported by the starting adoption of functions within the orchestrated learning activity category.

The measurements show that groups of innovators may not follow sequential improvements but aim for personal achievements and may leapfrog directly to new technologies and practices. This is shown by the innovator group that was identified in the baseline measurement as well as by the "new" innovator group of the reference measurement. The data suggest that educational innovators expose temporal characteristics that are unrelated to a persistent intrinsic precondition for taking additional transaction costs. However, the scale of this leapfrogging is in line with what diffusion theory would predict.

IMPLICATIONS FOR FACULTY DEVELOPMENT

The role of faculty development is to enable and to empower the faculty in an institution. One aspect of the related activities is educational support and the alignment of the initiatives to the faculty's development needs. This is particularly challenging in a multi-year digital transformation process. Therefore, it is important to develop an understanding of the changing practices and habits among the faculty.

Garrison & Vaughan (2008) suggest the concept of a community of inquiry as a key principle for the digital transformation from purely campus-based to blended learning practices. This should support lecturers to find the most appropriate combinations of technology and conventional didactics for their subjects and personal approach to higher education. This approach assumes implicitly that all members of the faculty share attitudes towards education, educational approaches, and proceed at the same pace when adopting new ideas and practices.

The experience from the presented case indicates that this approach is limited with respect to reach and impact. Moreover, the community of inquiry setting did not reflect the transitional practice, but the discourse raised new and complex challenges outside of the immediate practice as exposed in on-demand support. This discouraged interested "mainstream" faculty members and lowered the impact of these interventions even further.

The data of the used LMS functions provided important insights about the organizational transition towards blended learning. Using the different LMS functions as indicators for separate adoption processes improved the understanding of the dynamics of the transformation processes and helped to estimate when to expect new practices to occur across the organization. This has been an important element for channeling relevant information to the mainstream faculty.

Through the data lens, a gap between the practices of innovators and the mainstream faculty was identified that was otherwise undetectable and unexpected. In the presented case, the gap was partially caused by the LMS user interface and how it provided access to educational functions. Instead of developing the faculty members to be able to work around these user interface flaws, the choice was to improve the user interface. This technical change resulted in immediate uptake and effectively closed the gap between the mainstream and the initial innovators.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The data also revealed that willingness to innovate is not a personal trait, but a situational motivation that depends on "opportunistic factors" that change for different adoption processes. As the initial gap closed, new innovators emerged among the faculty. For faculty development, these new actors were easily identified without using the data because they were actively seeking support. However, these innovators were not helpful for guiding the overarching faculty development.

CONCLUSION

An important insight from this case study is that the adoption of digital education at the organizational level is not the single homogeneous process presented in the literature. Instead, online learning environments are collections of tools that support different educational practices. Each practice has its independent characteristics and educational functions. These differences lead to distinguishable adoption processes. Faculty development needs to account for such differences and their temporal dynamics. With this respect, meeting the mainstream's needs poses a key challenge, because mainstream faculty members are often not proactively seeking support. The data from the LMS helps to understand their digital teaching practice and to tailor scalable faculty development solutions that target the specific needs of these professors and lecturers. In the presented case, this intervention took the shape of an online blended learning handbook that helped lecturers within the mainstream not to expose their support needs.

The innovation adoption model helped to explain the dynamics and to identify bottlenecks of the adoption processes. Although the model derives factors from the theory that influence the adoption processes for different groups among the faculty, this chapter could only verify the plausibility of these factors based on the observations. It does not suggest their validity or consistency. Yet, the work led to a refined insight on the influencing factors in digital transformation projects and the presented framework provides tools for structured monitoring of the educational practice. Because this monitoring is non-invasive, it can be frequently applied and therefore contributes to the awareness about the development needs and technology acceptance among the faculty.

REFERENCES

Advanced Distributed Learning (ADL) Initiative. (2009). Sharable Content Object Reference Model (SCORM) 2004 4th Edition Run-Time Environment (RTE) Version 1.1. Alexandria, VA: ADL Initiative.

Bagozzi, R. P. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the Association for Information Systems*, *8*(4), 244–254. doi:10.17705/1jais.00122

Beggs, A., & Klemperer, P. (1992). Multi-period competition with switching costs. *Econometrica*, *60*(3), 651–666. doi:10.2307/2951587

Boelens, R., Voet, M., & De Wever, B. (2018). The design of blended learning in response to student diversity in higher education: Instructors' views and use of differentiated instruction in blended learning. *Computers & Education*, *120*, 197–212. doi:10.1016/j.compedu.2018.02.009

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bundesamt für Berufsbildung und Technologie. (2009). *Die Schweizer Fachhochschule, Ein Überblick für Gutachterinnen und Gutachter in Akkreditierungsverfahren.* Bern, Switzerland: Schweizer Eidgenossenschaft. Retrieved from https://www.sbfi.admin.ch/dam/sbfi/de/dokumente/die_schweizer_fachhochschuleneinueberblick.pdf.download.pdf/die_schweizer_fachhochschuleneinueberblick.pdf

Bundesamt für Statistik. (2017). *Bildungsperspektiven, Szenarien 2016 - 2025 für das Bildungssystem*. Neuchâtel, Switzerland: Bundesamt für Statistik. Retrieved from https://www.bfs.admin.ch/–bfs/–de/home/statistiken/bildung-wissenschaft/szenarien-bildungssystem/hochschule-studierende.assetdetail.1822581.html

Coase, R. H. (2000). The problem of social cost. In C. Gopalakrishnan (Ed.), *Classic Papers in Natural Resource Economics*. London: Palgrave Macmillan.

Coase, R. H. (2008). The institutional structure of production. In C. Ménard & M. M. Shirley (Eds.), Handbook of new institutional economics (pp. 31-39). Berlin, Germany: Springer. doi:10.1007/978-3-540-69305-5_3

Davis, F. D., Bagozzi, R. P., & Washaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982–1003. doi:10.1287/mnsc.35.8.982

Dillenbourg, P. (2015). *Orchestration Graphs: Modeling Scalable Education*. Lausanne: EPFL Press.

Garrison, D. R., & Vaughan, N. D. (2008). *Blended Learning in Higher Education: Framework, Principles, and Guidelines*. San Francisco: Jossey-Bass.

Gerstein, J. (2012). The Flipped Classroom Model: A Full Picture. *User Generated Education*. Retrieved from https://usergeneratededucation.wordpress.com/2011/06/13/the-flipped-classroom-model-a-full-picture/

Geyskens, I., Steenkemp, J.-B. E. M., & Kumar, N. (2006). Make, buy, or ally: A transaction cost theory meta-analysis. *Academy of Management Journal*, *49*(3), 519–543. doi:10.5465/amj.2006.21794670

Global, I. M. S. (2015). *IMS Global Learning Tools Interoperability, Version 1.2 Final Specification*. Retrieved from https://www.imsglobal.org/lti/

Graham, C. R., Woodfield, W., & Harrison, J. B. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *Internet and Higher Education*, *18*, 4–14. doi:10.1016/j.iheduc.2012.09.003

Gruber, M. R., Glahn, C., Specht, M., & Koper, R. (2010). Orchestrating learning using adaptive educational designs in IMS Learning Design. In M. Wolpers, P. A. Kirschner, M. Scheffel, S. Lindstädt, & V. Dimitrova (Eds.), *Sustaining TEL: From Innovation to Learning and Practice. Proceedings of EC-TEL 2010* (pp. 123-138). New York: Springer. 10.1007/978-3-642-16020-2_9

Koper, R., Olivier, B., & Anderson, T. (Eds.). (2003). *IMS Learning Design Information Model*. IMS Global Learning Consortium.

Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *Journal of Economic Education*, *31*(1), 30–43. doi:10.1080/00220480009596759

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lenggenhager, T. (2016). *SWITCHaai Status update.* Presented at AAI & Swiss edu-ID Update event, Universität Bern. Retrieved from https://www.switch.ch/aai/support/presentations/–update2016/01_SWITCHaai_Status_Update.pdf

Martín García, A. V.; García del Dujo, A., & Muñoz Rodríguez, J. M. (2014). Determinants of Blended Learning adoption in Higher Education. Adaptation of the UTAUT Model. *Educación XX1*, *17*(2), 217-240.

Moore, G. A. (2003). *Crossing the chasm, marketing and selling high-tech products to mainstream customers*. New York, NY: Harpers Business Review.

Porter, W. W., & Graham, C. R. (2016). Institutional drivers and barriers to faculty adoption of blended learning in higher education. *British Journal of Educational Technology*, *47*(4), 748–762. doi:10.1111/bjet.12269

Porter, W. W., Graham, C. R., Bodily, R., & Sandberg, D. (2016). A qualitative analysis of institutional drivers and barriers to blended learning adoption in higher education. *Internet and Higher Education*, *28*(1), 17–27. doi:10.1016/j.iheduc.2015.08.003

Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers & Education*, *75*, 185–195. doi:10.1016/j.compedu.2014.02.011

Roberts, P. W., & Greenwood, R. (1997). Integrating transaction cost and institutional theories: Toward a constrained-efficiency framework for understanding organizational design adoption. *Academy of Management Review*, *22*(20), 346–373. doi:10.5465/amr.1997.9707154062

Stein, J., & Graham, C. R. (2014). *Essentials for blended learning, a standards-based guide*. New York: Routledge. doi:10.4324/9780203075258

Tate, W. L., Dooley, K. J., & Ellram, L. M. (2011). Transaction cost and institutional drivers of supplier adoption of environmental practices. *Journal of Business Logistics*, *32*(1), 6–16. doi:10.1111/j.2158-1592.2011.01001.x

Torrisi, G., & Drew, S. (2013). The literature landscape of blended learning in higher education: The need for better understanding of academic blended practice. *The International Journal for Academic Development*, *18*(4), 371–383. doi:10.1080/1360144X.2013.786720

Tshabalala, M., Ndeya-Ndereya, C., & Van der Merwe, T. (2013). Academic Staff's Challenges in Adopting Blended Learning: Reality at a Developing University. In *Proceedings of the International Conference on e-Learning* (pp. 396-403). Cape Town, South Africa: Academic Press.

Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research*, *11*(4), 342–365. doi:10.1287/isre.11.4.342.11872

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, *46*(2), 186–204. doi:10.1287/mnsc.46.2.186.11926

Williamson, O. E. (1998). Transaction costs economy: How it works and where it is headed. *De Economist*, *147*(1), 23–58. doi:10.1023/A:1003263908567

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Williamson, O. E. (2008). Transaction cost economics. In C. Ménard & M. M. Shirley (Eds.), Handbook of new institutional economics (pp. 41-65). Berlin, Germany: Springer. doi:10.1007/978-3-540-69305-5_4

Yigitbasioglu, O. (2014). Modelling the intention to adopt cloud computing services: A transaction cost theory perspective. *AJIS. Australian Journal of Information Systems*, *18*(3), 193–210.

ADDITIONAL READING

Looi, C. K., Wong, L. H., Glahn, C., & Cai, S. (2019). *Seamless learning; perspectives, challenges and opportunities*. Singapore: Springer Singapore. doi:10.1007/978-981-13-3071-1

Macfadyen, L. P., & Dawson, S. (2012). Numbers Are Not Enough. Why e-Learning Analytics Failed to Inform an Institutional Strategic Plan. *Journal of Educational Technology & Society*, *15*(3), 149–163.

Sergis, S., & Sampson, D. G. (2017). Teaching and Learning Analytics to Support Teacher Inquiry: A Systematic Literature Review. In A. Peña-Ayala (Ed.), *Learning Analytics: Fundaments, Applications, and Trends: A View of the Current State of the Art to Enhance e-Learning* (pp. 25–63). Cambridge: Springer International Publishing. doi:10.1007/978-3-319-52977-6_2

KEY TERMS AND DEFINITIONS

Adoption: The integration of a concept, idea, product, or service into an existing practice.

Adoption Rate: The number of adoptions by market actors or organization members at a given time.

Asset Specificity: The number of product or concept specific factors that refers to the unique features of products, ideas, or practices that differentiate them from other solutions. Asset specificity contributes to uncertainty factors that hinder potential adoption.

Basic Learning Activities: The parts of educational processes that require student activity that are not related to other learning activities other than by their co-location.

Blended Learning: An educational design principle that relies on connecting face-to-face and online learning experiences. Typically, onsite courses become blended when online activities are designed to replace some onsite sessions.

Course Organization: The administrative tasks that are part of educational processes. These tasks include student information, organization of group work, scheduling of activities, and collecting assignments for grading.

Data-Driven Orchestration: Automated orchestration of learning activities by using performance data of individual students or groups of students. The automated orchestration is based on conditions and completion rules that are defined in an educational design.

Digital Transformation: The reorganization of organizational processes towards the optimal usage of digital technologies and resources.

Educational Design: The process of planning and preparing educational processes. Educational designs determine the experiences of learners.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

IMS LTI: Learning tools interoperability (LTI) is a standard created by the IMS Global Learning Consortium that links content and resources to learning platforms.

Learning Resource Management: The organization and arrangement of learning resources, including text documents, images, infographics, HTML text, videos, audio files, and links to internet resources.

Orchestrated Learning Activities: Sequences or arrangements of learning activities that allow lecturers and students to monitor the learning progress. Lecturers may decide to change the arrangement and flow of their educational design based on this information.

Transaction Costs: The "overhead" costs that contribute to pricing and influence adoption decisions. Transaction costs include necessary investments in developing new procedures and practices, competence development and training, as well as infrastructure.

This research was previously published in the Handbook of Research on Faculty Development for Digital Teaching and Learning; pages 379-401, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 46
Transformative Organizational Communication Practices

Philip J. Salem
Texas State University, USA

ABSTRACT

Most efforts at transformational organizational change fail. In order to explain that failure and the potential for success, this chapter introduces the construct of organizational communication practices and develops a theory to explain how these processes constitute organizations as complex adaptive social systems. Five axioms anchor the theory, and the author derives theorems explaining the important features of attempting to change transformative organizational communication practices.

INTRODUCTION

Communication and Organizational Change

First order organizational change is about simple learning and minor adaptations—the continuous, incremental adjustments that lead to differences in degree and more efficient outcomes (Argyris, 1992). Second order change, transformational change, involves altering the core features of organizations – goals, authority relationships, organizational structures, markets, or technologies (Aldrich & Ruef, 2006; Rao & Singh, 1999). Transformational change may appear to be discontinuous or episodic (Nadler, Shaw, & Walton, 1995), but it involves learning that challenges the premises behind first order change (Argyris, 1992). First order change refers to differences in degree, but second order change denotes differences in kind (Adler, 1967). First order change is about doing things better, but second order change is about doing better things. Change management is an expression that refers to efforts at controlling and directing both types of change.

Strategic initiatives are efforts at managing transformational change. These are typically top-down efforts aimed at employee commitment to the changes. Enduring improvements appear to be impossible without a change of culture (Cameron & Quinn, 1999). Some classic research indicated transformational

DOI: 10.4018/978-1-7998-7297-9.ch046

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

change efforts were successful only about a third of the time (Cameron & Quinn, 1999; Meyer, Goes, & Brooks, 1995) and more recent estimates place the figure at or below 20 percent (Cabry & Haughey, 2014; Towers Watson, 2013). Strategic initiatives with the purpose of changing organizational culture succeed less than 20 percent of the time (Smith, 2002). There is a body of literature just dealing with these failures and a multitude of explanations (see Robbins & Finley, 1996), effective communication separates those that were most successful from those that were not (Cabrey & Haughey, 2014), and there are specific identifiable communication patterns associated with failed change efforts (Salem, 2008). Transformational change may be less a product of strategic initiatives and more about the natural ways changes emerge in any social system.

Most organizational change literature treats communication as a separate part of "the organization". Weick (1969) argued that investigating the process of organizing was more true to the experiences of people than researching organizations. Farace, Monge and Russell (1977) offered one of the first organizational communication textbooks attempting to focus on process. Johnson (1977) contended "the 'organizing' of organizations can be examined as communication. Without communication, no organizations exist. Communication is not just something that happens within organizations. Communicating is organizing" (p. 3). Extending her earlier work (Johnson, 1976/1999), she went on to describe three communication coordination formats that organize social activity. These works were some of the earliest attempts to investigate the constitutive nature of communication (cf. Putnam, Nicotera, & McPhee, 2009).

Theory Development

When transformational efforts fail to alter "core processes", it is because the efforts did not produce changes in organizational communication or the changes in organizational communication were not transformative. The purpose of this paper is to describe a theory that will answer the following questions. (1) What are the dynamic features of human communication? (2) How do human communication practices constitute the boundaries of social units such as organizations? (3) How do communication practices naturally affect the way social systems adapt and learn? (4) How do communication practices evolve? (5) How can organizational communication practices changes transform an organizational communication system?

What follows is a theory building attempt that will lead to set of theorems. The theory building strategy involves defining constructs and creating relational statements (Dubin, 1978). I will define constructs as I explain relational statements.

There are several taxonomies for relational statements (Bachrach, 1989; Kaplan, 1964), and I will adopt a modified version suggested by Hawes (1975). Primary statements consist of statements the theorist assumes to be true because of semantics, logic, or past research. Theorists normally label the primary statements as either axioms or propositions. Axioms are the most general and contain definitions or constructs that are not readily observable. Propositions describe how observable phenomena relate to each other, and they are often summary statements reflecting past research. Corollaries are supplemental statements that help explain or highlight important features of a superordinate primary statement. This essay employs axioms and corollaries, but there will be references to past research.

Secondary statements are derived from primary statements and may involve adding constructs not in the primary statements. This theory building effort ends with theorems, a type of secondary statement, suggesting hypotheses, another type of secondary statement. Theorems are more general statements about how observable phenomena might relate to each other, and hypotheses are more specific.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

If communication is more than a way to assist organizational change and if communication is the way human beings coordinate actions and sustain all manner of relationships, then a change in communication is organizational change. This theory introduces the construct of organizational communication practices. When individuals communicate, their actions become part of emerging relationships and episodes. Individuals repeat communication, suggesting that the actors use rules for their performances. Organizational communication practices are the set of communication behaviors along with the rules for their enactment that constitute an emerging organization. When individuals change the organizational communication practices necessary to sustain and distinguish one organization from another, they are attempting to change transformative organizational communication practices. This theory explains how that happens and when it does not happen.

ORGANIZATIONAL COMMUNICATION PRACTICES

Axiom 1: Human Communication Occurs when Individuals Construct Messages as Part of Emergent Relationships and Episodes

The axiom sets boundaries and specifies a scope for the theory. Human communication is a process, and this theory is about how social phenomena emerges. This definition of human communication in the axiom points to four sets of factors (Salem, 2013). Individual humans, the creators of messages, is an expression inclusive of a host of psychological constructs (e.g., identity, motivation, social perceptions) located within individuals. Messages are behaviors and artifacts individuals use when trying to communicate with each other, and the boundary includes a host of familiar constructs referencing verbal and nonverbal aspects of messages. Relationships are emerging sets of shared or complementary perceptions individuals have about each other with each other. Examining relationships, in this model, makes room for broader social and cultural factors such as communication rules, cohesion, interdependence, and flexibility. Episodes are coherent sequences of interdependent messages developing as individuals communicate. Episodes suggests social interaction, stochastic processes, conversation analysis, and discourse studies. What may be lost is that since communication is about the development of episodes, any of the previous factors become irrelevant unless they help to explain episodes in general, types of episodes, sequences of episodes, or specific episodes.

Corollary 1.1 Human Communication is About the Tension Between Similar and Different

The dialectical tension between difference and similarity drives human communication. Page (2011) identified three levels of difference. Variance refers to difference within a type. Speakers have different amounts of credibility, for example. Diversity denotes differences across types. How many different ways did people discuss a given topic, and with what frequency did they employ these types? Configuration includes the different ways elements or types connect. Configuration is about communication networks, and configuration is also about how sequences, such as conversations, and the connections between sequences evolve over time. I will refer to difference, variety, or relative variety to refer to the general phenomenon, but use the other more specific terms as needed.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In its simplest form, the tension is between information and redundancy. Shannon's (1963/1949) use of the entropy formula (H) began with the tautology that information was the amount of relative variety in an array and that redundancy was the maximum relative variety possible minus the actual relative variety. The formula also described individual choices (information) as constrained (sources for redundancy). Fisher (1978) described several different ways others have labeled these extremes. Consider the following terms associated with difference: change, contrast, distinct, diverse, exploration, uncertain, and varied. Contrast these with terms suggesting similarity: alike, common, comparable, exploitation, organized, predictable, and stable. How do individuals recognize differences and integrate them into their knowledge? What is the proper balance between the potential stimulation of the message structure and how easily others will understand it? How well will individuals integrate into a group or any social relationship? When is the proper time to introduce a topic with the potential for conflict? This tension will be part of nearly all the topics in this piece. In this section, examples of that tension are between agency and constraint and between loose and tight coupling.

Corollary 1.2 Human Communication Involves a Mix of Individual Agency and Social Constraints

Agency refers to the ability of an entity to make a choice to act, to carry out that action, and to be responsible for an action; it means the entity can affect change (Littlejohn & Foss, 2009). In human communication, individuals have agency. They choose what to perceive, how to make sense of the objects of their attention, how to make sense of others and their social relationship to others, which rules might apply to those relationships, how to create a message, and what impact their messages might have had as part of an episode.

Humans, like all living systems, have limited agency. There are constraints. Passive constraints are the limitations on agency from sources that do not have agency themselves. For humans, passive constraints are likely to be invariant, delayed and emergent, and mindless factors associated with anything physical, biological, cultural, social, and psychological. Furthermore, the choices people have made and the messages they have constructed in the past alter the probabilities for consequent choices. To attempt to develop a relationship and an episode automatically limits individual agency.

Active constraints are limitations on agency from sources having their own agency. Active constraints occur naturally in human communication as individuals inform, motivate, persuade, and instruct each other (Ackoff & Emery, 1972). Individuals choose the enactment of their performances, but the separate performances act as mutual constraints on the participants as episodes and relationships develop. Engaging in human communication automatically constrains individuals' choices.

Corollary 1.3 Human Communication Sequences Vary by the Extent to Which Individual Behaviors are Coupled to Each Other

Weick (1976, 1979) employed coupling constructs to explain sequences of behavior to accomplishing a task and the strength of relationships between systems. He identified over fifteen uses of the expression "loose coupling" (Weick, 1976). In the current theory, coupling refers to the extent to which behaviors constrain each other. Tight coupling will refer to those sequences with high predictability between behaviors, loose coupling will refer to those sequences in which there are several behaviors that could follow each other in a sequence while still maintaining some coherence for the sequence, and decoupling refers

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to those sequences in which behaviors are not connecting to each other. By defining coupling in this way, the focus becomes the overt behaviors of actors, and actors' constraint on each other as perceptions about each other emerge concomitant to the patterns of behavior.

There are several different types of episodes. A simultaneous monologue refers to a minimally coherent episode in which actors express their own interests with little or no references to each other. In some instances, actors may talk over each other and turn-taking breaks down. An impromptu episode refers to instances in which actors struggle to learn each other's rules or to discover new rules. In these instances, the actors may develop coherence toward the end of the episode or abandon the episode altogether. Improvisation involves individuals accepting but adding to previous comments, responding in the moment, and placing comments within a sense of an emerging collective whole (Sawyer, 2001a). Coherence varies within an improvised episode as actors switch topics and cue each other to different rules. Most conversation is improvisation, and actors' communication resembles jazz (Eisenberg, 1990; Hawes, 1973). Messages are decoupled or minimally coupled in simultaneous monologues or impromptu episodes but loosely coupled in improvisation.

Messages become tightly coupled in social routines. Social routines refer to intended repeated sequences of behavior in which actors discard, expand, limit, or refine their interactions to better accomplish an outcome. The development of tight coupling in a routine resembles trial-and-error learning as actors improve their ability to accomplish outcomes (Rerup & Feldman, 2011). Actors employ rules, but the sequences may be so tightly coupled that they can also employ a script. Rothenbuhler (1998) suggested that ritual differs from other social routines in that it expresses or reinforces a social order. A social ritual is a social routine that cues, reflects, or reinforces some socio-cultural aspect (e.g., cohesion, interdependence, power) of the relationships between actors. Rites and ceremonies are the most tightly coupled and scripted forms of these rituals, but more loosely coupled rituals such as a Friday happy hour together or meeting for morning coffee are common. Alternatively, actors perform or complete some task with instrumental social routines (ISRs). Enacting routines involves the most constraints.

Others have investigated repeated organizational behaviors. Nelson and Winter (1982) sought to describe regular and predictable patterns of organizational members as "routines", but their analysis did not highlight how communication constitutes such patterns, and they used the same construct, "routines," to refer to the behaviors and the "decisions rules" related to the construction of the sequences. Similarly, Aldrich and Rueff (1999) highlighted the importance of routines in creating organizational forms, but they focused more on knowledge and other psychological factors and failed to recognize how communication constitutes goal direction and boundary management as well as task and management activities. Pentland and Feldman (2005) saw routines as dynamic and generative, they provided a model classifying research about routines, but they failed to mention communication. Johnson (1976/1999, 1977), a communication scholar, developed her model of communication coordination formats by investigating communication regularities.

Axiom 2: Organizational Communication Practices Define the Boundaries of Organizations

Communication Practices (CPs) are a set of communication behaviors along with the rules for their enactment. Although some research focuses on the typical ways individuals create messages (e.g., style research), the focus of this theory is about how messages become part of episodes and contribute to the development of relationships. All social units (e.g., families, organizations) are sets of identifiable episodes

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and episode sequences, and the emergence of such events and sequences also suggests the emergence of concomitant social relationships. This theory is about improvisations and social routines – how they might have originated and how they change. This theory is also about how impromptu episodes might become communication practices.

Organizational Communication Practices (OCPs) are the set of communication behaviors along with the rules for their enactment that organizational members perform. A common feature of traditional definitions of organizations is that they are constituted to produce some task – products or services (Scott, 2003). Organizations are a system of identifiable episodes and episode sequences involved with (a) the production of some task or (b) the creation or alteration of concomitant emerging relationships. And so, the OCPs consisting of the patterns of instrumental social routines along with the improvisations attendant to them constitute the emerging task structure of an organization, and the OCPs consisting of the patterns of social rituals along with improvisations attendant to them constitute the emerging organizational culture. Some episodes are part of sequences that do both.

Communication practices include rules. Giddens (1984) regarded rules as generalized procedures applied in the enactment or reproduction of social practices, Weick (1979) described assembly rules as policies, procedures, instructions, or guides for mobilizing social interaction, and Shiminoff (1980) explained communication rules as followable prescriptions indicating the obligated, preferred, or prohibited behavior in certain situations. Axelrod and Cohen (1999) conceived of rules as instructions for agent behavior, and the set of rules constituted the generative mechanisms for how agent's acted and interacted. Lundberg (2000) developed a model of social rules noting that rules may apply to individuals or social systems and that they may cluster into rule systems and sets of meta-rules he called rule regimes. All would agree that rules may be explicit or implicit, and, although actors may employ codified explicit rules, actors make sense and interpret all rules.

Ultimately, the locus of rules is part of an actor's social cognitions and schemata (Kunda, 1999; Moskowitz, 2004). For an organization to function well, it is more important for the members to have a shared or complimentary sense of the rules than it is for them to share or align their goals (Weick, 1979). Social actors can employ rules because they repeat much of their interaction with variation, and actors can adjust to variation in performance by changing rules or improvising.

Rules take the form of conditional statements about behavior, "If (when) situation, then behave (or not)". These are generative or regulative rules that lead to actions, they constrain communicators, and they may become the accepted procedures for conducting an episode. Others think of some rules as being constitutive, about linking actions to meaning or defining a situation (condition) (Farace, Monge, & Russell, 1977; Searle, 1969). Such rules are more about framing and making sense than about social actions (Weick, 1995), but one or more of these constitutive rules may define the situation that is the "situation" in regulative rules. For example, "When communicating with a person of superior rank in a formal situation, address that person as "Sir,"" clearly states how a person should act and acts as a constraint, but the person using this rule must have some sense of "rank" and of a "formal situation," part of constitutive rules or frames, before that person could activate the regulative rule. Indeed, when social actors use a given combination of regulative and constitutive rules they are attempting to constitute the situation.

There is a long history of studying the behaviors that are part of OCPs. In the past, organizational communication researchers classified communication by organizational function. Farace, Monge, and Russell (1977) and Stohl and Redding (1987) reviewed multiple categories of communication or message functions. McPhee and Zuag (2000) reviewed later literature on functions before settling on a classifica-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tion of flows constituting organizations. In some instances, the categories are similar to organizational goals (e.g., innovation). In other instances, some researchers may use the same terms for superordinate categories while others use the term for subordinate categories (e.g., Is innovation a type of goal function or a separate function). When organizational researchers identified "core" organizational features, functions, or processes, they used similar terms (cf., Aldrich & Ruef, 2006; Rao & Singh, 1999). What is clear is that researchers should use some classification that contributes to understanding OCPs and to understanding how those practices might change.

Some OCPs are archetypical OCPs that distinguish one group of organizations or groups within an organization from each other. Consider the differences between the first customer service interview between a patient and a receptionist at a health services organization such as a hospital or physician's office and the first encounter between a customer and employee at a fast-food restaurant. For OCPs to be archetypical, the OCPs must be similar across some groups but different than other groups.

Idiotypical or idiomatic OCPs distinguish and identify one group of social actors from another. Idiomatic OCPs may constitute a unique function, or they may constitute a common function in a unique manner. Furthermore, ideotypical OCPs may consist of configurations (e.g., connections or sequences) between otherwise common or archetypical OCPs. For an OCP to be idiomatic, the OCP must be common across members of a group but different than other groups.

The sets of OCPs employed by those identifying themselves as members of an organization create a boundary between one group of social actors and another. Some OCPs are archetypical OCPs and others are idiomatic OCPs. The mix and configuration of OCPs is idiotypical, however.

When individuals change the OCPs necessary to sustain and distinguish one organization from another, they are attempting to change idiotypical OCPs. This theory explains how that happens and when it does not happen. Additionally, some OCPs may be more important to generating and sustaining the emergence of higher levels of coordination.

Axiom 3: Communication Practices Constitute Complex Adaptive Social Systems

A system is a set of interacting components that constitute a dynamic whole with emergent properties (Buckley, 1998, p. 35). Any system becomes complex when the interactions of components lead to an evolving whole at a higher level of organization. That is, the local interactions between components are necessary for global properties of the whole (Merali & Allen, 2001; Miller & Page, 2007). A complex adaptive system (CAS) is a system in which changes in an environment can affect the system, and changes within the system can affect the environment (Buckley, 1968). As components alter their local interactions to account for each other and the environment, the global system properties change. A CAS is a system that learns.

When researchers study CASs, they often do so through agent based modeling. Agent based models are computer simulations of how components interact with the environment and each other to produce emergent properties (Railsback & Grimm, 2012). Researchers begin with a set of hypotheses, research questions, or developed theory, they program the traits of the various components and the rules for interaction, and they run the model using one or more computer programs designed for simulations. In addition to satisfying the initial research goals, the models may also demonstrate unanticipated emergent phenomena.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Researchers refer to the components as agents. Agents are unique and autonomous components capable of interacting with other agents in some local space (Railsback & Grimm, 2012), and so, researchers include agency and constraints when they design the system. Each component has its own set of traits and rules for interaction. The similarities between components may be an effort to represent a species or the members of a common system or subsystem. When components repeat interactions, the repetition may reinforce particular rules for the interacting agents or trigger new rules shared by the interacting agents to represent the emergence of a system or subsystem. Some agent modeling researchers represent this "sharing", by giving all agents or groups of agents the same rules. A more realistic representation would account for the emergent character of rules as communication develops. The outcomes of simultaneous interactions or sequences of interactions become social constraints altering the next performances of behaviors.

When models use agents to represent just two humans, the models produce the relationship between humans, their communication (interactions), their episodes, and the arrangement of their sequences of episodes. The emergent relationship and episodes have properties that do not describe individuals or individual messages (actions), and the humans (agents) come to have characteristics they did not have before the emergence of the system. What researchers would be modeling is how the development of communication practices constitutes a complex adaptive social system.

Corollary 3.1 Communication Practices are Autopoietic

CASs are autopoietic, meaning the parts organize themselves into a system. Adaptation and evolution occur from the bottom up. When CASs adapt, it is because the components have adapted (Page, 2011). The components construct the patterns of interaction, and the arrangement of repeated interactions is the structure of the system (Buckley, 1998). The system has no agency, but the system represents and acts as a passive constraint on the components collectively (Buckley, 1998). When components change, the structure changes, and the system changes.

Communication is the process that humans use to organize themselves into a complex adaptive social system. Ashby (1968a) suggested that constraint was the minimal condition for organization. When a person considers the state or behaviors of another person before that first person behaves, the condition or behavior of the other person acts as a constraint on the actions of the first person. Social relationships evolve as a set of mutual constraints on the individuals in a relationship. When people communicate with each other, they use mutual or compatible individual constraints (rules) concomitantly as coordinated behaviors (episodes) emerge. Coupled systems achieve coordination as individual systems discover and match the appropriate mix of variety and constraint to sustain the links to each other. The Law of Requisite Variety suggests that living systems can achieve this matching naturally (Ashby, 1968b).

Corollary 3.2 Communication Practices are Autocatalytic

Organizing a CAS involves autocatalytic processes. That is, once set in motion, the processes will continue to function on their own. The processes repeat themselves with the output from one iteration acting as a recursive input for the next iteration. The processes have the potential to be multiplicative so that the relationships between inputs and outputs are nonlinear. Some parameters define constraints for processes, and the removal of constraints acts to improve the likelihood of nonlinearity. Removing

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

constraints increases variety in the system and can push a relatively stable structure to transformative change or dissolution.

Communication practices are the primary autocatalytic process in complex adaptive social systems. The practices repeat themselves and have rules. An episode emerges as individuals use a set of rules to make messages that are input into the episode, and the emerging episode, the output, becomes input for the evaluating the effect of the last message and for creating the next message. The practices have the potential to be multiplicative such that the relationships between inputs and outputs are nonlinear. For example, episodes can involve innovation within or across practices, and there can be conflict. Parameters such as rules for formal roles and the assumed topics or functions for the practices define constraints, but the removal of constraints acts to improve the likelihood of nonlinearity. Removing constraints increases variety and can push a stable practice to transformative change or termination of the practice. As variance within practices increase, more diverse practices emerge, and the overall configuration may change.

The system emerges as a configuration. On the one hand, the configuration includes a social network of actors with links representing the nature of their relationships to each other. On the other hand, the configuration also includes the arrangement of the episodes emerging as relationships emerge. This second arrangement may be more sensitive to the sequence of episodes such that the arrangement suggests cycles of episodes. Social network analysis can display both arrangements as either separate networks or as one network combining both relationships and episodes (Scott, 2000; Wasserman & Faust, 1994). CASs consist of diverse, rule-governed, interdependent entities interacting over a network (Page, 2011).

The actors in a social system are human beings developing relationships and performing role behaviors. This means there is much more plasticity or variance with social systems than other CASs (Buckley, 1968, 1998). There are many organizational roles for organizational members, and each role is part of different relationships with its own rules. A person may be a clerk, but that same person develops different relationships, requiring different roles and rules, with the people with whom they interact. People negotiate their roles with each other. Furthermore, each person plays other roles outside their organizational experiences, and other relationships and experiences affect the performance of organizational roles. The abilities for actors to learn and adapt is even more important when the components of the system are naturally so varied, and their interactions can be so different.

Local communication involves the emergence of relationships between the actors and the development of episodes. The configurations of the relationships between actors form an emerging communication network, and the temporal connections between episodes form emerging communication sequences. It is the emergence of these arrangements that become a complex adaptive social system. Local communication leads to higher order systems such as a local unit, a department, a division, and the organization as a whole. The sets of OCPs that sustain the emergence of these arrangements constitute an organization.

Theorem 1: Strategic initiatives will fail to accomplish transformational change when they do not alter idiomatic organizational communication practices.

Organizational members create and modify OCPs on their own (autopoietic), the processes become self-stimulating (autocatalytic), and these practices become emergent task structures and cultures that identify the social system as an organization. OCPs are the core processes. Organizational goals, for example, are emergent phenomena happening through communication, and any regular effort at reviewing, assessing, or changing goals is an instance of OCPs. Likewise, any effort at changing the way

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

an "organization" performs a task function necessarily means changing the communication practices identified with those functions since communicating is organizing.

Transformational organizational change is about transforming communication. Rao and Singh (1999) framed different types of organizational change as the evolution of a new species, and they concluded that strong speciation occurs when most of the core processes change. Especially important were those parts of core processes that identify an organization and distinguish it from other organizations. Idiomatic OCPs are those communication practices that identify an organization and distinguish it from other organizations, and transformative organizational change happens only when there are changes in these practices.

Strategic initiatives fail when the directors of these efforts fail to account for idiotypical OCPs. For example, anyone strategically attempting a functional transformational change must consider questions like the following. What are the distinguishing OCPs associated with a given function? Which of these practices do people wish to change, and how do they wish to change them? Which episodes do people wish to change, how will the arrangement of episodes change, and how might these changes alter the task structure, climate, and culture? How might organizational members modify the changes, and how might these modifications change the answers to the previous questions? How much time will be needed for the communication associated with trying to make this change? Without tentative answers to these types of questions, the effort will not succeed.

CHANGING ORGANIZATIONAL COMMUNICATION PRACTICES

Axiom 4: Organizational Communication Practices Evolve Through a Modified Four Phase Natural Selection Process

Behavioral science researchers have attempted to use Darwin's natural selection model as an analog for the development of social behavior for some time. Campbell's development of his sociocultural evolution model may have been the most successful (Campbell, 1965). Organizational researchers have used it to frame a variety of research, and Campbell's work led to the development of population ecology research (Aldrich & Ruff, 2006; Baum & McKelvey, 1999). Weick (1969, 1979) modified Campbell's original model to explain learning as making sense. Natural selection has also been part of the assumptions made by researchers studying nonlinear processes in organizations (Marion, 1999, 2002; Stacey 1996, 2003). Communication researchers often refer to this approach as part of evolutionary or ecological models (Monge et al., 2011)

Original models identified three parts to evolution. Variation is the process in which the entities perform different behaviors and produce different outcomes. Invention may account for some differences, and these novel occurrences may happen through combining previous behaviors or outcomes (e.g., crossovers). There are also errors (e.g., mutations), mistakes made trying to copy previous behaviors or outcomes from pervious performances. Variation provides a range of behaviors and outcomes for accomplishing a range of functions. Campbell (1965) referred to this stage as Blind Variation to emphasize the chance or blind characteristics of most variation. In an organization, the natural differences between people and among people and the differences in their interactions inside and outside organizational relationships are a continuing source for Blind Variation. Rational variation occurs when social actors develop variations strategically, to fulfill one or more conscious purposes. Weick (1969, 1979) called this first stage enactment to emphasize that social actors create those situations of which they will then make sense.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Selection is the second process related to natural selection. In natural systems, the environment provides a set of passive constraints (e.g., the availability of resources, the weather, the number and types of predators) that form selection criteria. In socio-cultural systems such as organizations, there are passive constraints such as each actor's personality, previous decisions, and the sequences of past behaviors, but the goals, decisions and efforts at persuasion or compliance become a set of active constraints forming selection criteria. If entities, behaviors, or outcomes fail to meet criteria, they are less likely to find opportunities to reproduce, and so selection pressures winnow what variation produced.

Retention is the last process. Retention refers to all those mechanisms to copy and preserve the selected organisms, behaviors, and outcomes. In biological systems, reproduction is the most obvious retention mechanism. In organizations, developing policies and procedures and storing them in documents are efforts at retention. All efforts at reinforcing routinization are part of retention. Reading documents and trying to conform to policies, a part of the enactment following retention, seldom produces completely uniform behavior. There will always be copying with variation.

When some of the early researchers of chaos theory and complexity theory developed their ideas, they began by exploring biological systems and natural selection. Kauffman (1993, 1995) investigated how biological life could emerge through the natural selection of chemicals in the primordial soup. His agents in his models were the chemicals that would constitute genes, and so his agents represented the distribution of genes across a fitness landscape. His models demonstrated that adding the interaction of the agents to the models made the emergence of life probable.

Traditional models of natural selection involved variation, selection, and retention, but Kauffman's model involved variation, interaction, selection, and retention. Newer agents interacted among themselves and older agents, and selection acted to insure that the most adaptive configurations of agents survived the environment to reproduce. There was also a mutually causal link between selection and agent interaction as selection pressures acted to alter the intensity of the interactions.

Interaction in the Kauffman model and similar models refers to the creation of a link between agents and the development of conditional behaviors – coordination. Some agents must rely on others while other agents rely on each other in a specific sequence. In an organization this could be as simple a link as a sales person waiting for another worker to deliver a product to the sales person before the sales person delivers the product to the customer. Of course, human communication is a form of interaction.

In analyzing communication networks, these distinctions would be about the direction and strength of ties between actors (Monge & Contractor, 2003). Some actors have links that are one directional (e.g., actor A gives to/influences/sends to actor B), and others have links that are bidirectional (e.g., actor A and B communicate with each other). The coupling distinctions are ways of defining the strength of the ties between each other. Weak links are loosely coupled and strong links are tightly coupled.

Human communication differs from other forms of "interaction" because it involves social actors in the process of constructing things together. As actors create individual messages they partially include themselves and define their roles as part of an emergent relationship (Katz & Kahn, 1978). The various messages connect to each other in some meaningful ways as part of an emerging episode. The actors create, reproduce, and potentially transform coherence and order as they mesh individual actions (Stacey, 2001).

When viewing communication as constituting organizations, the variation stage is exclusively about the performances of episodes and primarily about OCPs. Actors will repeat some episodes with little variation, and these episodes are tightly coupled. Other actors will repeat episodes with greater variation, and these episodes are loosely coupled. Some actors will improvise to account for differences, events or

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

circumstances not a part of routines. Impromptu episodes introduce the greatest variety into the system and may lead to improvisations and social routines if the episodes can survive the next two stages.

In the second stage, interaction, actors will communicate about the episodes they have created in variation. That is, the episodes at this stage are about the arrangement and coordination of episodes in the last stage. In some instances, the communication patterns will reinforce routines and the emerging system, in other instances communication will challenge or question routines, and there will be communication about the performances of the improvisations and recognition of any impromptu episodes. The arrangement of communication events following this stage becomes the input for the next stage. In this phase, human communication produces the whole people call the organization.

In the third stage, selection pressures will favor some links, network configurations, episodes, and episode sequences over others. Improvisations may be the most common communication in this stage. Actors will begin to act on what was observed at the end of the interaction stage and begin communication about how to retain, expand or eliminate some links, episodes, or arrangements between them. Some actors may construct explicit episodes to evaluate what is happening.

The last stage, retention, also involves communicating about other communication. Story-telling episodes, policy meetings, ceremonies, and training sessions are all good examples. The outputs for this stage are the rules for performing retained communication practices and the records of different performances that become the basis for the variation stage.

Theorem 2: The longer an organizational communication practice or set of practices have been in place, the more difficult they will be to transform.

As OCPs evolve, they become more efficient at accomplishing their functions. There will be incremental changes to OCPs that survive each iteration of the evolutionary process, and the incremental changes will become smaller and smaller the longer the OCPs persist. Episodes will become more tightly coupled as improvisations become routines. The OCPs will contain what members have learned. This is the essence of continuous, first order change.

This pattern of squeezing more and more variety out of the OCP is also part of improving the fit of the various OCPs to each other. Coordination becomes easier within units and then across units. History becomes a passive constraint on change. The performance of the OCPs can become mindless and can become a self-fulfilling prophecy about the efficacy of the OCPs (Kilduff, Crossland, & Tsai, 2008).

Organizational members will retain the rules for past communication practices even as there are attempts to install alternative OCPs. It is not uncommon for organizational members to employ old OCPs once a change management effort has ended or the champions of such an effort have left (Robbins & Finley, 1996; Salem, 2008). Members comply with such efforts, but they do not commit because they have experienced the success of the older OCPs and they know the newer OCPs will be temporary.

Changes enter as part of variation, but transformational change will involve changing idiomatic OCPs, the way people communicate about changes, selection criteria, and retention mechanisms. Transformational change will take time, and if the current OCPs have been in place for a long time, it will take a long time to change them. It will also take more communication to change.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Axiom 5: Transformational Change is Possible Because of the Nonlinear Potential Inherent in the Autopoietic and Autocatalytic Nature of Organizational Communication Practices

The traditional view of an organization was that it was a contrived or rational system (Katz & Kahn, 1977; Scott, 2003). This view meant that organizations may be a system, but they were a system with goals, technologies, and structures, and there were special components involved with management. However, in a CAS, there may be a system hierarchy (e.g., component, subsystem, system), but there is no hierarchy of components – no vertical authority differentiation. There may be actors who are involved with leadership or management, but that means those actors have different constraints and rules than others. It means there cannot be "top-down" change, but just the changes emerging from the nature of the actors and their interactions. The decider mechanism in a social system is dispersed downwardly – individual components make local decisions (Miller, 1978). Management's efforts achieving transformative change through a formal strategic initiative would face the same challenges as any effort challenging current practices. Leaders often view themselves as outside the system as they make attempts to change organizational behavior, and this tendency may account for their failure to appreciate the challenges facing their efforts (Griffin, 2002).

There has been considerable research in mathematics and the natural sciences about nonlinear processes since the 1940s. Likewise, social and behavioral science researchers have employed CAS models since at least the 1930s. There was a special issue of *Nonlinear Dynamics, Psychology, and Life Sciences* in 2013 devoted to organizations, there have been edited volumes devoted to nonlinear processes and organizations (Allen, Maquire, & McKelvey, 2011; Uhl-Bien & Marion, 2008), and communication scholars have incorporated these ideas into their research (Contractor, 1999; Monge et al., 2011). The development of basic ideas for these efforts goes back several centuries (Goldstein, 2008; Salem, 2013).

Stacey (1996) described organizational life in such a way that highlighted the autopoietic and autocatalytic features of organizational communication. Furthermore, this description highlights how variety bubbles up to affect organizational change. I will employ this model emphasizing OCPs.

Stacey (1996) begins his description by explaining that any organization has both a legitimate system and a shadow system. The legitimate system consists of the formalized task structure and the dominant culture. As noted earlier, the formal task structure consists of the arrangement of those OCPs involving the central instrumental social routines and the improvisations associated with them, and the dominant culture consists of the arrangement of those OCPs involving the prevailing social rituals and the improvisations associated with them. The shadow system begins as impromptu episodes and improvisations developing into communication practices as alternatives to those that constitute the legitimate system. Actors may organize the alternative communication practices into arrangements that become one or more shadow systems challenging the legitimate system.

A shadow system emerges from communication differences people experienced performing organizational roles and their roles in other relationships. Different communication experiences become part of the variance when performing organizational social routines. Actors may discover that the modified routines result in more beneficial episodes, and so the actors may repeat the modified routines as alternatives to the prevailing practices. The differences challenge the legitimacy of current constraints, and some of those challenges coalesce as alternative mixes of variety and constraint.

Notice that variety enters at the level of individuals and specific practices. There is variance between individuals in performing the same practices. This moves to diversity among types or between groups.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Actors perform similar OCPs within a group, but different actors perform different OCPs between groups. Variety enters into configurations by comparing structural and sequential OCP arrangements across time or by comparing large segments of an organization to each other. Stacey's description suggests that variety progresses from individual to group to configuration as a shadow system develops, and this pattern mirrors Page's (2011) levels of difference.

Stacey (1996) described four possible outcomes to dealing with these challenges. The legitimate system may continue to dominate as members ultimately reject one shadow system as others emerge, or the legitimate system may adapt by incorporating some alternatives as first order change. There will be little or no modifications in idiomatic OCPs as the organization exhibits stability and maintains an equilibrium state. When organizational theorist adopted a systems perspective, they thought of maintaining equilibrium as the ultimate measure of success. Indeed, systems researchers were emphasizing stability over change (Buckley, 1968). This first organizational outcome corresponds to a point attractor, a stable outcome in the nonlinear research literature occurring when little variety is part of an autocatalytic process (cf. Vallacher & Nowak, 2008).

When organizational members have been together for a long time, social routines dominate OCPs, and there are less frequent improvisations. There is the potential for inertia, stagnation, and cult formation as the system loses its robustness (Kilduff et al, 2008; Page, 2011). Difference can be threatening. There is also the danger for disintegration, as noted below.

A second outcome occurs when there are somewhat fewer constraints and greater variety than when a process leads to equilibrium. The legitimate system may split while members examine two or more structures as alternatives for behaving or may sustain multiple but competing sets of OCPs. The most obvious examples occur when organizations have project teams or members adopt a project structure. Actors may have one set of OCPs for the majority of members, but reserve a special set of OCPs for members working with special clients, exceptional task lines, or crises. In a purely project structure organization, the system maintains a central core coordinating separate continuing projects. In a matrix structure, the project managers emphasize the differences between their projects, but functional managers for the entire organization attempt to insure some uniformity across projects. In a brokered system, a central core may coordinate independent organizations to complete one task and may coordinate completely different organizations to complete a different task. The only sustainable legitimate system involves the OCPs at the core.

The movement from project teams to project structures to matrix structures to brokered systems is one of increasing variety, looser coupling, and greater improvisation. In the nonlinear literature, this archetype is called a period attractor in which multiple outcomes are possible from the same process (Vallacher & Nowak, 2008). The dean's office of an academic college faces these challenges with the shadow systems in different departments.

As variety increases, there is still a legitimate system with an increasingly more flexible system at the core as the number of shared OCPs becomes smaller. Some OCPs that were part of the legitimate system become part of a shadow system. The most obvious instances of this kind of turbulence happen with mergers, but any expansion or contraction of tasks stimulates movement between legitimate and shadow systems. The members may be in danger of losing their collective identification with other members, and the organization may be losing its distinctiveness.

The third outcome is disintegration of the system (Stacey, 1996). This can happen in two very common trajectories. First, the system may have become brittle over time as members squeezed so much variety out of the system that any change in routines could bring down the entire structure. People only know

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

one thing and one way to do it, they have been in the system for a while, and they have lost any desire to change, for example. Second, small changes magnified their impact to the point that the old system has lost viability. For example, an organization that evolved into a brokered system could die because the separate units may decide to do their own coordination.

The fourth outcome is the emergence of new legitimate systems (Stacey, 1996). That is, organizations undergo transformational changes and continue to transform themselves over time. Transformational change is possible because the legitimate system acts as a shield for internal turbulence as alternatives develop. The legitimate system is a source of order while disorder develops simultaneously. As the emerging shadow system gains momentum, creative destruction occurs and the former shadow system becomes the new legitimate system. Then the process begins again.

The third outcome is possible because autopoietic and autocatalytic process have led to chaos, the third outcome. Chaos appears to be random, but the system moved to this state because of a rule-governed autocatalytic process. With non-living systems (e.g., physics, chemistry), the state had the potential for self-re-organization, the fourth outcome, but in living systems (e.g., biology), the result was disintegration. Researchers labeled the state that can continuously produce the fourth outcome a strange attractor, the edge of chaos, or the complexity regime (cf. Salem, 2013). The significant difference between the autocatalytic process that led to chaos and the ones that led to the edge of chaos is that the amount of variety introduced into the processes at the edge of chaos is high, but it is less than the amount of variety introduced into the processes at chaos.

Theorem 3: When the diversity of communicators is high, strategic initiatives are more likely to accomplish transformational change than when the diversity is too low or too high.

Theorem 4: When the diversity of messages is high, strategic initiatives are more likely to accomplish transformational change than when the diversity is too low or too high.

Theorem 5: When the diversity of ways of communicating is high, strategic initiatives are more likely to accomplish transformational change than when the diversity is too low or too high.

Theorem 6: When the connectivity between communicators is high, strategic initiatives are more likely to accomplish transformational change than when the diversity is too low or too high.

The theorems are amenable to empirical investigation. There are ways of measuring or gathering data about variety, both quantitatively and qualitatively. Researchers can determine how much is too high, high, low, and too low.

All of the theorems are ways of increasing variety and reducing constraints on communication between organizational members. This is similar to what happens when researchers increase parameters using agent modeling. Increasing variety also has the effect of increasing the load for members.

The theorems posit how greater diversity of communicators, messages, ways to communicate, and opportunities to communicate affect the potential for transformational change. Episodes will become more improvisational, and there is the increasing possibility of impromptu episodes questioning old rules and establishing newer ones. Members will transform their communication and the configurations of communication that constitute their organization.

The particular transformations are unpredictable. None of the theorems posit an intended outcome. Rather, the theorems are about the likelihood of strategic initiatives being part of transformational change. Leadership in such an effort is about creating opportunities for members to learn from each other while managing inevitable tensions and conflict (Uhl-Bien & Marion, 2008).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

Most strategic initiatives fail to accomplish transformational change. Human communication is a dynamic process in which individuals co-construct their relationships and episodes. Individuals confront variety and the tensions between agency and constraints as they construct organizational communication practices. Accomplishing transformation change involves recognizing how individuals organize themselves with organizational communication practices that evolve and constitute organizations.

Organizational communication practices are the process by which a group of individuals become a complex adaptive system. These practices evolve naturally, but the autopoietic and autocatalytic nature of communication means that the process can sustain the system or challenge it as variety increases in the processes. The outcomes of autopoietic and autocatalytic processes are minimally predictable. Ultimately, transformational change is possible when individuals bring enough variety to their communication to challenge older idiomatic OCPs and develop newer ones. However, introducing too much variety could also lead to the dissolution of the system.

REFERENCES

Ackoff, R. L., & Emery, F. E. (1972). *On purposeful systems*. Chicago: Aldine-Athenton.

Adler, M. (1967). *The difference in man and the difference it makes*. New York, NY: Holt Rinehart & Winston.

Aldrich, H., & Ruef, M. (2006). *Organizations evolving* (2nd ed.). Thousand Oaks, CA: Sage.

Allen, P., Maguire, S., & McKelvey, B. (Eds.). (2011). *The Sage handbook of complexity and management*. Los Angeles, CA: Sage.

Argyris, C. (1992). *On organizational learning*. Cambridge, MA: Blackwell.

Ashby, H. R. (1968a). Principles of the self-organizing system. In W. Buckley (Ed.), *Modern systems research for the behavioral scientist* (pp. 108–122). Chicago, IL: Aldine.

Ashby, H. R. (1968b). Variety, constraint, and the Law of Requisite Variety. In W. Buckley (Ed.), *Modern systems research for the behavioral scientist* (pp. 129–136). Chicago, IL: Aldine.

Axelrod, R., & Cohen, M. D. (1999). *Harnessing complexity: Organizational implications of a scientific frontier*. New York: The Free Press.

Bacharach, S. B. (1989). Organizational theories: Some criteria for evaluation. *Academy of Management Review*, *14*(4), 496–515.

Buckley, W. (1968). Society as a complex adaptive system. In W. Buckley (Ed.), *Modern systems research for the behavioral scientist* (pp. 490–513). Chicago, IL: Aldine.

Buckley, W. (1998). *Society - A complex adaptive system: Essays in social theory*. Amsterdam: Gordon and Breach Publishers.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Cabrey, T. S., & Haughey, A. (with Cookes-Davies, T.). (2014). *Enabling organizational change through strategic efforts*. Project Management Institute. Retrieved from http://www.pmi.org/~/media/PDF/Publications/Enabling-Change-Through-Strategic-Initiatives.ashx

Cameron, K. S., & Quinn, R. E. (1999). *Diagnosing and changing organizational culture: Based on the competing values framework*. Reading, MA: Addison-Wesley.

Contractor, N. S. (1999). Self-organizing systems research in the social sciences: Reconciling the metaphors and models. *Management Communication Quarterly*, *13*(1), 154–166. doi:10.1177/0893318999131009

Eisenberg, E. (1990). Jamming: Transcendence through organizing. *Communication Research*, *17*(2), 139–164. doi:10.1177/009365090017002001

Farace, R. V., Monge, P. R., & Russell, H. M. (1977). *Communicating and organizing*. Reading, MA: Addison-Wesley Publishing.

Fisher, B. A. (1978). *Perspectives on human communication*. New York: Macmillan.

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Berkeley, CA: University of California Press.

Goldstein, J. (2008). Conceptual foundations of complexity science: Development and main constructs. In M. Uhl-Bien & R. Marion (Eds.), Complexity leadership: Part 1: Conceptual foundation (pp. 17-48). Charlotte, NC: Information Age Publishing, Inc.

Griffin, D. (2002). *The emergence of leadership: Linking self-organization and ethics*. London: Routledge. doi:10.4324/9780203361474

Hawes, L. (1975). *Pragmatics of analoguing: Theory and model construction in communication*. Reading, MA: Addison-Wesley.

Hawes, L. C. (1973). Interpersonal communication: The enactment of routines. In J. J. McKay (Ed.), *Exploration in speech communication* (pp. 84–85). Columbus, OH: Charles E. Merrill Publishing Company.

Johnson, B. (1999). Communication for organizing. In P. J. Salem (Ed.), *Organizational communication and change* (pp. 99-123). Cresskill, NJ: Hampton Press.

Johnson, B. M. (1977). *Communication: The process of organizing*. Boston, MA: Allyn & Bacon.

Kaplan, A. (1964). The conduct of inquiry: Methodology for behavioral science. San Francisco: Chandler.

Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations* (2nd ed.). New York: John Wiley & Sons.

Kauffman, S. (1993). *The origins of order: Self organization and selection in evolution*. New York: Oxford University Press.

Kauffman, S. (1995). *At home in the universe: The search for the laws of self-organization and complexity*. New York: Oxford University Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kilduff, M., Crossland, C., & Tsai, W. (2008). Pathways of opportunity in dynamic organizational networks. In M. Uhl-Bien & R. Marion (Eds.), *Complexity leadership: Part 1: Conceptual foundations* (pp. 83–99). Charlotte, NC: Information Age Publishers.

Kunda, Z. (1999). *Social cognitions: Making sense of people*. Cambridge, MA: MIT Press.

Littlejohn, S. W., & Foss, K. A. (2009). Agency. In S. Littlejohn & K. Foss (Eds.), *Encyclopedia of communication theory* (pp. 28–32). Thousand Oaks, CA: SAGE Publications, Inc. doi:10.4135/9781412959384

Lundberg, C. (2000). Organizational development as facilitating the surfacing and modification of social rules. In W. A. Pasmore & R. W. Woodman (Eds.), *Research in organizational change and development: An annual series featuring advances in theory, methodology, and research* (pp. 41–58). Stamford, CT: JAI Press.

Marion, R. (1999). *The edge of organization*. Thousand Oaks, CA: Sage.

Marion, R. (2002). *Leadership in education. Organizational theory for the practitioner*. Upper Saddle River, NJ: Merrill Prentice Hall.

McPhee, R. D., & Zaug, P. (2000). The communicative constitution of organizations: A framework for explanation. *Electronic Journal of Communication, 10*(1-2). Retrieved from http://www.cios.org/EJCPUBLIC/010/1/01017.html

Merali, Y., & Allen, P. (2001). Complexity and systems thinking. In P. Allen, S. Maguire, & B. McKelvey (Eds.), *The SAGE handbook of complexity and management* (pp. 331–352). Los Angeles, CA: Sage.

Meyer, A. D., Goes, J. B., & Brooks, G. R. (1995). Organizations reacting to hyperturbulence. In G. P. Huber & A. H. van de Ven (Eds.), *Longitudinal field research methods: Studying processes in organizational change* (pp. 66–111). Thousand Oaks, CA: Sage.

Miller, H. H., & Page, S. E. (2007). *Complex adaptive systems: An introduction to computational models of social life*. Princeton, NJ: Princeton University Press.

Miller, J. G. (1978). *Living systems*. New York: McGraw Hill.

Monge, P. R., & Contractor, N. S. (2003). *Theories of communication networks*. Oxford: Oxford University Press.

Monge, P. R., Lee, S., Fulk, J., Frank, L. B., Margolin, D., Schultz, C., … Weber, M. (2011). Evolutionary and ecological models. Management Communication Quarterly, 25, 26-34.

Moskowitz, G. B. (2004). *Social cognition: Understanding self and other*. New York: Guilford.

Nadler, D. A., Shaw, R. B., & Walton, A. E. (1995). *Discontinuous change: Leading organizational transformation*. San Francisco, CA: Jossey-Bass.

Nelson, R. R., & Winter, S. G. (1982). *An evolutionary theory of economic change*. Cambridge, MA: The Belknap Press of Harvard University Press.

Page, S. E. (2011). *Diversity and complexity*. Princeton, NJ: Princeton University Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pentland, B. T., & Feldman, M. S. (2005). Organizational routines as a unit of analysis. *Industrial and Corporate Change*, *5*(5), 793–815. doi:10.1093/icc/dth070

Putnam, L. L., Nicotera, A. M., & McPhee, R. D. (2009). Introduction: Communication constitutes organization. In L. L. Putnam & A. M. Nicotera (Eds.), *Building theories of organizations: The constitutive role of communication* (pp. 1–19). New York: Routledge.

Railsback, S. F., & Grimm, V. (2012). *Agent-based and individual-based modeling: A practical introduction*. Princeton, NJ: Princeton University Press.

Rao, H., & Singh, J. V. (1999). Types of variation in organizational populations: The speciation of new organizational forms. In J. A. C. Baum & B. McKelvey (Eds.), Variations in organization science: In honor of Donald T. Campbell (pp. 63-77). Thousand Oaks, CA: Sage.

Rerup, C., & Feldman, M. S. (2011). Routines as a source of change in organizational schemata: The role of trail-and-error learning. *Academy of Management Journal*, *54*(3), 577–610. doi:10.5465/AMJ.2011.61968107

Robbins, H., & Finely, M. (1996). *Why change doesn't work: Why initiatives go wrong and how to try again – and succeed*. Princeton, NJ: Peterson's/Pacesetter Books.

Rothenbuhler, E. W. (1998). *Ritual communication: From everyday conversation to mediated ceremony*. Thousand Oaks, CA: Sage.

Salem, P. J. (2008). The seven communication reasons organizations do not change. *Corporate Communication: An International Journal*, *13*(3), 333–348. doi:10.1108/13563280810893698

Salem, P. J. (2013). *The complexity of human communication* (2nd ed.). Cresskill, NJ: Hampton Press.

Sawyer, R. K. (2001a). *Creating conversations: Improvisations in everyday discourse*. Cresskill, NJ: Hampton Press.

Scott, J. (2000). *Social network analysis: A handbook* (2nd ed.). Los Angeles: Sage.

Scott, W. R. (2003). *Organizations: Rational, natural, and open systems* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Searle, J. R. (1969). *Speech acts: An essay in the philosophy of language*. Cambridge: Cambridge University Press. doi:10.1017/CBO9781139173438

Shannon, C. E., & Weaver, W. (1963). *The mathematical theory of communication*. Urbana, IL: University of Illinois Press. (Original work published 1949)

Shimanoff, S. B. (1980). *Communication rules: Theory and research*. Beverly Hills, CA: Sage.

Smith, M. E. (2002). Success rates for different types of organizational change. *Performance Improvement*, *41*(1), 26–33. doi:10.1002/pfi.4140410107

Stacey, R. D. (1996). *Complexity and creativity in organizations*. San Francisco, CA: Barrett-Koehler.

Stacey, R. D. (2001). *Complex responsive processes in organizations: Learning and knowledge creation*. London: Routledge.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Stacey, R. D. (2003). *Strategic management and organizational dynamics: The challenge of complexity*. New York: Prentice Hall.

Stohl, C., & Redding, W. C. (1987). Messages and message exchange processes. In F. M. Jablin, L. L. Putnam, K. H. Roberts, & L. W. Porter (Eds.), *Handbook of organizational communication: An interdisciplinary perspective* (pp. 451–496). Newbury Park, CA: Sage.

Towers Watson. (2013). *Change and communication ROI: How the fundamentals have evolved and the best adapt*. Retrieved from https://www.towerswatson.com/en-US/Insights/IC-Types/Survey-Research-Results/2013/12/2013-2014-change-and-communication-roi-study

Uhl-Bien, M., & Marion, R. (Eds.). (2008). *Complexity leadership. Part 1: Conceptual foundations*. Charlotte, NC: Information Age Publishing, Inc.

Vallacher, R. R., & Nowak, A. (2008). Dynamical social psychology: On complexity and coordination in interpersonal relations. In M. Uhl-Bien & R. Marion (Eds.), *Complexity leadership: Part 1: Conceptual foundations* (pp. 49–81). Charlotte, NC: Information Age Publishers.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. New York: Cambridge University Press. doi:10.1017/CBO9780511815478

Weick, K. E. (1979). *The social psychology of organizing* (2nd ed.). Reading, MA: Addison-Wesley.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage.

KEY TERMS AND DEFINITIONS

Agency: The ability of an entity to make a choice to act, to carry out that action, and to be responsible for an action; it means the entity can affect change.

Autocatalytic Process: An iterative and recursive self generating process with the potential for nonlinear outcomes given the proper conditions.

Autopoietic Processes: A process in which components organize themselves into a system.

Complex Adaptive System: A set of diverse, rule-governed, interdependent entities interacting over a network such that the system can adapt and learn. However, the system changes only as a function of changes in the entities or their interactions.

Constraint: The limitations on agency or the source of limitations on agency. Passive constraints are the limitations on agency from sources that do not have agency themselves. Active constraints are limitations on agency from sources having their own agency.

Idiomatic or Idiotypical Organizational Communication Practices: The set of communication behaviors along with the rules for their enactment that identify and distinguish one organization from another.

Organizational Change: Organizational differences at different times.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Organizational Communication Practices (OCPs): The set of communication behaviors along with the rules for their enactment performed by organizational members. OCPs consisting of the patterns of instrumental social routines along with the improvisations attendant to them constitute the emerging task *structure* of an organization, and OCPs consisting of the patterns of social rituals along with improvisations attendant to them constitute the emerging organizational culture.

Variety: Refers to the tension between similar and different. Greater variety means the extent of difference is greater than or has increased while similarities are less or have decreased from one circumstance or period compared to another.

This research was previously published in Transformative Practice and Research in Organizational Communication; pages 109-129, copyright year 2018 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 47
Reflections on the Effect of Organizational Restructuring: Evidence From Albania

Ionica Oncioiu
Titu Maiorescu University, Romania

Diana Andreea Mândricel
Titu Maiorescu University, Romania

ABSTRACT

This chapter presents a new perspective on processes of change and adaptation to changes in Albanian telecommunications companies in order to maintain their position on the market. The objective of organizational changes, as a continuous process of experimentation and adaptation, is to correlate the capacities of an adaptation company to the business environment. The results of the study have shown that successful management of change is important for the survival and success of any company in the current environment in Albania. To take advantage of the benefits of organizational change stimulated mainly through innovation, companies need to think, act holistically, and make multi-level changes.

INTRODUCTION

The management of organizational change is a continuous process of experimentation and adaptation that has as its main target the correlation of capabilities of an organization to adapt to an environment business (Rojon et al., 2015; Pieper et al., 2017).

At the same time, contemporary society launches industrial and organizational challenges that trigger a new rhythm of change with many faces (Ericksen & Dyer, 2005; Lee et al., 2016; Pattnaik & Sahoo, 2018). The ensemble of forces as components of the external environment is extremely difficult in the existence and survival of prosperity (Podsakoff & Organ, 1986; Pettigrew et al., 2001; Meuer, 2017).

DOI: 10.4018/978-1-7998-7297-9.ch047

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Moreover, the main concern of the telecommunications system is the efficient management of initiatives of strategic change, and the fundamental difference between the success of an organization's success and the failure of others is merely the ability to adapt to any change (Schulz, 2004; Wu et al., 2011; Briggs et al., 2012). Thus, telecommunications organizations need to permanently study and monitor the external environment to anticipate changes and adapt quickly.

The management of change underlines the problematic of managing change, being in itself a phase that has at least two meanings (Sementelli, 2016). The first one refers to adopting changes in a structural way, planned and organized in order to efficiently implement some methods and systems within an organization in activity, as changes that have to be managed are found within an organization and are controlled by it. The second meaning of management of change refers to the reaction and the answer to changes that the organization does not control them in a small measure (legislative changes, the change of social or political climate, competitiveness, and the changes of economic boundaries).

This article takes a fresh look at empirical studies that have tried to demonstrate the connection between change management and organizational development in telecommunications system and it has three main contributions.

First, in support of the theory, we derive two different testable hypotheses that allow us to formulate a strategy of change within the telecommunications companies in Albania. A better understanding of change was supported by empirical proofs from various authors, including Renn et al. (2014), Weiss (2001), Bloodgood and Morrow (2000), Bolman and Deal (1999), and Chahal et al. (2016), who proposed a model of the stages of change relatively similar to the reaction of employees.

Second, in the investigative approach to new change management challenges in the contemporary economy, we used a complex strategy of research, combining quantitative and qualitative methods of investigation. All the scientific process involved taking into account all the parameters/variables considered useful in identifying the answer to the central research question. The entire research process involved completing specific rules, collection, analysis, and the selection of information that can be proven objectivity with a lot of rigor over a predetermined length of time. The results obtained are valid and reproducible because they are based on a methodology of well-chosen research that lends credibility to the conclusions we have reached at the end of the research period.

Third, using a qualitative model design, we demonstrate that no matter how well the strategies of change are formulated, the implementation of change is a decisive step in its successful realization. Managerial practice has shown that strategy implementation failure is the basic reason why people are anxious about organizational change (Song et al., 2015). More specifically, the diversity of views expressed in the literature specifically referring to change and management helped us determine the best approach for positioning our scientific research on the new change management challenges in the contemporary economy (Guo et al., 2017).

The results of this study show that successful management of change is very important for the success of the organization and its survival in the current business environment (Kemper et al., 2017), also in the private telecommunications environment. In the light of the apparent logical hole, the theories and approaches of management of change that are available for theoreticians and practitioners often argue between themselves, and many of them lack the empirical evidence supported by incontestable hypothesis regarding the nature of contemporary organizational management of change (Munro, 2014).

Finally, our findings have revealed that the transition from passive status to the active status of personnel in an organization is possible when change occurs and is implemented.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The rest of the article is organized as follows: Section 2 provides the materials and methods development; Section 3 presents the results and discusses our findings. Finally, the conclusions are presented.

BACKGROUND

According to specialists, Albanian telecommunications companies as well as other organizations face problems in anticipation and adaptation to changes in their environment (Guillén & Saris, 2013). The factor that causes lack of performance in the field of competitiveness is precisely the inability to recognize the changes that occur in the business environment. Adopting a systematic approach to change contributes to the success of an organization (Bostan, 2016; Popa, 2012). In this respect, they will have to simultaneously manage all the challenges of change. One of the challenges of organizational change is the importance of managing experience in changing personnel (Strauss et al., 2012; Jung et al., 2016).

Through major changes with impact on all members of an organization, it is trying to eliminate uncertainties (Wu & Chen, 2014). The insuring conditions that Albanian companies remain on the market and can adapt to market requirements are: (1) good knowledge of the company; (2) transparency of management processes in order to increase the quality of services; (3) creation and diversification of internal mechanisms of reaction to disruptive forces outside the company (Popa, 2012).

Many specialists have approached the concept of management of change (Frese & Fay, 2001; Kotey & Slade, 2005; Paton & McCalman, 2008; Pfeffer, 2012). However, organizational change is far from being understood in terms of dynamics and effects in time, of the processes that occur, of discontinuity and context. The technical change in the industry of services represents an area poorly represented in the literature of speciality, despite the importance that innovation and employment have (Bakotic & Krnic, 2017).

RESEARCH METHODOLOGY

The design of our model was based on the view of Kets de Vries (2003), who stated that change is based on five categories of behaviour: behaviour of concern, confrontation behaviour, behaviour of classification, behaviour of convergence of the efforts to achieve the organization's goals, and behaviour of change.

Although some statistical works ignore the existence of improbability techniques (for reasons that are related to the impossibility of applying the theory of probability), because of the characteristics specific to the socioeconomic domain—which sometimes make it almost impossible to fulfil the conditions of compliance of a sample that will not violate the laws of probability—we believe that improbability techniques are important and useful for this study. For this phase of the study, we used the technique of sampling improbable (non-random), that is, proportional quota sampling, because the literature considers it adequate for exploratory studies given its greater accessibility and low cost.

Modifying the operational framework will achieve the scientific approach required the development of a questionnaire to obtain the views of respondents, and the selected respondents represented overall characteristics of the included population. The model of research proposed by this study started from the premise highlighted in the literature that there is a directly proportional correlation between organizational change and organizational culture.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The logical structure of the questionnaire allowed us to quantify each item from the process of implementation of change by subdividing the components and classification of variables according to the criterion of causality. The evaluation of the respondents' opinions was done using the 5-level Likert scale to avoid their reluctance: strongly agree, agree, indifferent, disagree, and strongly disagree. All questions were closed-ended questions. The distribution and filling of the questionnaires were conducted from July 2018 to October 2018 in Albanian telecommunications companies (Albtelecom, Eagle Mobile, Plus Communication, Telekom Albania). To ensure the objectivity of the answers, the respondents were provided with a climate of anonymity.

The adoption of empirical research conducted on the four sections (D - the level of acceptance of change, E - appreciation towards the way of communication of change, F - evaluation of determining factors in the success of change, G - evaluation of the level of resistance to change) of the hypothesis (H_1 The evaluation of the attitude towards change is positively influenced by the necessity of change within the organization, and the circulation of information within organization) allowed the calculation of scores for each item facilitated our analysis of the scores.

Based on the results obtained by submitting the scores and comparing them with those identified in the strong points (SP) and weak points (WP), we can proceed to the validation and invalidation of items in the next step. According to the research model, the questionnaire was structured in a logical sequence in seven sections; in step two, the items established in determining the interdependence of components that allow the identification and characterization H_1 will be analysed and interpreted.

RESULTS

Triggering the process of change in companies requires identifying the main problems the companies face and the opportunities for the establishment and development of collaborative relationships between specialists in change management and the members of the organization that is going to make the change (Latham & Pinder, 2005; Belbin et al., 2012; Leyer et al., 2017).

The results of the analysis and their interpretation were carried out in two stages:

1st Stage: Identifying the strengths and weaknesses of management of change in the Albanian telecommunications companies in terms of the important motivation in the success of change and the attitude toward change.

2nd Stage: Analysis and interpretation of items for determining the management of change in organizations according to H_1 using statistical and econometric methods.

The hypothesis is explained by the following equation:

$$H_1 = \beta_0 + \beta_1 (Y_1^D) + \beta_2 (Y_1^E) + \beta_3 (Y_1^F) + \beta_4 (Y_1^G) \quad (1)$$

where:

Y_1^D = the need of change within the organization—the values show the average of items 1, 4, 5, 6, 7, 8, 9, and 10;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Y_1^E = the circulation of information within the organization—the values show the average of items 2, 4, 5, 6, and 9;

Y_1^F = level of effort needed to eliminate barriers in the way of change—the values present the average of items 1, 2, 3, 5, and 6; and

Y_1^G = the behavior of the personnel responding to change—values present the average of items 3, 4, 6, 7, 8, 10, 13, 14, 15, and 17.

The modelling of the equation was done by selecting the items validated in Table 1 and the resultative ones, Y_1^D, Y_1^E, Y_1^F, and Y_1^G, that involved a multicollinear direct equation. Using the regression linear function from Excel, we estimated the parameters and the statistics of additional regression for Y_1^D, Y_1^E, and Y_1^F.

Besides, β1, β_2, β_3, and β_4 parameters are expected to be positive (see Table 2).

$H_1 = 0.44 + 0.20\ (D) + 0.10\ (E) + 0.25\ (F) + 0.34\ (G)$

Table 1. Indicators of central and variation tendency regarding the items – validation/invalidation items for H_1

Symbol	Items	Indicators of central and variation tendency				
		Media	Standard deviation	Coeff. de variation%	PF/ PS	Validation/ invalidation
Section D – The level of acceptance of change (Y_1^D)						
$x_{1.1}^D$	Is your organization in a process of change?	3.70	0.94	0.88	PF	Validation
$x_{1.2}^D$	In your organisation is there necessary to implement an organizational change?	3.50	0.99	0.98	PS	Invalidation
$x_{1.3}^D$	The change in the organization will end successfully?	3.40	0.81	0.66	PS	Invalidation
$x_{1.4}^D$	In general I consider changes to be something positive	4.02	0.71	0.51	PF	Validation
$x_{1.5}^D$	I like to try new and different things	4.30	0.53	0.28	PF	Validation
$x_{1.6}^D$	Every time life becomes routine I always find ways to change something	3.98	0.83	0.69	PF	Validation
$x_{1.7}^D$	I would prefer to be surprised in any way rather than get bored	4.05	0.69	0.47	PF	Validation
$x_{1.8}^D$	I often change my mind	3.10	0.82	0.67	PS	Invalidation
$x_{1.9}^D$	I change my opinion if convincing arguments are brought to me	3.90	0.81	0.66	PF	Validation
$x_{1.10}^D$	My opinions are consequent in time	3.97	0.52	0.27	PF	Validation

continues on following page

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Continued

Symbol	Items	Indicators of central and variation tendency				
		Media	Standard deviation	Coeff. de variation%	PF/ PS	Validation/ invalidation
Section E – Appreciation towards the way of communication of change (Y_1^E)						
$x_{1.1}^E$	I feel comfortable to share my ideas directly with the members of the superior management	3.88	0.80	0.65	PS	Invalidation
$x_{1.2}^E$	In most of the situations I receive information I need to fulfil my tasks	3.94	0.82	0.67	PF	Validation
$x_{1.3}^E$	The managers don't have any hesitation to communicate information about the organization to the subordinates	3.83	0.92	0.84	PS	Invalidation
$x_{1.4}^E$	A lot of the information I receive every day is detailed and precise	3.94	0.76	0.57	PF	Validation
$x_{1.5}^E$	I receive the information I need to fulfil my tasks on time	3.88	0.72	0.51	PF	Validation
$x_{1.6}^E$	It doesn't happen to be late in fulfilling my tasks due to the lack of the information I need	4.07	0.81	0.66	PF	Validation
$x_{1.7}^E$	The greatest part of daily communication I receive from the superior management	3.83	0.74	0.55	PS	Invalidation
$x_{1.8}^E$	This organization often supports "polis" meetings where the employees meet to share information	2.98	0.92	0.84	PS	Invalidation
$x_{1.9}^E$	The most part of the information I need I receive through formal channels	3.78	0.89	0.80	PF	Validation
Section F – Evaluation of determining factors in the success of change (Y_1^F)						
$x_{1.1}^F$	Recruitment and selection of personnel according to well defined criteria	3.93	0.82	0.67	PF	Validation
$x_{1.2}^F$	Training programs	4.54	0.50	0.25	PF	Validation
$x_{1.3}^F$	Development of leader abilities	4.17	0.70	0.49	PF	Validation
$x_{1.4}^F$	Management of performances	4.30	0.69	0.48	PS	Invalidation
$x_{1.5}^F$	Compensation of employees	4.43	0.62	0.39	PF	Validation
$x_{1.6}^F$	Stimulation of the involvement of the employees	4.30	0.73	0.53	PF	Validation
Section G – Evaluation of the level of resistance to change (Y_1^G)						
$x_{1.1}^G$	Great part of the information I receive daily is transmitted to the inferior levels through a kind of "colander"	2.80	1.07	1.14	PF	Invalidation
$x_{1.2}^G$	I usually find out the news of the company with a few months later	2.29	1.28	1.63	PF	Invalidation

continues on following page

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Continued

Symbol	Items	Indicators of central and variation tendency				
		Media	Standard deviation	Coeff. de variation%	PF/ PS	Validation/ invalidation
$x_{1.3}^{G}$	Changing plans seems a real drudge for me	2.69	1.19	1.41	PS	Validation
$x_{1.4}^{G}$	I often feel a little bit uncomfortable even when it is about changes which. possibly can improve my life	2.62	1.16	1.35	PS	Validation
$x_{1.5}^{G}$	When someone puts pressure on me to change something. I have the tendency to oppose myself. even if in the end it will be in my advantage	2.56	1.12	1.26	PF	Invalidation
$x_{1.6}^{G}$	Sometimes I have the tendency to avoid changes of any kind even if I know I will benefit from them	2.07	1.12	1.26	PS	Validation
$x_{1.7}^{G}$	When I am informed of the changes of plans I start to be tensed	2.71	1.08	1.18	PS	Validation
$x_{1.8}^{G}$	When things do not go according to the plans I am stressed	2.99	1.03	1.06	PS	Validation
$x_{1.9}^{G}$	If my supervisor changed the evaluation criteria of performance I would probably feel uncomfortable	2.59	0.10	0.93	PF	Invalidation
$x_{1.10}^{G}$	If I were informed that there will be some significant changes at work I would probably feel stressed	2.80	0.98	0.95	PS	Validation
$x_{1.11}^{G}$	I would chose an ordinary day instead of a day with unexpected events anytime	2.80	0.98	0.96	PF	Invalidation
$x_{1.12}^{G}$	Things would go better if your supervisor changed?	2.28	1.40	1.95	PF	Invalidation
$x_{1.13}^{G}$	Do you say that you do not have time? When in fact you are not in a mood?	2.08	1.39	1.94	PS	Validation
$x_{1.14}^{G}$	Do you make your breaks as long as you can?	1.93	1.41	2.01	PS	Validation
$x_{1.15}^{G}$	Do you do overtime?	3.63	1.22	1.48	PF	Validation
$x_{1.16}^{G}$	Are you late for work?	2.22	1.40	1.96	PF	Invalidation
$x_{1.17}^{G}$	Is my job too tiring?	2.58	1.01	1.01	PS	Validation

The influence of the first factor on the variation of the resultative factor H_1 is higher and is justified by identifying the behavior of the personnel in response to change before we can determine the level of effort needed to eliminate barriers of change, the need for change within an organization, and the circulation of information within the analyzed organizations.

As a result of the findings, 62.08% of items were validated. Due to the fact that the hypotheses were validated, there was no need for subsequent re-formulations. Thus, our findings have indicated that there is a need for a model of change implementation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Indicators of the central and variation tendency regarding Y_1^D, Y_1^E, Y_1^F, and Y_1^G

Symbol	Items	Indicators of central and variation tendency			
		Coefficients	Multiple R	R Square	F
Section D – The level of acceptance of change (Y_1^D)					
	Intercept	-134.32	0.72	0.77	19.42
$x_{1.1}^D$	Is your organization in a process of change?	-20.46			
$x_{1.4}^D$	In general I consider changes to be something positive	-31.31			
$x_{1.5}^D$	I like to try new and different things	13.94			
$x_{1.6}^D$	Every time life becomes routine I always find ways to change something	64.08			
$x_{1.7}^D$	I would prefer to be surprised in any way rather than get bored	-12.28			
$x_{1.9}^D$	I change my opinion if convincing arguments are brought to me	-33.25			
$x_{1.10}^D$	My opinions are consequent in time	83.43			
Section E – Appreciation towards the way of communication of change (Y_1^E)					
	Intercept	51.91	0.68	0.47	66.47
$x_{1.2}^E$	In most of the situations I receive information I need to fulfil my tasks	68.33			
$x_{1.4}^E$	A lot of the information I receive every day is detailed and precise	72.56			
$x_{1.5}^E$	I receive the information I need to fulfil my tasks on time	-112.79			
$x_{1.6}^E$	It doesn't happen to be late in fulfilling my tasks due to the lack of the information I need	-17.99			
$x_{1.9}^E$	The most part of the information I need I receive through formal channels	42.42			

continues on following page

SOLUTIONS AND RECOMMENDATIONS

From the perspective of change, the complex problems managers face cannot be analysed objectively and continuously within the current tasks (Wang & Ahmed, 2003). Each manager forms a set of beliefs and specific premises that are relevant to the organization where he or she works (Basten & Haamann, 2018).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Continued

Symbol	Items	Indicators of central and variation tendency			
		Coefficients	Multiple R	R Square	F
Section F – Evaluation of determining factors in the success of change (Y_1^F)					
	Intercept	193.28	0.82	0.60	8.64
$x_{1.1}^F$	Recruitment and selection of personnel according to well defined criteria	13.29			
$x_{1.2}^F$	Training programs	22.97			
$x_{1.3}^F$	Development of leader abilities	-48.31			
$x_{1.5}^F$	Compensation of employees	-12.62			
$x_{1.6}^F$	Stimulation of the involvement of employees	22.46			
Section G – Evaluation of the level of resistance to change (Y_1^G)					
	Intercept	9.15	0.65	0.80	15.93
$x_{1.3}^G$	Changing plans seems a real drudge for me	-74.23			
$x_{1.4}^G$	I often feel a little bit uncomfortable even when it is about changes which. possibly can improve my life	-5.89			
$x_{1.6}^G$	Sometimes I have the tendency to avoid changes of any kind even if I know I will benefit from them	22.90			
$x_{1.7}^G$	When I am informed of the changes of plans I start to be tensed	75.76			
$x_{1.8}^G$	When things do not go according to the plans I am stressed	43.39			
$x_{1.10}^G$	If I were informed that there will be some significant changes at work I would probably feel stressed	-40.27			
$x_{1.13}^G$	Do you say that you do not have time? When in fact you are not in a mood?	35.51			
$x_{1.14}^G$	Do you make your breaks as long as you can?	2.11			
$x_{1.15}^G$	Do you do overtime?	8.87			
$x_{1.17}^G$	Is my job too tiring?	-24.57			

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

For Albanian telecommunications companies, the change, motivation and performance paradigm has a mandatory cultural character. Creating a model of value compatible with the basic rules of market economy, forming and consolidating a strong managerial organizational culture within these companies must be declared and sustained through concrete actions. Ensuring survival through a strong organizational culture requires an attachment to value even in the sacrifice of short-term financial interests as in the case of Western firms.

Over the years, this paradigm has included different categories of premises that have strengthened the history and success of organizations by creating a set of actions and responses to those signals that managers can interpret and consider relevant to their decisions. In any case, the leaders of the future need to understand the depth and impact of what managing change in organizational development means in their pursuit of performance, productivity growth, and selection and motivation of the human resource appropriate to the specific business.

A key element in transferring a company to another economic level or that can help the company in a situation that can remove it from the market is about: (1) evolving, developing, gaining new market segments; (2) maintaining market position; (3) the influence of a strong managerial culture. Managerial culture contributes significantly to guiding business change processes, especially through managers' actions and decisions.

Among the qualities and knowledge gained by outstandingly successful specialists in the field of organizational change we can list: (1) the knowledge of human communication; (2) knowledge of human behavior; (3) abilities to set goals, diagnosis and solving problems; (4) other qualities: objectivity, flexibility, imagination, conscientiousness, charisma, self-confidence and people.

A paradigm like this can be more easily understood by those outside telecommunications companies than by those inside them, because the elements that compose self-explanatory are understood by itself. In this way, managers receive a great deal of information that is contradictory in most cases due to the interpretation of the information through the paradigm. Albanian telecommunications companies use the paradigm to formulate their strategies, considering the paradigm as a tool of interpretation and formula of action.

CONCLUSION

Organizational change consists of establishing a new model of thinking and behavior (Argote, McEvily & Reagans, 2003; Rerup & Levinthal, 2014). The confrontation between the old model and the new organizational model can lead to oversized resistance being subject to failure (Harms & Credé, 2010). That is why designing a plan of change is essential by incorporating it into an organizational context. Given the changes that are constantly changing in the national and international business environment, it is a good idea for modern telecommunications companies to keep up with the changes, as they may lose their development opportunities. This can lead to a positive change in the mentality of all employees, benefiting from financial and competitive advantages, which gives companies a high degree of competitive advantage and efficiency.

Due to global competition, technological advances and economic change, specialists need to redesign the organization map, change organizational culture, and align strategies to external demands and opportunities. By aligning organizational development practices and techniques, it is possible to adapt to the values and cultures of the organizations in which they are to be implemented. Specialists need

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

structures, systems, strategies and systematic and congruent organizational models to successfully implement changes in organizational development.

According with the results, the first and most important change will be that they will no longer be workplaces but places to work so that the human resource involved achieves maximum productivity yields. The performance measurement system is affected by the changes made in an organization, just as in the case of the transition to a market economy. The synergy of economic performance brings together those management tools that best meet the new challenges and are based on the relationship strategy-organizational culture.

REFERENCES

Argote, L., McEvily, B., & Reagans, R. (2003). Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management Science*, *49*(4), 571–582. doi:10.1287/mnsc.49.4.571.14424

Bakotic, D., & Krnic, A. (2017). Exploring the relationship between business process improvement and employees' behaviour. *Journal of Organizational Change Management*, *30*(7), 1044–1062. doi:10.1108/JOCM-06-2016-0116

Basten, D., & Haamann, T. (2018). Approaches for Organizational Learning: A Literature Review. *SAGE Open*, *8*(3), 1–20. doi:10.1177/2158244018794224

Belbin, C., Erwee, R., & Wiesner, R. (2012). Employee perceptions of workforce retention strategies in a health system. *Journal of Management & Organization*, *18*(5), 742–760. doi:10.1017/S1833367200000651

Bloodgood, J.M., & Morrow, J.L., Jr. (2000). Strategic organizational change within an institutional framework. *Journal of Managerial Issues, 12*(2), 208-226.

Bolman, L. G., & Deal, T. E. (1999). 4 Steps to keeping change efforts heading in the right direction. *Journal for Quality and Participation*, *22*(3), 6–11.

Bostan, I. (2016). Investigating the Effectiveness of Programs on Health Financing Based on Audit Procedures. *Iranian Journal of Public Health*, *45*(8), 1074–1079. PMID:27928534

Briggs, D., Cruickshank, M., & Paliadelis, P. (2012). Health managers and health reform. *Journal of Management & Organization*, *18*(5), 641–658. doi:10.1017/S1833367200000584

Chahal, H., Jyoti, J., & Rani, A. (2016). The Effect of Perceived High-performance Human Resource Practices on Business Performance: Role of Organizational Learning. *Global Business Review*, *17*(3), 107S–132S. doi:10.1177/0972150916631193

Ericksen, J., & Dyer, L. (2005). Toward a strategic human resource management model of high reliability organization performance. *International Journal of Human Resource Management*, *16*(6), 907–925. doi:10.1080/09585190500120731

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Frese, M., & Fay, D. (2001). Personal initiative: An active performance concept for work in the 21st century. *Research in Organizational Behavior*, *23*, 133–187. doi:10.1016/S0191-3085(01)23005-6

Guillén, L., & Saris, W. E. (2013). Competencies, Personality Traits, and Organizational Rewards of Middle Managers: A Motive-Based Approach. *Human Performance*, *26*(1), 66–92. doi:10.1080/08959285.2012.736898

Guo, D., Chen, H., Long, R., Lu, H., & Long, Q. (2017). A Co-Word Analysis of Organizational Constraints for Maintaining Sustainability. *Sustainability*, *9*(11), 1928. doi:10.3390u9101928

Harms, P. D., & Credé, M. (2010). Emotional intelligence and transformational and transactional leadership: A meta-analysis. *Journal of Leadership & Organizational Studies*, *17*(1), 5–17. doi:10.1177/1548051809350894

Jung, J., Nam, C., Lee, E., & Kim, S. (2016). Subculture by autonomy and group cohesion and its effect on job satisfaction of R&D professionals in an R&D organization. *Journal of Management & Organization*, *22*(2), 154–172. doi:10.1017/jmo.2015.20

Kemper, P. F., Van Dyck, C., Wagner, C., & Martine de Bruijne, M. (2017). Implementation of Crew Resource Management: A Qualitative Study in 3 Intensive Care Units. *Journal of Patient Safety*, *13*(4), 223–23. doi:10.1097/PTS.0000000000000145 PMID:25420205

Kets de Vries, M. (2003). *Organizations on the couch: A Clinical Perspective on Organizational Dynamics*. John Wiley & Sons Ltd.

Kotey, B., & Slade, P. (2005). Formal human resource management practices in small, growing firms. *Journal of Small Business Management*, *43*(1), 16–40. doi:10.1111/j.1540-627X.2004.00123.x

Latham, G. P., & Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annual Review of Psychology*, *56*(1), 485–516. doi:10.1146/annurev.psych.55.090902.142105 PMID:15709944

Lee, Y. H., Yang, C. C., & Chen, T. T. (2016). Barriers to incident-reporting behavior among nursing staff: A study based on the theory of planned behavior. *Journal of Management & Organization*, *22*(1), 1–18. doi:10.1017/jmo.2015.8

Leyer, M., Stumpf-Wollersheim, J., & Kronsbein, D. (2017). Stains on the bright side of process-oriented organizational design: An empirical investigation of advantages and disadvantages. *Schmalenbach Business Review*, *17*(1), 29–47. doi:10.100741464-016-0020-9

Meuer, J. (2017). Exploring the Complementarities within High-Performance Work Systems: A Set-Theoretic Analysis of UK Firms. *Human Resource Management*, *56*(4), 651–672. doi:10.1002/hrm.21793

Munro, I. (2014). Organizational ethics and foucault's 'art of living': Lessons from social movement organizations. *Organization Studies*, *35*(8), 1127–1148. doi:10.1177/0170840614530915

Paton, R. A., & McCalman, J. (2008). *Change Management: A Guide to Effective Implementation*. London: SAGE Publications.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pattnaik, S. C., & Sahoo, R. (2018). Human Resource Practices as Predictors of Organizational Performance: A Structural Equation Modeling Approach. *Global Business Review*. doi:10.1177/0972150918779286

Pettigrew, A. M., Woodman, R. W., & Cameron, K. S. (2001). Studying organizational change and development: Challenges for future research. *Academy of Management Journal*, *44*(4), 697–713.

Pfeffer, J., & DeVoe, S. E. (2012). The economic evaluation of time: Organizational causes and individual consequences. *Research in Organizational Behavior*, *32*, 1–15. doi:10.1016/j.riob.2012.11.001

Pieper, J. R., Trevor, C. O., Weller, I., & Duchon, D. (2017). Referral Hire Presence Implications for Referrer Turnover and Job Performance. *Journal of Management*, *19*, 14–20.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management*, *12*(4), 531–544. doi:10.1177/014920638601200408

Popa, R. I. (2012). An experimental perspective over personality and leadership styles inside Albanian organizations. *Procedia: Social and Behavioral Sciences*, *33*, 488–492. doi:10.1016/j.sbspro.2012.01.169

Renn, R. W., Steinbauer, R., & Fenner, G. (2014). Employee Behavioral Activation and Behavioral Inhibition Systems, Manager Ratings of Employee Job Performance, and Employee Withdrawal. *Human Performance*, *27*(4), 347–371. doi:10.1080/08959285.2014.929694

Rerup, C., & Levinthal, D. A. (2014). Situating the concept of organizational mindfulness: The multiple dimensions of organizational learning. In G. Becke (Ed.), *Mindful change in times of permanent reorganization*. Berlin, Germany: Springer. doi:10.1007/978-3-642-38694-7_3

Rojon, C., McDowall, A., & Saunders, M. N. K. (2015). The Relationships between Traditional Selection Assessments and Workplace Performance Criteria Specificity: A Comparative Meta-Analysis. *Human Performance*, *28*(1), 1–25. doi:10.1080/08959285.2014.974757

Schulz, F. C. (2004). Who should lead a organisation: MDs or MBAs? *Journalism*, *49*(2), 103–117.

Sementelli, J. (2016). OD, change management, and the a priori: Introducing parrhesia. *Journal of Organizational Change Management*, *29*(7), 1083–1096. doi:10.1108/JOCM-12-2015-0234

Song, W., Yu, H., Zhang, Y., & Jiang, W. (2015). Goal orientation and employee creativity: The mediating role of creative role identity. *Journal of Management & Organization*, *21*(1), 82–97. doi:10.1017/jmo.2014.64

Strauss, K., Griffin, M. A., & Parker, S. K. (2012). Future work selves: How salient hoped-for identities motivate proactive career behaviors. *The Journal of Applied Psychology*, *97*(3), 580–598. doi:10.1037/a0026423 PMID:22122111

Wang, C. L., & Ahmed, P. K. (2003). Organisational learning: A critical review. *The Learning Organization*, *10*(1), 8–17. doi:10.1108/09696470310457469

Weiss, J. W. (2001). *Organizational Behaviour and Change: Managing Diversity, Cross-Cultural Dynamics and Ethics*. South-Western Thomson Learning.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wu, I.-L., & Chen, J.-L. (2014). Knowledge management driven firm performance: The roles of business process capabilities and organizational learning. *Journal of Knowledge Management*, *18*(6), 1141–1164. doi:10.1108/JKM-05-2014-0192

Wu, M. H., Liao, C. H., Chiu, W. T., Lin, C. Y., & Yang, C. M. (2011). Can we accredit hospital ethics? A tentative proposal. *Journal of Medical Ethics*, *37*(8), 493–497. doi:10.1136/jme.2010.038836 PMID:21636607

This research was previously published in Throughput Accounting in a Hyperconnected World; pages 77-93, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 48
Knowledge of Management Tools and Systems in SMEs: Knowledge Transfer in Management

Adam Pawliczek
Technical University of Ostrava, Czech Republic & Moravian University College Olomouc, Czech Republic

Miroslav Rössler
Moravian University College Olomouc, Czech Republic

ABSTRACT

The chapter deals with knowledge management principles and their implication to knowledge in management represented by contemporary sophisticated management tools and systems. The most important management branches and methods, tools and systems, generally considered as very helpful for professional business operating, are presented. Further research results of management tools knowledge in contemporary enterprises are presented impacting the need of education and knowledge transfer in management responsible positions. The need of management knowledge for the competitiveness of enterprises is accented. Business and competitive intelligence as media for competitiveness are introduced. In the last part of the chapter, a model of the knowledge management system applicable in SMEs is suggested. The purpose of the chapter is to make the reader familiar with some of the most important management tools, methods and systems and suggest principles for an easy and effective knowledge management system in the enterprise.

INTRODUCTION

The entire society is constantly evolving and, recently, the fact that knowledge is arriving at the forefront is typical for it. We live no longer in an industrial society, but in a post-industrial society, sometimes referred to as information society which gradually merges into a knowledge society. Every day the amount of information increases and the need for its efficient classification and management grows. Information,

DOI: 10.4018/978-1-7998-7297-9.ch048

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

however, to be useful, needs to be converted. This transformed information is called knowledge. Knowledge has some important extra over information. It is contextualized and enriched by our own experience.

The main goal of the chapter is to describe and discuss important interconnections of modern management tools with knowledge management principles and suggest a knowledge management model process applicable in SMEs. The chapter works with important terms of knowledge management. The partial goal is to summarize the most important modern tools used in different branches of management, which can be considered as a base of professional management knowledge. The second partial goal is to present a selection of IT support instruments (software) on the market applicable in SMEs. The reader will be familiar with different branches of modern management and tools used in them as well as with the sophisticated software support suitable for SMEs and the model of knowledge management. The acquired knowledge will improve the management skills of entrepreneurs and open new perspectives for competitiveness and prosperity.

The chapter is partially derived from an unpublished habilitation thesis concerning management methods, tools and system. Added value of the chapter is in focusing of readers on sophisticated management tools which certainly help to improve competitiveness and business results. The core contribution of the paper is in practical research results seen in part 3. The main contribution of the paper for readers is the increasing of awareness and orientation on what management knowledge to focus and adapt in order to improve business competitiveness. The chapter is dedicated mainly to students of management, entrepreneurs and SMEs managers.

The chapter layout (contents):

1. **Theory of Knowledge Management in Management:** Describing basic terms and ideas as data, information, explicit, implicit, tacit knowledge, knowledge management and knowledge in management.
2. **Knowledge in Management:** Management tools, methods and systems in particular segments of management – fields and areas of management methods, tools and systems – overview.
3. **Knowledge of Management Tools, Methods and Systems in SMEs:** Primary and secondary research results from worldwide data and the Czech Republic.
4. **Competitiveness, Innovation and Knowledge Management:** Innovation, intellectual capital and learning organization ideas, management tools, methods and systems and business performance.
5. **Business and Competitive Intelligence:** Systematic data collection and processing by the management information system.
6. **BI/CI Software Support:** Selected specific MIS software products.
7. **Solutions and Recommendations:** Design of knowledge management system for SMEs based on basic knowledge management and knowledge in management ideas.

THEORY OF KNOWLEDGE MANAGEMENT IN MANAGEMENT

As reported by Peter Ferdinand Drucker:

The most important and truly unique asset of the management of the twentieth century was the fifty times increased productivity of manual workers (laborers) in production. The most important asset which the management of the twenty-first century should make is the increase of the productivity of knowledge

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

work and knowledge workers. The most important asset of companies in the twentieth century was the production equipment (machines). The most important asset of institutions (whether profit or non-profit) in the twenty-first century will be knowledge workers and their productivity (Drucker, p. 79-94, 1999).

Knowledge and technology-based economies are performing generally better than economies based on natural resources. Knowledge can be seen as an asset to some extent, but unlike physical assets it is difficult for us to grasp and quantify. On the other hand, it has a great advantage. Knowledge can be shared with others without losing it. Knowledge sharing does not diminish its usefulness, it only reduces its value, becoming less rare (Still, pp. 8 to 9, ...).

To create knowledge in management we have to work with:

- **Data:** Can be viewed as a characteristics of a system, object, and is under the influence of chaos.
- **Information:** Usefully interpreted data can also be understood as entries on the relation of one subject to another or other.

The mutual relationship between data, information and knowledge can be illustratively described the way that data as properly expressed symbols is considered as feedstock which is transformed into information. Knowledge defines the basic framework for thinking cognitive processes of data interpretation (Veber, p. 196, ...).

Knowledge creates a mental system framework for evaluating and integrating new information. It is mainly the result of active learning based on own knowledge and experience, to a lesser extent the result of passively acting lessons. The process of learning and teaching classifies individual knowledge elements into certain relations. Sometimes yet another level of knowledge is featured, known as the wisdom. Knowledge is a necessary part of competent managerial decisions.

TYPES OF KNOWLEDGE

For the purposes of knowledge management, knowledge is usually divided into the following three types:

- Explicit (explicit)
- Implicit (implicit)
- Unformulated (tacit).

Table 1. Explicit, implicit and not-formulated knowledge

Types of Knowledge			
	Explicit	**Implicit**	**Tacit (Not-Formulated)**
Description	Formalized or documented knowledge, usually well-structured and transferable. Mostly in ICT form.	Knowledge in heads of workers which can be transferred to the explicit form any time.	Knowledge hidden in heads of workers which cannot be easily transferred to explicit form, formalized or documented.
Example	Documents, manuals, computers codes, etc.	Knowledge of process and its limitations in the head of the process owner.	Expert knowledge in the area, gained experience, etc.

(Own processing, 2016)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Definition of Knowledge Management

A large amount of definitions can be found. Three of them are presented as they are understandable and concise:

Knowledge management can be defined e.g. as a systematic and inclusive process of management and coordination of a wide portfolio of the company activities, i.e. retrieving, creating, storing, sharing, merging, developing, evolving, and use of the knowledge of individuals and groups with the goal to achieve greater business efficiency. Knowledge in this context is certainly not a mere academic neologism, but it is a productive embodied intelligence obtained by "positive education and learning" through which the man - worker receives the amount of knowledge that allows them to orient themselves, formulate opinions, enrich their analytical and deduction skills, conclude to synthesis, fully within the meaning of the needs of the organization (Petříková, p. 115, 2010).

Another definition says:

Knowledge management is very difficult to define. This applies to acquiring, creating, sharing and using the knowledge. This knowledge includes both explicit and implicit knowledge. Knowledge does not only mean the know-how – to know how to, but also who knows, knows why and knows when. It does not relate to the wise books and best practices, but rather people – working communities that maintain knowledge about a topic and share what they know, build on it and adapt it for their own use. It is not a brief summary of what is known at a certain moment in time, but developing a body of knowledge maintained in its recent form by people who use it regularly (Collison, p.13, 2005).

Arian Ward from the company Work Frontiers International defines knowledge management as follows:

It is not creating an encyclopedia that encompasses everything that anyone has ever known. Knowledge management is more about observing those who know and develop a company culture and technology that will encourage them to speak (Collison, p.49, 2005).

Knowledge in Management

Knowledge pools in management can be simply divided into theory and experience (case studies). The theoretical part can be characterized by a number of management methods, tools and systems regarding to the particular branches of management and the practical one is merely dependent on the amount of professional practice.

KNOWLEDGE IN MANAGEMENT: MANAGEMENT METHODS, TOOLS, AND SYSTEMS IN PARTICULAR SEGMENTS OF MANAGEMENT

There are many different tools, methods and systems for the effective implementation of the basic management functions such as planning, monitoring of objectives, organizing, leadership, communication, decision-making, monitoring, etc. These have been developed over more than a century of the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

democratic market business, particularly in Europe, North America, and Japan. Managerial methods are traditionally divided into deductive, inductive and dialectical. Another classification sees them as empirical, exact and creative approaches (Mohelská et al., 2012). These authors divide the field of the use of management methods as follows:

- Managerial decision-making,
- Risk management,
- Scheduling
- Organization
- Management of employees,
- Control and management of work activities,
- Organization performance evaluation.

Management Methods

Management methods are procedures, methods, techniques or "ways" that lead to achieving effective negotiations and management objectives. The usual managerial objectives are financial business performance, competitiveness, growth, long-term prosperity, and sustainability. Management methods can include simple rules, more complex techniques and tools, or comprehensive management systems containing a complex of partial methods (Pearce, 1995). Descartes assumed that even the most difficult problems can be decomposed into long chains of simple steps and if their order is preserved, a solution must be found (Fajkus, 2005). The methodical approach (in contrast to intuitive management) leads to measurable results, self-reflection and the possibility of implementation of a cycle of continuous improvement. Modern trends suggest that the choice of the appropriate management methods and their implementation is the key activity to the dynamism of the enterprise performance according to the required indicators (e.g. by using the KPI). There is no clear border among the concepts of managerial methods, tools, systems, and techniques.

Management Tools

Management tools are formalized for the performance of managerial functions in an enterprise with the aim to build a creative environment in order to increase the efficiency of managerial work. And yet, they include a wide range of management tools and techniques - from simple planning software to complex social sciences, organizational, technological, economic and social instruments which co-create the current paradigm of management. A paradigm is understood as the main idea, a given concept of managerial thinking and action. A paradigm is thus age-conditioned, based on a concept valid only for a certain era and is therefore dependent on time. Generally speaking, a paradigm is based on a system of principles (postulates) which create the particular concept of thinking.

Management Systems

A system is a whole (1), composed of parts that interact with each other. Between the parts of the system, flows of information, matter and energy (money) can occur. A system (2) is a deliberate process, method of action and implementation of something (Klimeš, 1981). The following cases can be seen as

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a management systems: (A) an enterprise, logistics chain, manufacturing, project, or (B) the knowledge structure and software to support the optimal management of these activities – management information system (MIS). Management systems in the business can be regarded as open, continuous, stochastic, and dynamic. Similar properties must be also in the characteristics of the IT support means that model the actual systems themselves. The management systems can be considered as systems of processes and procedures (management methods and tools) which ensure that the organization fulfils the given tasks to achieve its goals. An important group of management systems (QMS/EMS quality management) is based on cyclical processes as Deming's PDCA.

Table 2. Systematic overview of the selected important managerial techniques, tools, methods and systems according to the areas of management

Area of Management	Name of the Tool, Technique, Method, System
Strategic Management	7 Classes of Strategic Risks (Slywotzky), **5F** (Five Forces) Analysis, **BCG** (Boston matrix), **BSC** (Balanced Scorecard), the Blue Ocean Strategy, Gap Analysis, EFE Matrix, IFE Matrix, Hierarchy of Strategies, Management by Objectives, **MOST**, **PESTLE** Analysis, the Strategy → Structure Principle, Forecasting, Scenarios Technique, **SPACE** Analysis, **SWOT** Analysis, **SMART** - Goal Design, **VRIO** Analysis, Winterling Crisis Matrix, Critical Success Factors, **KPI** (Key Performance Indicators).
Management Organization	**BSC** (Balanced Scorecard), ERP (Enterprise Resource Planning), MBC (Management by Competencies), **MBO** (Management by Objectives), Organizational Development, Process Management, Project Management, Change Management, SOEM (Service Oriented Enterprise Management), SOM (Service Oriented Management), 5F (Five Forces) Analysis, Boston matrix, Critical Success Factors, Pareto principle, Strategy → Structure Principle, **PESTLE** Analysis, Reengineering, **SMART** - goal design, SWOT analysis, VRIO analysis, KGI (Key Goal Indicators), **KPI** (Key Performance Indicators), Excellence Model EFQM.
Quality Management	APQP (Advanced Product Quality Planning), PDCA (Deming Cycle), DMAIC Improvement Cycle, Excellence Model **EFQM**, **Kaizen**, Quality Rings, Lean, Poka-yoke, Six Sigma, **TQM** (Total Quality Management), the 5S, DOE (Design of Experiments) Ishikawa diagram, Kano model, Pareto Principle, **FMEA** (Failure Mode and Effect Analysis), FTA (Fault Tree Analysis), QFD (Quality Function Deployment), House of quality, **G8D** (Eight Disciplines), MSA (Measurement System Analysis), PPAP (Production Part Approval Process), Quality Management Systems ISO 9001,
Innovation Management	Blue Ocean Strategy, **CAF** (Common Assessment Framework), **DMAIC** Improvement Cycle, **PDCA** (Deming cycle), Excellence Model **EFQM**, Kaizen, Quality Rings, Open Innovation, Six Sigma, **TQM** (Total Quality Management), User Centered Design, Brainstorming, Mindmaps, Pareto principle, SMART- goals design.
Change Management	Three step change (Lewin), Four step change, Eight step change, organizational development, change management by CSF (Critical Success Factors), 5F (Five Forces) Analysis, Kolb Cycle of learning, Delphi method, Pareto principle, **SMART** - goals design, **SWOT** analysis, **SWOT** analysis, Scenarios Technique, **PESTLE** analysis.
Production Management	ABC-D, BOA (Belastungorientiere Auftragsfreigabe), CIM (Computer Integrated Management), CRP (Capacity Resource Planning), DBR (Drum Buffer Rope), JIT (Just-in-time), MRP (Material Requirements Planning), MRP II (Manufacturing Resource Planning), ERP (Enterprise Resource Planning), KANBAN, FIFO (First In First Out), **FEFO** (First Expired, First Out), HIFO (Highest In First Out), **LIFO** (Lowest In First Out), Lean Production, BCG Matrix, Pareto principle, **VRIO** analysis, ISO 9001, ISO 14000.
Marketing and Sales	5K Method, TLM (Total Loyalty Marketing), Branding, Blue Ocean Strategy, Holistic marketing concept, Marketing strategy, Marketing mix 3V, 4C, 4P, Positioning, **CRM** (Customer Relationship Management), Brand Management, PR (Public Relations), Market segmentation, Targeting, Product concept, Web marketing mix 4S, WOMM (Word of Mouth Marketing), 5F (Five Forces) analysis, An off matrix, **BCG** (Boston matrix), Kano model, Customer portfolio matrix, **PESTLE** analysis, **SWOT** analysis, **VRIO** analysis.
Process Management	BCM (Business Continuity Management), **BPM** (Business Process Management), ITIL (ICT processes management), Six Sigma, PDCA (Deming cycle), **DMAIC** improvement cycle, reengineering, Time frames, statistical methods, ISO 9001, TQM (Total Quality Management).

continues on following page

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Continued

Area of Management	Name of the Tool, Technique, Method, System
Economy and Finance Management	Pareto principle, Financial leverage, PESTLE analysis, SWOT analysis, VRIO analysis, Break Even Point Analysis, Financial statements analysis, Determination of financial indicators (liquidity, rentability, investments, indebtedness, activities, market value, productivity), TCO (Total Cost of Ownership), EBIT (Earnings before Interest and Taxes), Gross margin, Cash Flow, NOPAT (Net Operating Profit after Taxes), EVA (Economic Value Added), MVA (Market Value Added), WAAC (Weighted Average Cost of Capital), 29NPV (Net Present Value), IRR (Internal Rate of Return), Altman analysis (Altman Z-score).
Service Management	**BCG** matrix, Pareto principle, CorSet Framework, ITIL, ITSM (IT Service Management), SSME (Service Science, Management and Engineering), SOEM (Service Oriented Enterprise Management), SOM (Service Oriented Management), Services management system ICT ISO 20000.
Computer science and IT Management	SOA (Service Oriented Architecture), Code and Fix, EUP (Enterprise Unified Process), MSF (Microsoft Solutions Framework), MMDIS (Multidimensional Management and Development of Information Systems), DSDM (Dynamic System Development Method), ASD (Adaptive Software Development), BPEL (Business Process Execution Language), BPMN (Business Process Modelling Notation), ISO 8000, **ISO 9001**, ISO 15504, ISO 20000.
Facility Management	Process analysis, Benchmarking, Insourcing, Business Process Improvement, Outsourcing, Spatial optimization, SLA (Service Level Agreement), SLM (Service Level Management), **SWOT** analysis, Maintenance, **FMS** (Facility Management Systems), CAFM (Computer Aided Facility Management).
Logistics and Transport	APS (Advanced Planning & Scheduling), Benchmarking, **ERP** (Enterprise Resource Planning), JIT (Just-in-time), KANBAN, MRP (Material Requirements Planning), MRP II (Manufacturing Resource Planning), Outsourcing, SCM (Supply Chain Management), CPM (Critical Path Method), **TOC** (Theory of Constraints), Network Analysis, model SCOR (Supply Chain Operations Reference-model).
Project Management	Gantt chart, Project schedule, Network analysis methods, RACI and RASCI responsibility matrix, Project plan, Project-Based Management, WBS (Work Breakdown Structure), Impact Analysis, **PMBOK** (Project Management Body of Knowledge), PRINCE2 (Projects in Controlled Environment), Project management standards ISO 10006, ISO 21500.
Risk Management	BASEL I-III, CorIA (Core Impact Assessment), Checklist analysis, CCA (Cause-Consequence Analysis), CRI (Continuous Risk Improvement), Delphi method, **CCTA** Risk Analysis and Management Method), **CPQRA** (Chemical Process Quantitative Risk Analysis), EWRM (Enterprise-Wide Risk Management), ETA (Event Tree Analysis), FMEA (Failure Modes and Effects Analysis), FMECA (Failure Mode, Effects and Critical Analysis), FTA (Fault Tree Analysis), HAZOP (Hazard and Operability Study), HAZID (Hazard Identification Study), HRA (Human Reliability Analysis), **PHA** (Preliminary Hazard Analysis), PPAP (Production Part Approval Process), Forecasting, RIPRAN (Risk Project Analysis), **RR** (Relative Ranking), SA (Safety Audit) SR (Safety Review), VaR (Value at Risk), W-I (What-if Analysis), Winterling Crisis Matrix, Risk Management ISO 31000, OHSAS 18001.
Crisis Management	Crisis plan, Winterling Crisis Matrix, Pareto principle, Forecasting, SMART - objective design, Scenarios technique,
Knowledge Management	SECI process, Social network analysis, Sociogram, Sociometrics, Management epistemology, Learning.
Human Resources Management	360° feedback, Jobs analysis, Social network analysis, BEI (Behavioral Event Interview), Jack Welch Matrix, Job description, Staff audit, Role prosets, Sociogram, Sociometry, Job specification, Satisfaction Survey Methods.

(Own processing with Management Mania data, 2015)

Table 2 presents a systematic overview of management methods, tools and systems (information systems with ICT support) according to the area of management. The main reason of this table is to make the reader familiar with the most known and popular management tools according to the wide international management community at www Management Mania. Many methods, however, are universal and are used in multiple areas of management. Knowledge and implementation of an appropriate set of tools as well of their knowledge transfer through the organization is a significant condition of wise management and business prosperity.

KNOWLEDGE OF MANAGEMENT METHODS, TOOLS AND SYSTEMS IN SMES: SECONDARY AND PRIMARY RESEARCH RESULTS

The important question is: Which management methods, tools and systems are really worth to learn and apply? The question can be answered from two points of view:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1. Do specific management tools influence enterprise performance and how?
2. Which management tools are utilized by other successful enterprises?

The point of view (2) is answered with the help of Bain and Company, the Czech Association of SMEs and own research (primary data) research results in the world and Czech/Slovak conditions. The point of view (1) is answered later.

On the basis of the discussed basic ideas on management tools the following hypothesis was formulated: The knowledge of modern management methods, tools and systems in enterprises is generally heavily minor (under 30%).

Management Tools Used Around the World

Bain & Company has been performing its research since 1993. The purpose of it is to provide information to managers about which management methods and tools will improve their business results and how managers of global enterprises perceive the strategic challenges and priorities. The 15th survey of Bain & Company has shown that in the year 2014, executive managers used mostly the following 10 management tools – see Table 3.

Table 3. The best known management methods according to Bain & Company

Name of the Tool, Technique, Method, System	
• Customer relationship management (CRM), • Benchmarking, • Employee engagement survey, • Strategic planning, • Outsourcing,	• Balanced Scorecard, • Expression of Vision and Mission, • Supply Chain Management (SCM), • Change management, • Customer segmentation.

(Own processing with Bain & Company data, 2015)

The company focuses on 25 key tools. The list can only include tools that are current, significant for senior managers, and measurable. The company approaches 13 000 respondents from more than 70 countries of America, Europe, Asia and Africa and, over the years, systematically monitors the effectiveness of managerial tools in enterprises (Bain & Company, 2015).

Management Tools Utilized in the Czech Republic

In 2011, the Association of Small and Medium-Sized Enterprises implemented the survey no. 10 ASMEC CR "Opinions of Entrepreneurs on the Modern Methods of Management of the Company" which states that the active knowledge of modern methods of management for enterprises in the Czech Republic is at a low level (Modern management, 2011).

The survey focused on the following three main areas:

- Evaluation of the competitiveness of Czech enterprises and barriers to their growth as seen by entrepreneurs.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Knowledge and attitude of Czech entrepreneurs of and towards modern methods of enterprise management.
- Knowledge and attitude of Czech entrepreneurs of and towards the EFQM model.

Target group: The segment of B2B companies with more than 25 employees with activity in manufacturing, trade and services (n = 541). Research method: CATI (Computer Assisted Telephone Interviewing). Data collection date: May 2011.

The results of the research investigation suggest that the active knowledge of modern enterprise management methods is at a relatively low level. Only 22.55% of respondents spontaneously stated some of the methods of enterprise management. A considerable part of the respondents, however, stated a non-existent method of modern management. A frequency graph shows that only very few respondents actually know any of the methods of modern business management. The awareness of modern enterprise management methods is at a low level.

When asked the question: "Do you know any modern methods of enterprise management? If so, which ones?", only 22.55% of the respondents said they knew a management tool. The best known methods are named in Table 4.

Table 4. The best known management methods according to ASMEC

Name of the Tool, Technique, Method, System	
• Six Sigma, • Lean, • BSC, • Kaizen, • ISO norms,	• Controlling, • Project management, • Coaching, • SWOT, • Planning, • Leadership.

(Own processing with ASMEC data, 2015)

Modern methods of enterprise management are currently used by 28.1% of the surveyed enterprises. There is therefore a large space for the implementation of these procedures and methods, taking into account the fact that the management of the companies attributes this enterprise management tool great importance. Overall, 152 respondents said that they use one of the methods of business management. The most commonly used methods are:

- Lean enterprise (28,9%),
- Six Sigma (12,5%) and
- Balanced Scorecard (13,2%).

The category "Others" often named methods that are not among the modern management methods, which again highlights the ignorance of these specific management tools. It shows that the enterprises belonging to the production sector have the most extensive experience with the modern methods of management.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The results of the research show that only 16.9% of respondents are considering the introduction of some of the modern management methods. This group represents the potential enterprises interested in the EFQM model. The responses show that almost 80% of Czech entrepreneurs do not know of the existence of the most successful European management model (EFQM) which is used by more than 30,000 European enterprises. This is a very significant competitive disadvantage for the Czech Republic because, according to independent analyses, the EFQM model brings enterprises improvement of their business results by tens of percent.

The survey shows that although the Czech entrepreneurs realize the importance of modern management methods, they only have minimal information about these methods and practically do not use them. Yet almost 80% of the Czech entrepreneurs in the survey said that they consider the modern management methods crucial for quality enterprise management. Moreover, 98% of the respondents considered the quality and conceptual business management important for the long-term competitiveness of the enterprise. 77% of Czech entrepreneurs actively do not know any modern management method and almost the same percentage of enterprises does not make use of any such method. One of the key elements in maintaining and increasing competitiveness is therefore among entrepreneurs neglected in such a way that this means a significant risk to the success of the Czech enterprises on the world markets. (ASMEC, 2011).

RESULTS OF OWN RESEARCH: PRIMARY DATA: CZECH REPUBLIC AND SLOVAKIA

The questionnaire research was realized during the spring semester 2012 by students of the Business Entrepreneurship Faculty in Karvina, Silesian University in Opava (Czech Republic). 722 companies active in the Czech and Slovak Republic in the time period 2009-2011 were subjects of interest (SMEs create 89% of the sample group in accordance with the number of employees' criterion). The interview protocol included a controlled dialogue of a student with an enterprise owner, an executive manager or a top manager, so the collected data has the character of an expert guess opinion. Company identification (10 questions) and identification of the student and their opinion on the questionnaire relevance (5 questions) was a necessary part of each form. The initial sample size of 722 companies was filtered and reduced to 677 credible items. The questionnaire form also includes the nondisclosure statement to provide business and privacy protection. Moreover, the data was analyzed anonymously and published as no-name data only. The questionnaire was focused on seven areas of interest and contained 61 questions.

The data was processed by Microsoft Excel® and IBM SPSS®. Analyses, results and discussion are presented later (Pawliczek, 2013).

Data Structure

The analyses of the bulk sample (the all firms group including 677 enterprises) and their attitude to business strategic management brought the following information (Pawliczek, 2013).

- **Enterprise Size:** More than 51% of the questioned enterprises (the all firms group) are the so-called "micro" enterprises with no more than 10 employees, approximately 24% are "small" enterprises up to 50 employees and approximately 14% are "medium" enterprises – all together 89%

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

are SMEs (small and medium – incl. micro enterprises up to 250 employees). Only about 11% of the researched group are created by big enterprises with more than 250 employees.

- **Geographical Point:** From this point of view, 89,1% (603 enterprises) of the all firms group (counting 677 enterprises) are settled in the Czech Republic; 10,9% (74 enterprises) are in the Slovak Republic. 63,5% (430 enterprises) are from the Moravian-Silesian region, (34) questioned enterprises are from Prague, the capital of the Czech Republic. Overall 79,6% of enterprises are from Moravia regions and 9,5% from Bohemia regions including Prague.
- **Structure of Economic Activity:** Concerning branches according to NACE-CZ industry classification we can say that almost a quarter (24%) of the questioned enterprises were active in section C – Manufacturing. Than very closely with 23% the section G – Wholesale and retail trade; repair of motor vehicles and motorcycles is covered. On the third place, there is the section F – Construction (13%). No other sections exceed 7% and all other sections together create 40% of the all firms group.

Selected Management Tools

Selected evaluated management methods, tools and systems:

1. **ISO 9000 Family:** (ISO 9001): A part of the family of international standards issued by the ISO (International Organization for Standardization). Standard ISO 9001 is not a management method, it is a standard or norm which serves as a reference model for setting the basic management processes in an organization that continuously helps to improve the quality of the provided products or services and customer satisfaction (that is why quality management system).
2. **ISO 14000 Family:** In the world, ISO 14001 is the most recognized and used one for environmental management systems. This standard requires the organization to identify all environmental impacts and related aspects of its business. In addition, it defines the objectives of environment and introduces measures to improve performance through process improvement in areas of high priority.
3. **EFQM Excellence Model:** (EFQM Model). The EFQM Model was developed by the EFQM Foundation as a framework for the implementation of quality management methods in the organization.
4. **TQM:** (Total Quality Management): A very complex management method that puts emphasis on the quality management in all dimensions of the organizational life. It goes beyond quality management and it is also a method of strategic management and it is a management philosophy for all of the activities of the organization. There are many different forms and interpretations of TQM.
5. **BSC:** (Balanced Scorecard) A system of management and measurement of the performance of the organization which is based on defining a balanced system of interrelated indicators of business performance. Hence the "balanced". Balanced Scorecard was developed by American consultants Robert S. Kaplan and David P. Norton in the nineties of the 20th century.
6. **KPI:** (Key Performance Indicators) A term that refers to the performance indicators/metrics associated with the process, service, organizational unit or the entire organization. KPIs reflect the desired performance (quality, efficiency or economy).
7. **EVA:** (Economic Value Added) A term that refers to the currently very important valuation measurement of the enterprise performance. The basic idea of the indicator is that the invested capital has to have a greater benefit that the cost of this capital.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

8. **Porter's 5 Forces:** The work of Michael E. Porter. It is a way of analyzing the industry and its risks. The model works with the five elements (Five Forces). The principle of this method is a forecasting of the development of the competitive situation in analyzed industry, based on the estimate of the potential behavior of the subjects and objects involved in a given market and forecasting of the risk of imminent business (Porter, 1980).
9. **SWOT Analysis:** A universal analytical technique focusing on the evaluation of internal and external factors affecting the success of an organization or any other evaluated system. Most often, the SWOT analysis is used in the strategic management of an organization in the evaluation of a strategic intention. The author of the SWOT analysis is Albert Humphrey who designed it in the sixties of the 20th century.
10. **BCG Matrix:** (Growth-Share Matrix) A method that comes from the consulting company Boston Consulting Group (BCG). The name BCG matrix or Boston matrix comes from here. The BCG matrix is used for the evaluation of the product portfolio of the organization in marketing and sales planning.
11. **SMART:** An analytical technique for designing objectives in management and planning. SMART is an acronym from the initial letters of the English names of the objective attributes (Specific, Measurable, Achievable/Acceptable, Realistic/Relevant, Time Specific/Track-able).
12. **PEST(LE) Analysis:** An analytical technique used for the strategic analysis of organizational surroundings. PESTLE (sometimes also PESTEL) is an acronym and each letter represents a different type of external factors (Political, Economic, Social, Technological, Legal, Ecological).
13. **MBO:** (Management by Objectives) was designed by Peter F. Drucker as a method based on setting and mutual agreement of the objectives and evaluating the success of their achievement. The task implementers are allowed to decide which method is the most appropriate to achieve the objective. It is a delegation of responsibility for the objective to the implementer. The method is applicable in virtually all management fields.
14. **6-Sigma:** A complex method of management and, like Lean, it is known more as a philosophy that the organization (enterprise) must take. It is focused on continuous improvement (innovation) of the organization by understanding customer needs, using the process analysis and methods standardization in the measurement. It is a comprehensive, flexible management system that is based on understanding customer needs and expectations, on the disciplined use of information and data to management and decision-making.
15. **Kaizen:** A method of gradual improvement based on cultural traditions of Japan (the word itself comes from Japanese). The improvement focuses on the gradual optimizing of the processes and work practices, quality improvement and scrap reducing, material and time savings leading to cost reduction, work safety and reducing workplace accidents.
16. **Lean:** (Lean Management) is a very broad management method. The term philosophy that the organization (enterprise) must accept is most often used in the connection with Lean. Lean is based on several basic principles. Primarily it is the effort of the organization to continuously improve in all areas and to avoid unnecessary wastage. The second principle is the best possible customer needs satisfaction, no matter how. Lean is often used with different attributes; depending on what fields this philosophy is applied to (Baranov, 2011; Kotler, 2007; Management Mania, 2013).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Research Results: Utilization of Management Tools

Research results of the original research of the author on utilization of management tools are shortly summarized in Table 5. There is well visible that the most utilized technique is the SWOT analysis (47% of enterprises are familiar with it). Further QMS and EMS systems ISO 9000 and ISO 14000 are recognized. The most of the researched methods are not recognized and used by less than 7% of the researched enterprises.

Table 5. The percentage of management methods utilized by the examined enterprise group

Number	Name of the Tool, Technique, Method, System	Percentage of utilization
1.	SWOT	47%
2.	ISO 9000	37%
3.	ISO 14000	18%
4.	TQM	16%
5.	SMART	16%
6.	EVA	9%
7.	BCG	7%
8.	BSC	6%
9.	Kaizen	6%
10.	KPI	6%
11.	MBO	4%
12.	Six Sigma	4%
13.	EFQM	3%
14.	Lean	3%
15.	PESTLE	2%
16.	5 Forces – Porter	2%

(Own processing, 2016)

The quadratic index which results 3 can be easily calculated and it can be interpreted as follows:

18% (3) of the selected researched management tools is applied by 18% of the researched enterprises.

With the help of own original research supported by the research of ASMEC, we can approve the following hypothesis: The knowledge of modern management methods, tools and systems in enterprises is generally heavily minor (under 30%). This fact show potential for improving competitiveness by studying and adapting modern management methods, tools and systems and implement it to their knowledge management systems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

COMPETITIVENESS, INNOVATION, AND KNOWLEDGE MANAGEMENT

Long-term adaptation of effective and progressive set of management tools, methods and systems in enterprise is the task for knowledge management. Proper knowledge management in new economy is clearly the way to improve competitiveness. Nowadays knowledge is a necessary source of the competitive advantage. The gap between the book and the market value of the company grows in all companies regardless of their size. This difference is more pronounced in higher labor intensive sectors compared to the financial and physical means (Grublová et al., P. 39-40, 2014). One of the aspects that increase the value of the companies is the knowledge that the company possesses. Well utilized knowledge enables companies to be more successful in the market than companies that do not use their knowledge correctly.

Innovation is the outcome of a complex (company-wide) management system of innovation activities. Information that without knowledge is elusive is important. Therefore, we are talking about the chain (transfer): Information → Knowledge → Innovation. But, even here, it holds true: "to be at the right time in the right place". Innovations are considered to be the main boosters for the economic growth. Gradually the wide economic community has increasingly focused on finding ways to manage innovations, monitor and exploit their potential to create new values. Interest was mainly in factors from which innovations arise. Innovative businesses therefore focused on developing precisely these factors. This is essentially a creation of new knowledge, application of that knowledge in the development of products and processes, and their subsequent evaluation in terms of commercial exploitation (Grublová et al., P. 1-2, 2014).

The basic SECI model (see Figure 2) of the creation (transfer, reproduction) of knowledge is a cyclical process and therefore it is always necessary to focus on the development of knowledge, by which the organization supports its innovation potential.

Intellectual Capital and Learning Organization

Continuous adaptation of an effective and progressive set of management tools, methods and systems in an enterprise is a part of important intellectual capital. Intellectual capital of an organization is much more than just the sum of knowledge, skills and abilities. *Intellectual capital is a set of intangible assets that an organization possesses and can be used in the implementation of targeted changes in its business behavior through which it achieves the necessary implementation of their innovative projects. Intellectual capital of organizations therefore represents only the potential effect that, when combined with tangible assets, leads to added value and increased competitiveness of organizations offering innovative solutions (Pitra et co., P. 32, 2015).*

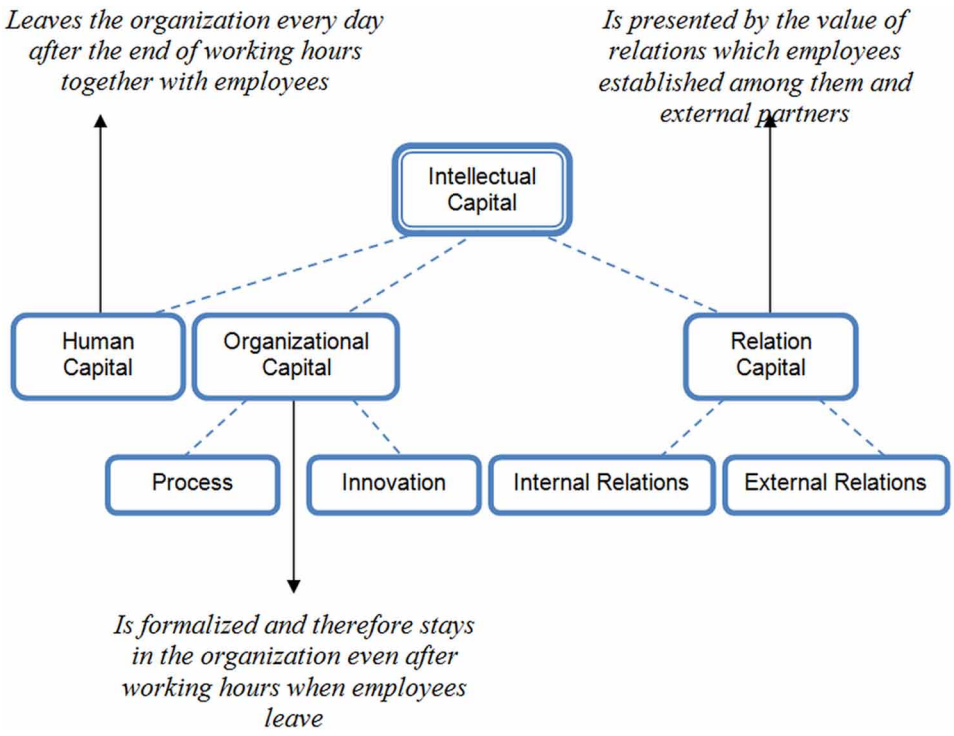
The chasm between the book and market value of the company is growing in all companies regardless of their size. This difference is more pronounced in more labor intensive industries in comparison to financial and physical resources. For this reason the concept of "intellectual capital" emerged which summarizes all the intangible factors contributing to the predominance of the market value of the company above its book value. These factors can include the loyalty of employees and their commitment, brand, goodwill, organizational values, customer loyalty, experience and skills of employees (Grublová et al., P. 39-40, 2014).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Composition of the intellectual capital of an organization can be seen in Figure 1. Intellectual capital consists of three basic components, namely: human capital, organizational capital and relational capital:

- ***Human Capital:*** *Consists of a set of knowledge, skills and abilities of individual employees of the organization and is bound on the individuality of each employee. When leaving, the staff of the organization leaves the human capital with them as well.*
- ***Organizational Capital:*** *Formalized by intangible assets, represented by purposeful linking of the contents of the database and the knowledge base of the organization. Represents the component of intellectual capital which remains in the organization even after the quitting of workers who created it.*
- ***Relational Capital:*** *Represents a set of relations that workers of the organization created with their partners within the organization and with partners who operate outside the organization.*

Figure 1. Composition of the intellectual capital of the company
(Own processing with Bureš, 2016)



After the leaving of workers, only the formalized component (external knowledge) of the relational capital remains in the organization, the tacit component (internal knowledge) leaves along with its bearer (Pitra et co., P. 33, 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In accordance with principles of the learning organization described by one of the most important books related to knowledge management, the book The Fifth Discipline by Peter M. Senge, the following disciplines of knowledge creation and transfer must be addressed:

- **Personal Mastery:** The discipline of continuous brightening and deepening of individual personal vision, concentrating energy sources, developing patience and objective perception of reality.
- **Mental Models:** Our deeply ingrained assumptions and generalizations, affecting our world comprehension and acting in it.
- **Shaping a Common Shared Vision:** Only a true vision (not a mere declaration of a vision) is what gets people together and encourages the desire to achieve outstanding performance and learning in them – they do it because they want to, not because someone ordered them.
- **Team Learning:** Intellectual abilities of the team that can exceed the cognitive abilities of individuals (but beware, it can be vice versa).
- **Systems Thinking:** The fifth discipline, a discipline that integrates all the previous ones and creates one single associated unit.

The author accents that the basis for the success of any organization is to change its mind – the organization needs to retreat from the traditional models, have its view of itself and its surroundings changed, and begin to work on a change, a change towards a learning organization (Senge, p. 25-30, 2006).

Management Tools, Methods and Systems and Business Performance

The previous paragraphs focused on systematic learning and the creation of intellectual capital in management aiming to successful innovativeness and competitive advance, but the point of view (a) still needs to be answered: Do specific management tools influence enterprise performance and how? Is creation and transfer of knowledge in that area meaningful?

The answer is not simple, previous research results of the authors aimed at the influence of management methods, tools and systems on different factors of enterprise performance with an impact on strategic management tools and continuous improvement tools. The research was properly documented and published (Pawliczek, 2015).

BUSINESS AND COMPETITIVE INTELLIGENCE

Knowledge management and system thinking can be strongly supported by ICT, ensuring increase in the speed of operation, memory and sharing of results. Acronyms as MIS, BI, CI, ERP need to be clarified.

Management Information Systems

At present, ICT support is of crucial importance for managerial decision-making. Management information systems (MIS) are systems for data processing. These systems make the information relevant for both basic as well as advanced (strategic) enterprise management decisions available. The data in MIS should include as many working systems and departments of the enterprise as possible. Currently, MIS is relevant for all medium-sized and large companies as well as for SMEs that want to be able to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

make decisions quickly and with confidence when dealing with everyday business problems. In order to achieve this, it is naturally necessary to have the data from many systems in one place. These systems would usually include accounting, controlling, planning, production, sales, and more. On this basis, it is possible to perform a flexible analysis of data depending on various factors and parameters, such as location (of the branch), products, time, sector of activity, customers, employees, etc. (Andersen, 2001, Pentaho, 2015).

Business Intelligence

Business Intelligence (BI) are the skills, knowledge, know-how, technology, application, quality, risk management, security, and processes used in business to obtain a better understanding of the global context. For this purpose, enterprises undertake the collection, integration, analysis, interpretation, and presentation of business information. Business intelligence is a follow-up to MIS implementing modern management methods, tools and systems (Bartes, 2005, Lichtenthaler, 2008).

Enterprise Resource Planning

Enterprise resource planning (enterprise information system) is an ICT assisted system whereby an enterprise (organization) manages and integrates all or most of its activity areas such as planning, inventory, purchasing, sales, marketing, finance, human resources, manufacturing, and more. The important and most popular MIS include the following (SOL, 2015):

- **Enterprise Resources Planning (ERP):** Systems for the management and planning of the resources of the enterprise.
- **Customer Relation Management (CRM):** Systems for customer relationship management.
- **Human Resources Management (HRM):** Systems for human resources management.
- **Advanced Production Systems (APS):** Systems for advanced production planning and control.
- **Computer Aided Facility Management (CFM):** Systems for the management of buildings with the support of ICT.

Competitive Intelligence

Competitive Intelligence (CI) – competitive intelligence is one of the advanced Business Intelligence disciplines, i.e. it is an interdisciplinary field related to knowledge management. It is a systematic and ethical process of gathering, analyzing, and the use of external information which can affect the intentions of the organization, its decision-making, and behavior. CI is supposed to work as a decision-making support in order to ensure the competitiveness of the company and also as an early warning system in case of a crisis. The basis of CI is formed by the so-called news cycle using as many free Internet information resources as possible. Furthermore, the cycle uses resources of a commercial character - database centers, press agencies, etc. (Molnár, 2012). The CI should form a basis for the use of management tools which work with the obtained information (PEST, Porter 5F, SWOT, and others) for the needs of management. All of this should be linked via ICT to form a comprehensive management information system (Pawliczek, 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

BI/CI SOFTWARE SUPPORT

Creating of the organizational memory for knowledge retention is connected with the implementation of the MIS software. A few examples of the MIS software with an accent to business and competitive intelligence:

- **Asseco Helios Solutions:** Provides a perfect and up-to-date overview of the market situation, the basis for strategic decision-making and automates routine operations (Helios, 2015).
- **FaMa+ CAFM:** Provides comprehensive management and maintenance of buildings and technologies, management of lease relationships (contractual relations, rental provisions and services, payments, billing, reminders), repairs, reconstruction, and related services (Tesco SW, 2015).
- **IS Karat:** Allows successful planning and decision-making, leads to the efficient use of resources. Facilitates communication and management, simplifies and accelerates the key processes in the areas of production, trade, finance, marketing, or logistics (Karat, 2015).
- **K2 Atmitec:** A comprehensive system for the management of enterprises. In its modules, the system can manage business processes, create enterprise activity overviews and provide relevant data for decision-making in a complex manner. It is divided into a number of scalable products to suit all business segments (K2 Atmitec, 2015).
- **Pentaho-Business Analytics:** A system providing an interactive visual analysis, KPI-suitable user grid, adjustable reporting, current information for management and administration, complete data integration, and predictive analysis (Pentaho, 2015).
- **Pohoda Business Intelligence:** Accounting, warehouses, documents (Stormware, 2015).
- **SAP Business Objects Business Intelligence:** Makes use of the analysis of the trade data in order to describe, predict and increase the performance of the enterprise (SAP, 2015).
- **Tovek CI:** Enables the effective processing of large amounts of unstructured data. Professional tools based on full text technology for information searching (Molnár, 2012).

SOLUTIONS AND RECOMMENDATIONS: DESIGN OF THE KNOWLEDGE MANAGEMENT SYSTEM FOR SMES

The suggested knowledge management system is based on two interconnected phases:

- Knowledge creation,
- Knowledge continuity – interpersonal (intergenerational) transfer.

Both parts integrally include the knowledge transfer. As the knowledge transfer is intensively active, so the chance for knowledge continuity is better.

Knowledge Creation Process

First it is necessary to realize that the process of knowledge creation is important because the development of competences (abilities to perform certain activities, use management tools) is mainly about the knowledge creation.

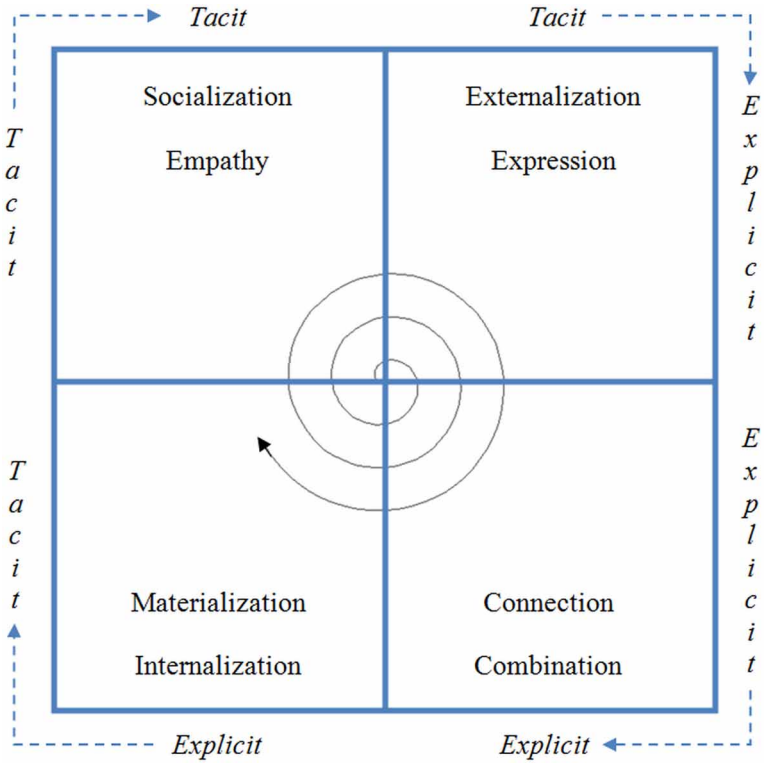
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The organization develops knowledge through interaction between explicit and tacit knowledge. These interactions between the two types of knowledge are referred to as the knowledge conversion. Through the process of converting, knowledge is expanding both in terms of quality and quantity. The four types of knowledge conversions include socialization, externalization, combination and internalization (Urbancová, p. 26, 2013).

As well-known from Nonaka's theory, the knowledge creation process consists of (Bureš, p. 48-49, 2007). The spiral is shown in Figure 2**.**

- **Socialization:** The process of converting new tacit knowledge through experience sharing (interpersonal communication).

Figure 2. Model SECI: Elements of the knowledge conversion process
(Own processing with Pitra, 2016)



- **Externalization:** The process of articulation of tacit knowledge into explicit knowledge (publication).
- **Combinations:** The process of transformation of explicit knowledge into a comprehensive and systematic set of explicit knowledge (by IT software support).
- **Internalization:** The process of the embodiment of explicit knowledge into tacit knowledge (providing of products or services).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

As the Figure 2 indicates, it is a cyclic process which comprises in different stages individual and group activities and the interaction of people with environment. From the process of knowledge production (a process known as SECI) and with respect to the laws of the SECI process, effective methods of managerial development should also be derived (Urbancová, p. 26, 2013).

Knowledge Continuity

An essential part of knowledge management is the continuity of knowledge. Important reasons why the continuity of knowledge in the organization is so important (Urbancová, p. 28, 2013):

- Accelerates the training of new employees enabling them to be more productive sooner.
- Unifies knowledge and allows employees to focus on acquiring new knowledge.
- Allows increasing the productivity of the organization.
- Increases creativity, innovation, continuous improvement and organizational learning (everything depends on the knowledge of history).
- Improves decision-making, reduces errors of new workers.
- Reduces stress of employees, boosts the morale and loyalty of employees to the organization.
- Maintains knowledge networks that would otherwise be lost with leaving workers.
- Prevents the accumulation of knowledge in one person (often problem of family businesses).
- Retains organizational memory, knowledge remains in the organization.
- Reduces fluctuation and its financial implications.
- Reduces the vulnerability of organizations in the use of contingent workers (temps, etc.).

Knowledge Management System Chart

The presented chapter focuses on knowledge in management represented by sophisticated management tools, accented by knowledge management in that area and its influence on enterprise competitiveness.

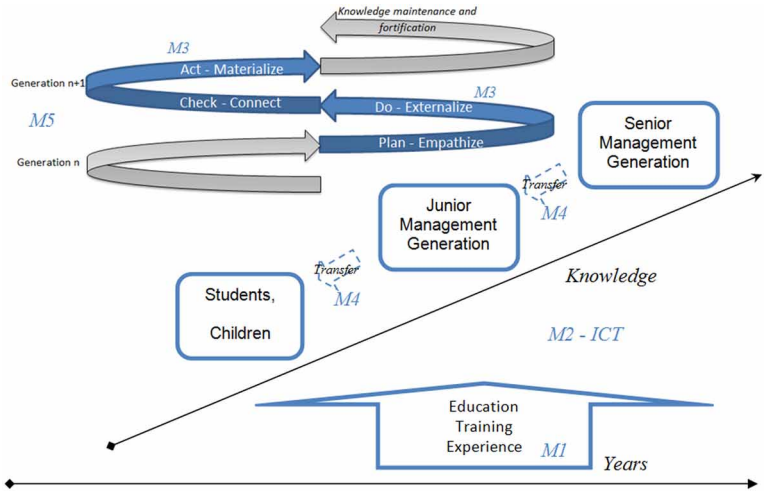
The suggested knowledge management system should content the following interconnected working components:

1. Module: Creation of knowledge in management tools supporting better knowledge of the business system and its surroundings and consequent better decision-making.
2. Module: Provide the enterprise with quality management information systems (BI/CI) to work effectively with implicit and explicit knowledge.
3. Module: Practical usages increase the amount of practical work and case studies.
4. Module: Transfer of tacit know-how (management kabbalah) from senior generation with more experience to junior generation and students by cooperation and experience.
5. Put previous activities under PDCA-SECI type cycle of continuous improvement.

Figure 3 summarizes the above mentioned modules in complex system maintaining, fortifying and increasing knowledge in an organization. The solution of the knowledge management problem lies in long-term continuously improved PDCA-SECI processes (M5) based on knowledge creation (M1) and mutual inter-employees transfer: tacit to explicit and vice versa (see Figure 2) and knowledge usage (M3). The intergeneration transfer (M4), where rare and valuable knowledge can be gained from (often

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Knowledge management system chart
(Own processing, 2016)



undervalued) oldest and most experienced generations, is especially useful. This feature is often a very important competitive advantage of family businesses.

The knowledge management system is a part of the enterprise know-how and has to be sensitively adjusted to the specific enterprise conditions. Selection of proprietary software support (M2) is also an important task. As results from the previous research with other management systems (strategic management) have shown, it is certainly better to implement some knowledge management system and tune it slowly, than neglect this activity.

FUTURE RESEARCH DIRECTIONS

Future research opportunities can be seen in:

- Deeper theoretical research of contemporary publications.
- Deeper mapping of management support software and management tools adapted in them.
- Specific characteristics of the knowledge management systems process in enterprises with relation to specific characteristics of the enterprise competitive performance.
- More detailed definition of suggested knowledge management model regarding coherent modules and their interconnection.

CONCLUSION

The chapter discusses the issue of knowledge in management related to knowledge management where knowledge in management is represented by external, internal and tacit knowledge of sophisticated management methods, tools and systems. The empiric research (primary and secondary) indicated that the knowledge of sophisticated management methods, tools and systems on management positions in SMEs

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is very low. This knowledge, however, due to the increase of innovativeness and competitive advantages of enterprises has to be permanently created by tools of a learning organization and transferred, ensuring its continuity. ICT support of MIS, ERP, BI and CI for management of especially explicit knowledge is very helpful. A simple knowledge management system containing 5 modules was formulated and introduced for application.

ACKNOWLEDGMENT

Thank you to Mgr. Jitka Lidaříková, MUCO for language corrections.

REFERENCES

K2 Atmitec. (2015). *Informační systém K2*. Ostrava: K2 atmitec. Retrieved from: http://www.k2.cz/cz/k2software/informacni-system-k2.html

Andersen, T. J. (2001). Information technology, strategic decision making approaches and organizational performance in different industrial settings. *Journal of Strategic Information Systems*, *10*(2), 101-119.

Association of Small and Medium Companies in CR (ASMEC). (2011). *Survey results no. 10.* Retrieved from: www.amsp.cz/uploads/dokumenty/AMSP _ URPruzkum_C10.pdf

Bain & Company. (2015). *Management Tools & Trends*. Retrieved from: http://www.bain.com/publications/insights/business-management-tools-andtrends.aspx

Baranov, V., Zaytsev, A., & Zaytsev, A. (2011). The Lean Production Concept and Its Influence on the Market Value of a Company. *Proceedings of the 10th International Conference Liberec Economic Forum 2011*.

Bartes, F. (2005). Inovace v podniku. Brno: Akademické nakladatelství CERM.

Bureš, V. (2007). *Znalostní management a proces jeho zavádění: průvodce pro praxi.* Praha: Grada Publishing.

Collison, Ch., & Parcell, G. (2005). Knowledge management: praktický management znalostí z prostředí předních světových učících se organizací. Brno: Computer Press.

Drucker, P. F. (1999). Knowledge-Worker Productivity: The Biggest Challenge. *California Management Review*. Retrieved from: http://forschungsnetzwerk.at/downloadpub/knowledge_workers_the_biggest_challenge.pdf

Fajkus, B. (2005). *Filosofie a metodologie vědy: vývoj, současnost a perspektivy*. Prague: Academia.

Grublová, E., & Frank, J. (2014). Inovace a znalosti. Olomouc: Univerzita Palackého.

Helios. (2015). *Informační systémy pro všechna odvětví*. Prague: HELIOS CR. Retrieved from: http://www.helios.eu

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Karat Informační Systém. (2015). *Řešení pro výrobní firmy*. Přerov: Karat Software, a.s. Retrieved from: http://www.karatsoftware.cz/oborova-reseni/vyroba

Klimeš, L. (1981). *Slovník cizích slov, 5* (Revised Edition). Prague: SPN.

Kotler, P., & Keller, K. L. (2007). *Marketing Management*. Praha: Grada Publishing.

Lichtenthaler. (2008). Opening up strategic for. technology planning: extended roadmaps and functional markets. *Management Decision*, *46*(1-2), 77-91.

Management Mania. (2016). Retrieved from https://managementmania.com/en

Modern Management. (2011). *Čeští podnikatelé nepoužívají moderní metody řízení*. Praha: Economia, a,s. Retrieved from: http://modernirizeni.ihned.cz/c1-52417420-cesti-podnikatele-nepouzivaji-moderni-metody-rizeni

Mohelská, H., & Pitra, Z. (2012). *Manažerské metody.* Prague: Professional Publishing.

Molnár, Z. (2012). Competitive intelligence aneb jak získat konkurenční výhodu. Praha: Nakladatelství Oeconomica.

Molnár, Z., & Střelka, J. (2012). Competitive Intelligence v malých a středních podnicích. *E+M Economics and Management, 15*(3), 156-170.

Pawliczek, A. (2015). *Management Methods, Tools and Systems in the Operation of Enterprises with an Accent on the Strategy, Continuous Improvement and Performance* (habilitation thesis). Zlín: Univerzita Tomáše Bati. Fakulta managementu a ekonomiky.

Pawliczek, A., & Piszczur, R. (2013). Utilization of Modern Management Methods with Special Emphasis on ISO 9000 and 14000 in Contemporary Czech and Slovak Companies. In *Proceedings of the 11th International Conference Liberec Economic Forum 2013*. Sychrov: TU of Liberec.

Pearce, D. W. (1995). *Macmillanův slovník moderní ekonomie.* Prague: Victoria Publishing.

Pentaho – A Hitachi Data Systems Company. (2015). *Pentaho Business Analytics*. Retrieved from: http://www.pentaho.com/product/business-visualization-analytics

Petříková, R. (2010). Moderní management znalostí: (principy, procesy, příklady dobré praxe). Praha: Professional Publishing.

Pitra, Z., & Mohelská, H. (2015). *Management transferu znalostí: od prvního nápadu ke komerčně úspěšné inovaci.* Praha: Professional Publishing.

Porter, M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competitors. New York: Free Press.

SAP. (2015). *Explore our analytics products*. Walldorf: SAP SE. Retrieved from: http://go.sap.com/cz/product/analytics.html

Senge, P. M. (2006). Pátá disciplína: teorie a praxe učící se organizace. Praha: Management Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Stormware Software Development. (2015). *POHODA Business Intelligence*. Jihlava: Stromware, s.r.o. Retrieved from: http://www.stormware.cz/pohoda/business-intelligence/reseni

Systém On Line (SOL). (2015). *Přehledy IS*. Brno: CCB, s.r.o. Retrieved from: http://www.systemonline.cz/prehled-informacnich-system

Tesco Software. (2015). *Fama+ CAFM*. Olomouc: TESCO SW, a.s. Retrieved from: http://www.tescosw.cz/facilitymanagement/fama-cafm

Tichá, I. (2005). Učící se organizace. Praha: Alfa Nakladatelství.

Urbancová, H. (2013). Kontinuita znalostí: jak uchovat znalosti klíčových pracovníků v organizaci. Praha: Nakladatelství Adart.

Veber, J. (2009). Management: základy, moderní manažerské přístupy, výkonnost a prosperita. Praha: Management Press.

KEY TERMS AND DEFINITIONS

Business Intelligence: Set of skills (knowledge, know-how, technology, application, quality, risk management, security, and processes used in business) aiming better understanding of global business context.

Competitive Intelligence: Systematic process of gathering, analyzing, and the use of external information which can affect the intentions of the organization, its decision-making, planning and behavior.

Competitiveness: Ability of survival or expansion in global surrounding based on elasticity, adaptation, innovation, intellectual capital and knowledge management in a learning organization.

Enterprise Resources Planning: An ICT assisted system whereby an enterprise (organization) manages and integrates all or most of its activity areas such as planning, inventory, purchasing, sales, marketing, finance, human resources, manufacturing, and more.

Knowledge Management System: Systematic creation, classification, fortification, transfer and continuity of knowledge from senior to junior generations in organization based on PDCA and SECI cyclic processes.

Management Information System: Usually ICT based data processing (software) support for management by providing sophisticated structured information about an organization, processes, resources, personnel, market, etc.

Management Tools, Techniques, Methods and Systems: Simple, intermediate or complex analytical or creative plan activities applicable in different branches of management serving a sophisticated and effective management executive.

This research was previously published in Knowledge Management Initiatives and Strategies in Small and Medium Enterprises; pages 180-203, copyright year 2017 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 49
Change Management Serving Knowledge Management and Organizational Development: Reflections and Review

Moria Levy
Bar Ilan University, Israel

ABSTRACT

Changes are considered a challenge to organizations. Seventy percent of organizational initiatives are not completed. Various Change Management approaches have been developed over the years, yet organizations continue to find changes difficult to implement. This applies to all types of change, but the challenge of change is critical in human resources disciplines, specifically those dealing with Knowledge Management and Organizational Development. This chapter connects changes in these two fields and links them to leadership. It examines theories and implementation models of Change Management, starting with classic approaches, through to new models developed in recent years. Based on this examination, a practical approach drawing on components of the reviewed models is proposed. The suggested approach takes into particular consideration the demands of change in Knowledge Management and Organizational Development.

INTRODUCTION

Knowledge is discussed and researched for centuries, starting with the Greek, and up till the late 20th century with Michael Polanyi's publications discussing knowing as a personal asset (Polanyi, 1958) and tacit knowledge (Polanyi, 1966). Shortly before, we find Peter Drucker first mentioning the term of the "knowledge worker" (Drucker, 1957). However, Knowledge Management, as a discipline, researched and managed in organizations, emerged some 20 years ago.

DOI: 10.4018/978-1-7998-7297-9.ch049

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Knowledge Management

Knowledge Management covers a large spectrum of knowledge activities within organizations, and between them and related groups of interest. Knowledge retention deals with knowledge continuity and how organizations transfer the experts' knowledge and insights to the next generation (Levy, 2011). Knowledge sharing deals with means of transferring knowledge between people and communities, fostering reuse and minimizing re-invention of the organizational knowledge again and again (Den Hoof & Ridder, 2004). And Knowledge development focuses on models enabling the organizational knowledge growth (and the business growth), starting from debriefing and lessons learned (Milton, 2010), through learning models for development of professional frameworks (Levy, 2008), ending with innovation (Swan etc., 1999).

In 1988, an opinion survey conducted by The Harris Research Center revealed that organizations actually are interested in managing their knowledge. Contra to the conventional wisdom of the time (that is, in 1988), people were not afraid of losing power through sharing. Knowledge, as the survey revealed, was not shared mainly because of a lack of time or because organizations simply didn't know how to go about sharing; they were short on Knowledge Management methodologies (KPMG, 1998). Sharing knowledge mainly depends on the culture of the organization (Ruppel & Harrington, 2001; Al-Alawi etc, 2007). Over time we learned that, in some cases, workers did indeed refuse to share their knowledge due to a fear of losing their power or position. However, this was hardly a major obstacle. In fact, the current technological state of most organizations seems optimal for Knowledge Management. The advanced technologies utilized in most organizations today facilitate the process of Knowledge Management; Knowledge Management methodologies are common knowledge in many organizations (primarily in those which manage their knowledge by hiring a professional, either internal or external). Nevertheless, even today, managing knowledge isn't an easy task. Even in cases where maximum effort was invested, and talented, experienced personnel were assigned the task, success was hardly guaranteed.

In Knowledge Management terms, success can be defined as improving performances as a result of utilizing knowledge preserved, developed, shared and/or made accessible to workers. Improved performance can be derived from enhanced efficiency and/or increased quality of performance. Usually, accessible knowledge assists workers in making better decisions, thereby improving overall performance.

When evaluating the success of a Knowledge Management system assimilated in an organization, we might find evaluating the improvement of business output to be quite a complicated task. Obviously, there are cases in which output is more easily evaluated (e.g. customer service), yet in most cases, evaluation is far from simple. This task is challenging because linking improvement directly to Knowledge Management is not obvious, especially when a variety of alternative factors might be equally responsible for this change. The market is constantly transforming, whether it is our clients, our competitors, or our organization itself; and more than one change is usually taking place in the three aforementioned fields. Hence, differentiating the Knowledge Management factor from the rest is tricky, and it becomes an even harder task when the work process is an ongoing, complex one.

Some organizations measure their success by employing usage of shared documented knowledge as a parameter. This is an obvious mistake: Workers accessing shared knowledge do not ensure success. If the knowledge is not good enough, instructing our workers to use it will not yield improvement. It might possibly even lead to the contrary.

There are many prerequisites for success: Valuable knowledge, well-documented and organized knowledge, easy to use technologies enabling share and access, etc. For the purpose of this chapter, it is assumed that the relevant knowledge does exist, is saved in some knowledgebase, and that the knowledge

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is organized and accessed easily and intuitively. Furthermore, it is assumed that we are dealing with a technological platform in which knowledge is stored and updated according to predefined work procedures.

This chapter aims to reflect on how Change Management models and methodologies can be means to successful implementation of Knowledge Management, Organizational Development and Leadership. It focuses on the challenges to attracting users, in Organizational Development and Knowledge management activities held in organizations. Users must actively participate in order for the knowledge to be used. Managing the change that may yield this participation is not as easy as it might seem. Some believe that a high-quality knowledgebase is a sufficient reason for workers to use it and actively participate in managing organizational knowledge. This is an industrial myth. Hard work is required to attract workers. Change must be managed in order to shift the workers' attitude and actions.

BACKGROUND

Challenges of Change Management

Organizational Development

Worren et. al (1997) view the Organizational Development (OD) as a developing discipline: "The field of OD has evolved over time since its beginnings in the 1930s" (Worren et al., 1997, p. 274). By 1997, they argue, OD in its classic definition had become irrelevant. The new OD had developed into a new profession – Change Management. "In terms of scope, the term change management is currently used in a manner that encompasses theory and intervention strategies associated with what is known in the academic literature as OD, human resource management (HRM), project management and strategic change" (Worren et al., 1997, pp. 276-277).This understanding is problematic on two levels: If OD equals Change Management, what discipline remains to indicate HRM solutions, defining the directions of change for them? And, if Change Management equals OD, it is technically difficult to analyze and further define how Change Management will serve OD, i.e. itself (the term used in computers for this conundrum is bootstrapping).

Kaplan (1996) defines Organizational Development as "the facilitation of an organization's capacity to self-reflect, self-regulate and take control of its own processes of improvement and learning" (p. 89).

This definition is wider. Change Management may be one of its components, but does not encompass its full scope. OD includes employees' development, talent management, debriefing, and other organizational strategies. Change Management, in such a definition, serves in two roles: First, it is a component of Organizational Development, serving all operational, professional and organizational needs. However, Change Management specifically is also a critical factor, an enabler for of all complementary components of OD. A well-planned Change Management program and its effective implementation are keys to success in each OD component implementation, whether learning or defining new organizational norms, values and other behaviors.

Leadership and Change Management

People associate the term 'leadership' with characteristics as 'inspiration' (Owens, 1995) and 'idiosyncratic' (Buckingham, 2012). Researchers searched for the precise traits of leadership: for example,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

"Stogdill (1974) identified six categories of personal factors associated with leadership: capacity, achievement, responsibility, participation, status, and situation" (Mendez-Morse, 1992, p. 12). However, this search has yet to yield the expected results. No combination of traits was found to provide an ideal formula. Interestingly, other key definitions of leadership do not link the term with characteristics, but rather with change:

Rauch & Behling (1984): *Leadership is the process of influencing the activities of an organized group toward goal achievement.*

Wills (1994): *The leader is one who mobilizes others toward a goal shared by leaders and followers. Leaders, followers, and goals make up the three equally necessary supports for leadership.*

Kotter (1994): *The fundamental purpose of leadership is to produce useful change, especially non-incremental change.*

Northouse (2012): *Leadership is a process whereby an individual influences a group of individuals to achieve a common goal etc.*

Summerfield (2014): *In his reflections on leadership definition quotes eight different ideas (some quoted above), all discussing change and influence.*

In other words, in order to lead one must know how to influence those to follow; to move them through a non-trivial change. Leadership is Change Management.

Knowledge Management, Organizational Development and Leadership are major components of the 'intelligent human' asset management in organizations. Managing intelligent organizational change is one of the most difficult challenges that businesses face, even the most difficult for some (Kanter, 2003). The purpose of this chapter is to unpack the idea of Change Management, as it is used in these three fields.

CLASSIC CHANGE MANAGEMENT THEORIES

Change Management is understood to be a managerial approach. It deals with the changes required to cause an individual, a group or an organization to change their habits or routines in a specific way. Professional literature differentiates between Change Management theories concerning individuals and Organizational Change Management theories. Some further refine the definition, differentiating between additional levels of Change Management teams or groups.

According to Cameron & Green (2004), there are four approaches to Change Management concerning individuals:

1. **The Behavioral Approach:** An approach that focuses on changing behavior by identifying desired behaviors that yields the desired performance. The elements of the current state of these performances are then analyzed and altered accordingly (Watzlawick, Weakland & Fisch, 1974).
2. **The Cognitive Approach:** An approach based on the perception that people act according to the beliefs and values they hold. Successful management of change is rooted in influencing cognitive activity which in turn affects behavior, and will be based on defining the goals for desired results (Beck, 1976).
3. **The Psychodynamic Approach:** According to this approach, people go through a psychological process when experiencing change. Different researchers describe different stages of the process,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

which are essentially identical. Elizabeth Kubler-Ross, who was the first researcher to develop a model of this sort, defined the following stages: denial, anger, bargaining, depression, and acceptance (Kubler-Ross, 1969. Also see: Satir, 1991).

4. **The Humanistic Approach:** This approach combines different elements of the three approaches above, while regarding each individual holistically. The best-known representation of this approach is Maslow's hierarchy of needs, starting with basic physiological needs, through safety, love and acceptance, and finally, self-actualization (Maslow, 1970; also see Rogers, 1967).

In addition to these theories focusing on individuals, we find the field of Organizational Change Management. Morgan (1986) for example, reviews the theoretical state of the field while presenting his own theory, arguing that each of the various theories suit at least one of the following metaphors:

1. **Organizations as Machines:** A process-related approach focusing on strict organizational structure. Perspectives of organizational Change Management are similar to the theories focusing on individuals: There might be some resistance to change, but eventually, through order and moderation, the change will be implemented. The change will be managed, according to this metaphor, by authority figures.
2. **Organizations as Political Systems:** This metaphor highlights a distinction between the operational conduct and the political system, viewing the latter as a higher, separate level of management. In this view, Change Management changes will only occur if supported by a powerful figure or a strong coalition.
3. **Organizations as Organisms:** Like living organisms, organizations develop, change and adapt. Change Management Changes should be directed only as a reaction to some external need. Individuals and groups should be aware of the need for change in order for them to adapt to it. Companionship and psychological support are essential for successful change.
4. **Organizations as Ever-Changing Flows:** Organizations are complex systems and are part of a wider environment. Change Management, in this understanding, cannot be managed; it can only evolve. Managers are an integral part of the organizational environment and conflicts are an important part of Organizational Development. Change Management is there to provide options and to enable.

There are a range of practical implications for these metaphors. In 1947, Lewin formulated a simple, yet critically important, Change Management model, comprised of three stages: The first stage, known as the 'unfreeze' stage, consists of analyzing the current state of the organization, as well as identifying change-promoting and change-inhibiting factors and presenting the desired status. The second stage, the 'move' stage, deals with implementing the change. The final stage, the 'freeze' stage, deals with stabilizing the organization, setting a policy, rewarding success and writing relevant standards. Lewin's model is an example of model which implements the theories presented above. It is based on a combination of the "organizations as machines" metaphor (1) and the "organizations as organisms" metaphor (3).

Other researchers developed additional models, most notably Bullock & Batten (1985) who offered the plan-act-integrate model; Carnall (1990), who highlights managers as change leaders in processes, culture and organizational politics; and of course, Senge (1990) with the Spiral dynamics: Start small, grow moderately.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THE NEED FOR NEW OR RENEWED APPROACHES

Clearly, there is no shortage of approaches to the topic of Change Management. Furthermore, the existing theories demonstrate sophistication and depth. Consequently, it is somewhat surprising to discover that organizations continue to fail in the majority of initiated changes:

Despite an increase in academic and practitioner awareness of the importance of organizational change (Kotter, 1995), many initiatives still fail to yield the increase in profits and performance promised (Caldwell, 2003). Even with dozens of change models developed and countless changes implemented, in a study of 210 North American businesses, Smith (2002) found that 75 per cent of initiatives fail to make an impact (Raelin & Cataldo, 2011, p. 482).

From years of study, I estimate today more than 70 per cent of needed change either fails to be launched, even though some people clearly see the need, fails to be completed even though some people exhaust themselves trying, or finishes over budget, late and with initial aspirations unmet (Kotter, 2008, p. 12).

The number 70 is repeated in additional researches as the rate of failure of organizations who aim to change:

Despite some individual successes, however, change remains difficult to pull off, and few companies manage the process as well as they would like. Most of their initiatives—installing new technology, downsizing, restructuring, or trying to change corporate culture—have had low success rates. The brutal fact is that about 70% of all change initiatives fail. (Beer & Nohria, 2000, p. 9)

In light of this phenomenal failure rate, there is clearly a pressing need for reassessing existing approaches and offering new ones in order to better understand change and suggest how Change Management can be successfully applied both generally and specifically in Knowledge Management and Organizational Development in organizations. Ashkenas has pithily pinpointed the issue: "Change Management needs to change" (2013, page 1).

NEW APPROACHES TO CHANGE MANAGEMENT

A new wave of thinking and scholarship in the field of Change Management attempts to address this need:

One group of researchers consists of leading scholars with direct expertise in the discipline of Change Management. Two of the best-known are John Kotter and Jeff Hiatt. More than anyone else in the past twenty years, Kotter is indisputably associated with the promotion of Change Management and his model is recognized and implemented internationally across numerous leading organizations. According to Kotter (1995), organizational Change Management consists of eight stages:

1. Creating a sense of urgency.
2. Forming a guiding Coalition.
3. Forming a vision and a change strategy.
4. Communicating the change and the need for it; getting the workers' consent.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

5. Empowering others to act.
6. Creating initial success, generating short term achievements.
7. Not giving up: sustaining acceleration.
8. Institutionalizing change: Creating a new culture in which the implemented change is an integral part.

These eight steps are not strictly sequential, but rather spiral: One begins with step 1 and advances, yet sometimes reversing and skipping are required. However, Kotter was not satisfied simply with creating a model. After the model was implemented in nearly every international fortune 500 company, he was still not content. Kotter tried to understand why most organizations that attempt to initiate a change don't complete the implementation process. Kotter conducted research in approximately 250 organizations that implemented a change process, yet didn't succeed in completing it, in an attempt to understand what difficulties these organizations faced and in which specific stage. Surprisingly, Kotter's research revealed that most organizations fail to complete the very first of the eight stages (creating a sense of urgency) either due to organizational complacency or, on the contrary, because of a sense of urgency led to a rush to complete this stage successfully. In 2008, Kotter published the aptly named book *A Sense of Urgency*, in which he suggests how to methodically create a sense of urgency in organizations in order to continuously promote change.

Another useful, innovative model was developed by Jeffrey M. Hiatt of Procsi and described in his book *Change Management: The People Side of Change* (2003. Co-written with Timothy J. Creasey). This model is one component of an inclusive Change Management theory developed by the two.

The model is titled ADKAR, an acronym of the 5 elements that can inhibit organizational Change Management:

- **Awareness:** Every worker must be aware of and comprehend the importance of said change.
- **Desire:** Every worker must want to support and participate in this change.
- **Knowledge:** Every worker must know what he must do in order to change.
- **Ability:** Every worker must possess the ability to exercise new skills and behavior as required in order to perform this change.
- **Reinforcement:** Tools to helping the internalization of the change; turning it to a regular habit.

The second group of researchers developing new approaches to Change Management is scholars working on leadership, including the investigation of leadership characteristics and behaviors, leading to insights into Change Management approaches and models. Three researchers in this group worthy of note are Michael Fullan, Gary Hamel and Simon Sinek. Fullan is known as a leadership researcher, yet many of his books' titles employ the terminology of change: for example, *Leading in a Culture of Change* (2001), *The Six Secrets of Change* (2008), *The Challenge of Change* (2009), *Change Leader* (2011), and *Freedom to Change* (2015)., Other titles present change as part of the suggested methods: for example, *Motion Leadership* (2009), and *The Principal* (2014).

Gary Hamel is another influential leadership researcher with expertise in innovative management (*The Future of Management*" (2008); *What Matters Now* (2012)). Both Hamel and Fullan share the understanding that changes can be promoted and applied when those who direct them act as leaders to look up to, basing their leadership on values, respect and care for the people expected to follow. Fullan (2008) lists the keys to change and leadership success as follows: Love of employees; connecting peers

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

with purpose; transparency; constructive feedback request; and learning, both as individuals and as a system. Hamel (2012) describes the qualities of a new leader (the one leading the change) as having values; driven by ideology; innovation capabilities (see also 2008); adaptability; and desire.

Sinek has a different background, in marketing and strategic communication, yet his talks and books also focus on leadership and change. In *Start With Why: How Great Leaders Inspire Everyone to Take Action* (2009), Sinek emphasizes the importance of answering the "WHY" question, defining the reasoning and beliefs, as the basis of every strategy; as well as how this emotionally engages those to follow (or buy). The bottom line is: Leadership is the ability to apply changes, and change can be achieved when leadership answering the criteria described involves a clear purpose.

A third group of new approaches to Change Management is offered by social scientists. Two eminent researchers within this group are Peter Senge and Kurt Lewin. We mention Lewin's work here again, even though his theories are not part of the new wave (his change theory was introduced back in 1947), because his three-step process remains a foundational model for making change in organizations. From the three stages of 'unfreeze,' 'change,' and 'freeze,' an important lesson is learned: Before initiating any change, one must first transform the existing mindset, enabling the change to take place.

In *The Dance of Change* (1999), Senge et al. describe the basic conditions enabling the initiating of changes (pp. 55-56): Raising commitment; starting small and growing steadily; finding the time (if too short on time to change, fix crisis before starting); and continually identifying barriers and limits and lessening them.

The final set of perspectives completing the new wave of studies about Change Management is of Business Management thought leaders. The approach here is very practical, as is that of the first group mentioned above, of Change Management specialists. In their book *Switch: How to Change Things When Change Is Hard* (2010), two of these Business Management specialists, the brothers Dan and Chip Heath, refer to three scales one should employ when managing substantial Change Management (whether individual or organizational):

1. The rational dimension (titled "Direct the rider"):
    a. Creating a clear direction to the destination.
    b. Finding positive elements in the current situation.
    c. Defining specific tasks for critical stages.
2. The emotional dimension (titled " Motivate the elephant"):
    a. Connecting with emotions.
    b. Shrinking the change.
    c. Growing the people.
3. Adjusting the environment (titled "Shape the path"):
    a. Making small amendments and adjustments in change-oriented environments.
    b. Creating new habits in the new environment.
    c. Creating peer pressure in order to implement the change.

These four grouping provide a summary of the new generation of Change Management approaches and models: approaches grounded directly in Change Management theory; change based on leadership studies; change based on social psychology; and change based on business management theories. These four groups complement one another and, as in many other domains, the variation and the combination of approaches from different disciplines are of value.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

SOLUTIONS AND RECOMMENDATIONS

As noted above, getting workers to change their behaviors and perceptions is not a simple task. There is no single formula for success, and there is no guarantee that a formula proven successful in one setting will be successful in another (sometimes even within the same organization). However, two notable trends offer a reason to be optimistic about the chances to defeat the 70% curse - the number recurring time and again in research, representing the rate of failure in cases of organizational initiated changes.

The first of these trends is the new generation of thought leaders described in broad strokes above, researching the issue and suggesting new approaches and possibly better models. These researchers have in common their combination of theory and practice, through academia and business careers. This characteristic, indeed, gives rise to practical, well-grounded ideas that are tested time after time in real life situations. Even though these researchers represent different classes of theory, they share a number of core concepts (such as a focus on change or, more accurately, lack of change; and distinguishing lack of change from resistance to change (Lewin, 1947), as well as theoretical roots in early ideas that are present in the work of later researchers (for example, Kotter's 'sense of urgency' (2008) which is incorporated in almost every subsequent model).

The second notable trend has to do with organizations. Organizations are recognizing the need to proactively manage changes. While in the past, not many organizations assigned budgets and organizational resources to Change Management activities, one today finds that Change Management has a clear role in organizations. A Google search for "Change Management" and "job description" in April 2017 yielded over 1,000,000 results.

Blended Approach Based on New Change Management Approaches

The combinations of these two trends – the development of well-grounded directions in the management of changes, and organizations that are recognizing the importance of Change Management and assigning it resources –are the basis for some cautious optimism and a justification for offering a blended approach for implementation in managing change, which fosters success.

What is suggested here is an approach; an approach rather than a model, because it provides no recipes; an approach that must be adjusted to each organization's specific culture, current situation and type of need.

The approach is three staged, the two first stages based on the WHY strategy components (Sinek, 2009):

Initiate: Ask WHY

In order to initiate any change, the organization has to verify that the change serves a real need; that the added value is significant; and that it can be communicated clearly and loudly (Senge et al., 1999; Heath & Heath, 2010). Furthermore, the need for change should be urgent in the perception of those who will take part in the change. Important changes are not good enough. In order to convince organizations to actually initiate the move, a sense of urgency is key (Kotter, 2008).

When these conditions do occur, unfreezing must take place (Lewin, 1947). People are overwhelmed by knowledge and protect themselves by shutting down their attention and blocking new inputs. A sense of urgency is the key to cracking the status quo, unfreezing the current situation, and enabling a change.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Finally, initiating change focuses on the why question, recognizing it to be the starting point of a good strategy (Sinek, 2009).

Examples and tips for implementation:

Need and sense of urgency: Demonstrate the cost of not managing the knowledge. If for example, the change deals with debriefing and learning from lessons, demonstrate recurring mistakes. If the change has to do with reusing information in projects, demonstrate samples of documents with significant overlap, developed more than once.

Why: Present management a short list of business advantages, answering known needs as to why a social media network is required in the organization, and leading to the importance of their commitment to the change. Present existing known challenges, as low level of employees' engagement and the role the platform to improving this need.

Plan: Ask HOW and WHAT

Once the 'why' is defined, planning can take place focusing on the HOW and WHAT (Sinek, 2009):

The HOW question can be understood in several levels. It is suggested that the HOW be interpreted as the purpose and engagement, the planning of how those who follow can be respected and treated with care and compassion, and transparently sharing purpose with them (Fullan 2001, 2007; Hamel 2008, 2012).

Answering the question WHAT defines the actual plan. It is suggested to ease the change as much as possible, for example by:

- Slicing it into pieces (Heath & Heath, 2010).
- Being accurate as to expectations (Heath & Heath, 2010).
- Adjusting the environment to support it, by making it natural to navigate in the new pane, embedding hyperlinks in forms, new activities in current processes, where they naturally fit, etc. (Heath & Heath, 2010).
- Applying the suitable change to each target group, in accordance with the specific time and situation, using the ADKAR model (Hiatt & Creasey, 2003). Some may mainly have to be made aware (the A component), while others will need all the components (Awareness, Desire, Knowledge, Ability, and Reinforcement). Nonetheless, just one or two are those appropriate to focus on in a given timeframe.

Examples and tips for implementation:

Slicing into pieces: Design a reduced implementation of the process to take place, yielding a quick win. After first success, ask for additional budget and organizational commitment. For example, if knowledge continuity is the need, start with one expert, intended to retire. Demonstrate the knowledge captured, and only then present the full project and change.

Adjusting the environment to support the change: Embed an additional paragraph, for example into the template or form serving for project planning, requesting the project manager to list potential lessons from previous projects, that may be relevant to the new project.

Do: Verify Progress

Action is the third stage. While enacting the change, the main emphasis should be on:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Monitoring progress (Paton & McCalman, 2008).
- Continually learning and gently directing and refining the path (Heath & Heath, 2010).

Examples and tips for implementation:

Monitoring progress: Send a weekly update as to progress, listing the work and progress of each department. When managers will observe that their department is less than others (and there are always some that are behind), knowing all other managers are seeing the same report, many of them will urge their employees to whatever is required to achieve better relative results.

The pace of change in every aspect of our world has increased dramatically since Lewin presented his model back in 1947. The final 'freeze' stage, instituting the changes and freezing the new way of behavior may sound naive in today's work culture. In modern society, and even more so in the world of Knowledge Management, Organizational Development, and leadership, the promotion of change is an infinite process (or at least, one of an unfathomable length). The more we succeed, the more new needs appear, new changes are required, and new models and tools are discovered or invented. All these are accompanied by ever new Change Management projects. There might be a starting point, but there is no finish line in sight. This might not be the optimal setting for an organization to operate in, yet it is undoubtedly the current reality to which we must learn to adapt.

FUTURE RESEARCH DIRECTIONS

There is of yet no scientific proof that this approach can improve upon the sad statistic of 70% failures in initiated changes. However, the practical experience of organizations that have implemented this model in Knowledge Management projects seems to indicate that it works. Further research to ascertain the model's effectiveness is recommended over the next few years. At the same time, additional new approaches that are still being developed in the constantly evolving world of Change Management should be examined, in order to learn how they can contribute to the suggested approach and improve it. Our work is far from being done.

CONCLUSION

This chapter elaborated on the importance of appropriate Change Management and presented different theories and implementation models. Both classical and new approaches and models were presented and, based on the new generation of ideas, a hybrid approach was suggested. The suggestion combines elements from the various approaches and models addressing the needs of Knowledge Management and Organizational Development and Leadership that were discussed – all components of organizational intelligent asset management.

REFERENCES

Ashkenas, R. (2013). Change management needs to change. *Harvard Business Review*, *16*(April). Retrieved from https://hbr.org/2013/04/change-management-needs-to-cha

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York, NY: International Universities Press.

Beer, M., & Nohria, N. (2000). Cracking the code of change. *Harvard Business Review*. Retrieved from https://hbr.org/2000/05/cracking-the-code-of-change

Buckingham, M. (2012). Leadership development in the age of the algorithm. *Harvard Business Review*. Retrieved from https://hbr.org/2012/06/leadership-development-in-the-age-of-the-algorithm

Bullock, R. J., & Batten, D. (1985). It's just a phase we're going through: A review and synthesis of OD phase analysis. *Group & Organization Management*, *10*(4), 383–412.

Caldwell, R. (2003). Models of change agency. *British Journal of Management*, *14*(2), 131–142. doi:10.1111/1467-8551.00270

Cameron, E., & Green, M. (2004). *Making sense of change management*. London, UK: Kogan Page Limited.

Carnall, C. A. (1990). *Managing change in organisations*. London: Prentice Hall.

Drucker, P. F. (1957). *Landmarks of tomorrow*. New York: Harper & Row.

Fullan, M. (2001). *Leading in a culture of change*. San Francisco, CA: John Wiley & Sons.

Fullan, M. (2008). *The six secrets of change*. San Francisco, CA: John Wiley & Sons.

Fullan, M. (Ed.). (2009). *The challenge of change: Start school improvement now!* Thousand Oaks, CA: Corwin Press.

Fullan, M. (2009). *Motion leadership: The skinny on becoming change savvy*. Thousand Oaks, CA: Corwin Press.

Fullan, M. (2011). *Change leader: Learning to do what matters most*. San Francisco, CA: John Wiley & Sons.

Fullan, M. (2014). *The principal: Three keys to maximizing impact*. San Francisco, CA: John Wiley & Sons.

Fullan, M. (2015). *Freedom to change: Four strategies to put your inner drive into overdrive*. San Francisco, CA: John Wiley & Sons.

Hamel, G. (2008). The future of management. *Human Resource Management International Digest*, *16*(6), hrmid.2008.04416fae.001. doi:10.1108/hrmid.2008.04416fae.001

Hamel, G. (2012). What matters now. *Strategic Direction*, *28*(9). doi:10.1108d.2012.05628iaa.012

Hatch, M. J., & Cunliffe, A. L. (2006). *Organization theory: Modern, symbolic and postmodern perspectives*. Oxford, UK: Oxford University Press.

Heath, C., & Heath, D. (2010). *Switch: How to change things when change is hard*. New York, NY: Broadway Books.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hiatt, J. M., & Creasey, T. J. (2003). *Change Management: the people side of change*. Loveland, CO: Prosci Research.

Ismail Al-Alawi, A., Yousif Al-Marzooqi, N., & Fraidoon Mohammed, Y. (2007). Organizational culture and knowledge sharing: Critical success factors. *Journal of Knowledge Management*, *11*(2), 22–42. doi:10.1108/13673270710738898

Kanter, R. M. (2003). *Challenge of organizational change: How companies experience it and leaders guide it*. New York, NY: Simon and Schuster.

Kaplan, A. (1996). *The development practitioner's handbook*. London: Pluto Press.

Kotter, J. P. (1990). What leaders really do. *Harvard Business Review*, *68*(May), 103–111. PMID:10104518

Kotter, J. P. (1995). *Leading change*. Boston, MA: Harvard Business Review Press.

Kotter, J. P. (2008). *A sense of urgency*. Boston, MA: Harvard Business Press.

Kubler-Ross, E. (1969). *On Death and dying*. New York, NY: Macmillan.

Levy, M. (2008). A Case Study Of Successful Implementation of a Learning Model. *Journal of Knowledge Management Practice*, *9*(4).

Levy, M. (2011). Knowledge retention: Minimizing organizational business loss. *Journal of Knowledge Management*, *15*(4), 582–600. doi:10.1108/13673271111151974

Lewin, K. (1947). Frontiers in group dynamics: Concept, method and reality in social science; social equilibria and social change. *Human Relations*, *1*(1), 5–41. doi:10.1177/001872674700100103

KPMG Management Consulting. (1998). *The knowledge management research report 1998, A survey of 100 European companies*. Harris Research Center.

Maslow, A. (1970). *Motivation and personality*. New York, NY: Harper & Row.

Mendez-Morse, S. (1992). *Leadership characteristics that facilitate school change*. Austin, TX: Southwest Educational Development Laboratory.

Milton, N. (2010). *The Lessons Learned Handbook*. Oxford, UK: Chandos Publishing. doi:10.1533/9781780631929

Morgan, G. (1986). *Images of organization*. Newbury Park, CA: Sage Publications.

Northouse, P. G. (2012). *Leadership: Theory and practice*. Thousand Oaks, CA: Sage.

Owens, R. G. (1995). *Organizational behavior in education* (5th ed.). Boston, MA: Allyn and Bacon.

Paton, R. A., & McCalman, J. (2008). *Change management: A guide to effective implementation*. Thousand Oaks, CA: Sage.

Polanyi, M. (1958). *Personal Knowledge*. Chicago, IL: The University of Chicago Press.

Polanyi, M. (1966). *The Tacit Dimension*. Chicago, IL: The University of Chicago Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Raelin, J. D., & Cataldo, C. G. (2011). Whither middle management? Empowering interface and the failure of organizational change. *Journal of Change Management*, *11*(4), 481–507. doi:10.1080/14697017.2011.630509

Rauch, C. F., & Behling, O. (1984). Functionalism: Basis for an alternate approach to the study of leadership. In J. G. Hunt, D. M. Hosking, C. A. Schriesheim, & R. Stewart (Eds.), *Leaders and managers: International perspectives on managerial behavior and leadership* (pp. 45–62). Elmsford, NY: Pergamon Press. doi:10.1016/B978-0-08-030943-9.50012-7

Rogers, C. (1967). *On Becoming a person: A therapist's view*. London: Constable.

Ruppel, C. P., & Harrington, S. J. (2001). Sharing knowledge through intranets: A study of organizational culture and intranet implementation. *IEEE Transactions on Professional Communication*, *44*(1), 37–52. doi:10.1109/47.911131

Satir, V., Banmen, J., Gerber, J., & Gomori, M. (1991). *The Satir Model: Family therapy and beyond*. Palo Alto, CA: Science and Behavior Books.

Senge, P., Kleiner, A., Roberts, C., Ross, R., Roth, G., Smith, B., & Guman, E. C. (1999). *The dance of change: The challenges to sustaining momentum in learning organizations*. New York: Currency/Doubleday.

Senge, P. M. (1990). *The fifth discipline: The art and practice of the learning organization*. New York, NY: Doubleday Business.

Sinek, S. (2009). *Start with why: How great leaders inspire everyone to take action*. New York, NY: Penguin.

Smith, M. E. (2002). Implementing organizational change: Correlates of success and failure. *Performance Improvement Quarterly*, *15*(1), 67–83. doi:10.1111/j.1937-8327.2002.tb00241.x

Stogdill, R. M. (1948). Personal factors associated with leadership: A survey of the literature. *The Journal of Psychology*, *25*(1), 35–71. doi:10.1080/00223980.1948.9917362 PMID:18901913

Summerfield, M. R. (2014). Leadership: A simple definition. *American Journal of Health-System Pharmacy*, *71*(3), 251–253. doi:10.2146/ajhp130435 PMID:24429022

Swan, J., Newell, S., Scarbrough, H., & Hislop, D. (1999). Knowledge management and innovation: Networks and networking. *Journal of Knowledge Management*, *3*(4), 262–275. doi:10.1108/13673279910304014

Van Den Hooff, B., & De Ridder, J. A. (2004). Knowledge sharing in context: The influence of organizational commitment, communication climate and CMC use on knowledge sharing. *Journal of Knowledge Management*, *8*(6), 117–130. doi:10.1108/13673270410567675

Watzlawick, P., Weakland, J. H., & Fisch, R. (1974). *Change: Principles of problem formation and problem resolution*. New York, NY: WW Norton & Company.

Wills, G. (1994). *Certain trumpets: The call of leaders*. New York, NY: Simon & Schuster.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Worren, N. A., Ruddle, K., & Moore, K. (1999). From organizational development to change management. The emergence of a new profession. *The Journal of Applied Behavioral Science*, *35*(3), 273–286. doi:10.1177/0021886399353002

KEY TERMS AND DEFINITIONS

Development: 'Steady progress' and stresses effective assisting in hastening a process or bringing about a desired end, a significant consequence or event, the act or process of growing, progressing, or developing.

Globalization: Tendencies of businesses, technologies, or philosophies to spread throughout the world or the process of making this happen. Worldwide integration and development, the process enabling financial and investment markets to operate internationally, largely as a result of deregulation and improved communications.

Initiative: Readiness to engage in daring or difficult activity, the condition of being initiated into some experience or sphere of activity: knowledgeableness.

Knowledge: Human or organizational asset enabling good decisions and effective action in context. There are diverse views on the scope covered within knowledge, based on context and purpose. The definition above is general as to the various perspectives. Examples of knowledge: insights, know-hows, etc.

Knowledge Management: Management with regard to knowledge. Use of a systemic and holistic approach to improve results and learning; it includes optimizing the identification, creation, analysis, representation, distribution and application of knowledge to create organizational value.

Organization: Person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives. The concept of organization includes, but is not limited to sole-trader, company, corporation, firm, enterprise, authority, partnership, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

Perspective: Is a way of regarding situations, facts or topics or a mental view or the state of one's ideas; prospective means concerned with or related to the future and judging their relative importance. It includes the proper or accurate point of view or the ability to see with objectivity so as to try to get some perspective on issues for better solutions.

This research was previously published in Global Practices in Knowledge Management for Societal and Organizational Development; pages 256-270, copyright year 2018 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 50
Impact of Social CRM Capabilities on Firm Performance:
Examining the Mediating Role of Co-Created Customer Experience

Shampy Kamboj
Department of Management Studies, Indian Institute of Technology, Roorkee, India

Zillur Rahman
Department of Management Studies, Indian Institute of Technology, Roorkee, India

Mayank Yadav
Department of Management Studies, Indian Institute of Technology, Roorkee, India

Praveen Goyal
Department of Management, Birla Institute of Technology & Science, Pilani, India

ABSTRACT

The emergence of social media technologies have drastically changed the face of customer relationship management (CRM), hence firms are incorporating social media technologies in their existing CRM systems which has led to the evolution of social CRM. This article extends capability-based perspective of traditional CRM by integrating it with social media technologies and to assess empirically their significant impact on firm performance. It also examines the mediating role of co-created customer experience. The developed hypothesis and proposed model were tested through structural equation modeling (SEM). The results show that co-created customer experiences play a role of mediator between social CRM capabilities and performance outcomes. Sales/marketing centric technology resources significantly influence four dimensions and customer centric technology resources influence two dimensions of relational information processing capability. The findings also depict that there is an influence of Sales/marketing and customer centric technology resources on customer linking, market sensing and social CRM capabilities.

DOI: 10.4018/978-1-7998-7297-9.ch050

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Social media has transformed the role of consumers online. The consumers presently are not just passive receivers of information available online instead they have become active participant and co-creators of information online. Most of the comments posted by using social media, is in the form of "self-created content sharing" and placed by eighteen or older age online users (Lenhart, Purcell, Smith, & Zickuhr, 2010). To the interpersonal communication, the social applications enabled users to act together with firms and allow them for actively participating in the co-creation of experiences (Prahalad & Ramaswamy, 2004). Approximately 41 percent of the people online were found to be engaged with the brand they preferred with the help of various social media platforms (Mintel Group, 2011).

Now days, companies are focusing their marketing efforts towards social customers and highly expends on social media advertising. Businesses have approached to these social changes and technologies by following advertising network for online users instead of traditional advertising means (Trainor, 2012).

Most of the firms are starting to make use of social media for creating and retaining customer relations in the word-of-mouth marketing to customer-to-customer communications (Kozinets, De Valck, Wojnicki, & Wilner, 2010) for innovation co-creation (Sawhney, Verona, & Prandelli, 2005) and for community-based customer support (Greenberg, 2010). Most of the companies integrate their existing customer database with social data (VanBoskirk, Shar, Overby, & McGann, 2009) in order to enhance it and thus focusing on social customer relationship management (Social CRM).

The word "Social CRM" has been newly added into marketing, which represent a wide set of activities comes under social media (Greenberg, 2010). Social CRM capability: "the integration of traditional customer-facing activities, including processes, systems, and technologies with emerging social media applications to engage customers in collaborative conversations and enhance customer relationships" (Trainor, 2012, p. 319).

Although the usage of social media application is increasing, still the research in the field of marketing needs to build a conceptual model which relates Social CRM to the firm performance by considering extensive literature on CRM. This study makes an attempt in this direction and develop a conceptual model based on traditional CRM literature and integrating it with social media technologies and empirically to assess their significant impact on firm performance. In addition, it also examines the mediating role of co-created customer experience between social CRM capabilities and performance outcomes. This is the first study to empirically examine the impact of social CRM capability on customer based relational performance, customer based profit performance and new product performance.

This paper proceeds as follows: First, we review the literature related to the key constructs of research model and their relationships in order to propose hypotheses. Then, discuss the method utilized in this paper. Thereafter, present the findings and at the last, we conclude the article with research implications, restrictions and forthcoming research opportunity

THEORETICAL CONTEXT AND HYPOTHESIS DEVELOPMENT

Social CRM is based on both resources and capabilities based view which advocate that "performance is largely a function of a firm's resource endowment and its effectiveness at converting these resources to advantage-generating competencies" (Barney, 1991; Day, 1994).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CRM is oldest and widely used concept since 1990s, yet there is no generally accepted definition of it. According to Boulding, Staelin, Ehret and Johnston (2005, p. 157) "CRM relates to strategy, the management of the dual creation of value, the intelligent use of data and technology, the acquisition of customer knowledge and the diffusion of this knowledge to the appropriate stakeholders, the development of appropriate (long-term) relationships with specific customers and/or customer groups, and the integration of processes across the many areas of the firm and across the network of firms that collaborate to generate customer value".

Most of the literature in the field of CRM has not covered social media. Therefore, the definition of traditional CRM mainly focuses on organisms which facilitates sales and marketing support, data integration and analysis (Jayachandran, Sharma, Kaufman, & Raman, 2005; Rapp, Trainor, & Agnihotri, 2010). The definition may remain valid, but still due to the broader usage of social media applications, there is a need to integrate this view of traditional CRM with social CRM. It is because of the expansion in the applications, which comes under CRM technology and also to know that how the traditional CRM view changed in the age of social customers.

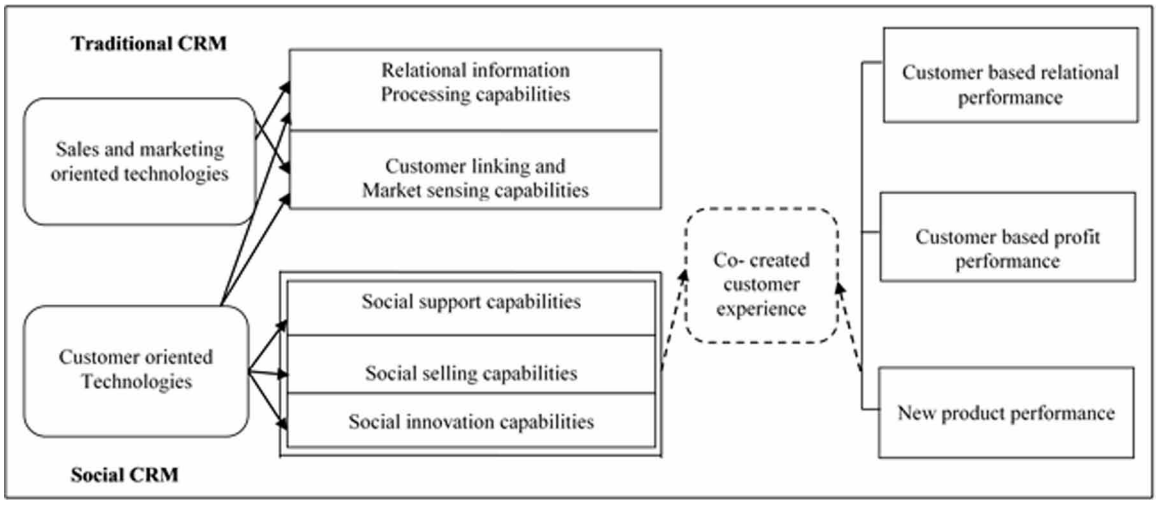
As a result of social media applications, a new term social CRM comes into existence that integrate both changes technological as well as social. This emerging concept of CRM integrates a network focused and more collaborative approach to customer relations. The labels "social CRM" or "CRM 2.0" have been adopted to explain this innovative way of developing and sustaining customer relationships inside the existing business and IT scenario (Trainor, 2012). According to Trainor (2012), "Social CRM is the integration of traditional customer-facing activities including processes, systems, and technologies with emerging social media applications to engage customers in collaborative conversations and enhance customer relationships" (p. 319). Social CRM is not an alternative in place of traditional CRM, instead of it is an extended view that adds on social capabilities, functions and processes. It facilitates the interaction between customers and firms (Greenberg, 2010). Existing CRM definitions provides interaction in technologies, processes and customers (Zablah, Bellenger, & Johnston, 2004). Literature on CRM shows that till now efforts to engage with customers were limited, but the usage of social media technologies by businesses and customers enables them more interactive (Kaplan & Haenlein, 2010).

Social CRM and Capabilities based View

The capabilities based view suggests that how the investment in marketing and IT capabilities leads to enhanced firm performance (Nath, Nachiappan, & Ramanathan, 2010; Rapp et al., 2010). Trainer, Rapp, Beitelspacher, & Schillewaert (2011) found that the integration of IT, business and human resources facilitates the growth of e- marketing capabilities, which have a constructive influence on firm performance. Rapp et al. (2010) suggest that how with the CRM technologies and firm resources, customer linking capabilities can be developed. They also described that these capabilities have an impact on both relational performance (customer acquisition, satisfaction, retention and loyalty) and firm performance (return on investment, competitive position and profitability). Trainor, Andzulis, Rapp and Agnihotri (2014) measured the impact of social CRM capabilities on customer relationship performance. Similarly Vorhies, Orr and Bush (2011) measured the impact of customer focused marketing capabilities on financial performance. In the same line Raman, Wittmann and Rauseo (2006) identified various organisational capabilities in CRM implementation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Conceptual model on Traditional and social CRM: technologies, capabilities and performance outcomes



These existing works provide guidance that through the integration of CRM technology resources, capabilities can be created. However, the past studies have not considered the latest technological changes brought by social media applications. The focus of these past studies lies in capabilities and resulting variables and examined in traditional CRM literature. Therefore, the investigation of social media capabilities and their outcomes keep aside from the scope of CRM research. In figure 1 a conceptual model based on both traditional and social capabilities shown. It depicts that social CRM is an extended version of traditional CRM and makes it more effective.

Sales, Marketing Centric Technologies and Traditional CRM Capabilities

Traditionally, technology was considered as a tool for sales or marketing that enhances the efficiency of employees. Ahearne and Rapp (2010) give the name "sales person oriented" or "sales person centric technology" to this perspective. They also believed that in sales and marketing, technology comes under sales person to customer interface continuum. In traditional CRM, technology oriented resources termed as sales/marketing centric. They include systems for customer analytics, e-mail, sales force automation, interactive voice response systems and database marketing. The main objective behind these technologies is to increase the efficiency of employees and to improve data analysis. As per Day (1994) these technologies, termed as *inside-out* processes. "Salesforce.com, a vendor of CRM and sales force automation software, offers a product called Sales Cloud that provides tools to manage accounts and contacts (data capture), leads and opportunities (data analysis), and e-mail and calendaring (efficiency and effectiveness)" (Trainor, 2012).

In the field of CRM, communication includes the information sharing between an enterprise and its consumers (Jayachandran et al., 2005). "Relational information processing ensures that the information needed to build trust and commitment between a firm and its customers is developed, provided to decision makers, and used effectively" (Rapp et al., 2010). This capability includes five dimensions; information use, information capture, information reciprocity, information incorporation, information

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

retrieval (Jayachandran et al., 2005). Relational information processing capability has a positive impact on customer retention and satisfaction (Jayachandran et al., 2005).

Based on the aforementioned opinions, we proposed that traditional CRM, sales and marketing technologies will influence information capture, integration, access and usage dimensions of relational information processing, and therefore we proceed with the following hypothesis.

H1: Sales/marketing-centric technology will positively influence information capture, integration, access and usage dimensions of relational information processing capability.

According to Trainor, "Customer-linking capability refers to how well a firm deploys its marketing resources to build durable relationships with customers" (2012, p. 323). This capability involves the ability to recognize customer necessities along with the capability to nurture relationships with consumers. "Market sensing refers to the ability of firms to continuously sense and act on events and trends by learning about customers, competitors, and channel members" (Day, 1994). The literature in the field of market orientation and CRM, involves both market sensing as well as customer linking capabilities and both positively affects firm performance (Hooley Greenley, Cadogan, & Fahy 2005; Rapp et al., 2010).

H2: Sales/marketing-centric technology will have a positive influence on market sensing and channel linking capability.

Customer Centric Technologies and Social CRM Capabilities

Customer centric technologies allow customers in social network to interact with others and to become network members. Twitter, YouTube, LinkedIn and Facebook depict social media applications which have converted from customer specific to customer centric tools and enables firms to interact with network members. Other examples can be blogs, user-generated content Sites, discussion forums and user-created communities. Another type of customer-centric technology may include the use of social media technologies to specially engage customers in interactions related to the organization.

Like, Starbucks in 2008 introduced its user community Web site named "My Starbucks Idea" (http://mystarbucksidea.force.com/ideaHome/) for providing a common platform to share ideas and get comments from its customer community. One more example in this context is "Salesforce.com's Idea Exchange" (http://success.salesforce.com/ideaHome/). It is a social media application that enables its customers to participate and give new ideas and interact directly with sales and marketing managers. Both sales and marketing as well as customer oriented technologies enable CRM. "A functioning "traditional CRM system may be necessary to take advantage of the opportunities afforded by social media applications and social CRM" (Greenberg, 2010).

"Information reciprocity—the activities and processes that encourage customers to interact and share information—has a logical relationship with social CRM technologies because reciprocity and interaction are cornerstones of social media applications" (Trainor, 2012). "It is logical to expect that information capture, or the acquisition of information from customer interactions with various sources and channels, can be developed by either sales/marketing-centric or customer-centric technology resources" (Jayachandran et al., 2005).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

H3: Customer centric technologies will have a positive influence on information capture and reciprocity dimensions of relational information processing capability.

These customer-centric technologies are the part of Social CRM technology. The traditional CRM only confined to those customers that are directly related to the firm, whereas, these Social CRM technology confined to the conversations of both official and unofficial customer. "Social CRM technologies, such as social media monitoring software, are likely to have a direct relationship with a firm's customer linking and market sensing capabilities because of the rich information afforded to managers who use them" (Trainor, 2012).

H4: Customer centric technologies will have a positive impact on market-sensing as well as channel linking capability.

Social service and support capability referred as "the ability (1) to interact with networks of customers to solve problems during service and support encounters and (2) to create and disseminate knowledge from these interactions throughout the organization" (Trainor, 2012. P. 325). "Social CRM technologies are already accepted forms of business–customer communications, and their implementation in customer service settings is rapidly growing" (Kingstone, 2010)

H5: Customer centric technologies will have a positive influence on social service and support capability.

Social selling capability referred "as the ability to use knowledge about customers and the network of customer relationships to effectively navigate the firm's sales cycle" (Trainor, 2012, p. 324). "Salesforce.com provides a Facebook integration toolkit that allows companies to combine traditional CRM data with dynamically updated personal data from Facebook. This gives the salespeople real-time personal data (i.e., status and profile updates) about their customers. This toolkit can also be used to cross-check consumers' Facebook "friends" with the existing contacts and accounts in the CRM database, allowing the formation of a network map of consumers and the associations among them, which gives salespeople another piece of valuable information that can be used during a sales call" (Trainer, 2012). Social network theory reveals that "each stage may require a unique network configuration because certain configurations are better suited to certain tasks" (Ustuner & Godes, 2006).

H6: Customer centric technologies will have a positive impact on social selling capability.

The notion of involving customers in new product development process is based on idea that customers are not only gives information regarding their preferences, but they also act as an innovation's valuable source (Von Hippel, 1986). According to Ernst, Hoyer, Krafft and Krieger (2011), "There appears to be a logical relationship between social CRM and NPD because social CRM addresses the interactions between the customer and the firm and the customer and his or her peers". Sawhney et al. (2005) founded that "how firms can engage customers in virtual environments and integrate their knowledge into the ideation, concept development, product design, product testing, and product introduction phases of the product development process". Social media technologies results into increased customer interactions and their incorporation into traditional CRM technologies leads to increase social innovation capabilities (Trainor, 2012).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

H7: Customer centric technologies will have a positive influence on social innovation capability.

Co-Created Customer Experiences, Social CRM Capabilities and Firm Performance

Recently, co-created customer experience is becoming an important part of CRM activities. According to an emerging view within the marketing literature, "as customers take a more active role in communicating and interacting with companies, these quality interactions, which enable customers to co-create unique experiences, are the key to unlocking new courses of competitive advantage" (Prahalad & Ramaswamy, 2004). The co-created customer experiences consist of collaborative support as well as Innovation co-creation and may affected by social CRM capabilities. Innovation creation referred as "the integration of existing knowledge with new knowledge" (Von Hippel & Katz, 2002).

Trainor (2012) suggested that co-created customer experience has direct relation with customer-based relational as well as profit performance. Customers may facilitate higher satisfaction through participating in co-created activities. "The interactive dialogs with the firm lead to greater communication intensity and information sharing—two activities that are recognized to be fundamental antecedents to trust and relationship development" (Morgan & Hunt, 1994).

By participating in co-creation activities, customers may also exhibit greater satisfaction. All these factors may have an impact on customer-based relationship to performance. "Firms that are able to develop the innovative co - creation and collaborative support outcomes may be able to spread development and support costs across their customer communities" (Trainor, 2012).

This may lower down the support costs and allow personnel to provide more time to profitable customers instead of unprofitable one, thus positively influences customer centric profit performance.

H8: Co-created customer experiences mediate the influence of social CRM capabilities on the firm's performance.

METHODOLOGY

It covers sample and data collection along with measures used in this study.

Sample and Data Collection

In this study, survey method was used for collecting data. The final data was acquired by managers through a random sample of top firms selected from the Forbs India 500 list. The respondents were from both the consumer and business markets. The respondents that were assured that, only aggregate results would be disclosed and their individual responses would keep confidential. The overall responses were obtained over a three week time frame and out of the firms approached, only 203 respondents given complete data. The responses on an average crossed five (s = 5. 63). Respondents were also asked about their acquaintance of their business operations and from how long they are into this business, in order to appraise their appropriateness to give responses. Subsequently, under experienced (experience < 1 year) respondents in the company were deemed to be invalid. In order to maintain greater accuracy in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the results, the respondents who were given invalid and incomplete responses were eliminated from the survey. In total, 132 responses were considered useful, with 26% response rate.

In this study, the key informants consist of managers of these companies due to the below mentioned reasons: Previous studies on the linkage of social media with firm performance and capability have also taken managers into consideration for giving information (Li & Calantone, 1998). Furthermore, some researchers recommended to make use of the various informers (Barnes, 1984). However, another study has reinforced that managers offer reliable and effective data (Li & Calantone, 1998) as they have control over the functions of their company and they had thorough information concerning the functions of the firm, the market and their competitors.

The non-response bias was analyzed by considering mean scores of initial and late respondents on the resource items. At the .05 levels in t-test, no significant differences were realized and all these lead to the confidence that non-response bias was not a matter of dispute in this research.

Measures

A multi item scale was employed to measure the theoretical constructs of the recommended model. The measures taken and their items are explained in detail below.

Sales/Marketing centric technology was measured by considering Ahearne and Rapp (2010) study. The customer-centric technology was operationalized using six items ($\alpha = .92$) from the Jayachandran et al. (2005) scale. This scale confine to the degree to which firm's customers are a center point of estimation.

Relational information processing capability was measured using an adapted scale from Jayachandran et al. (2005), which represents an organization system for information Reciprocity, capture, integration, access and use. The aforementioned five underlying factors were evaluated by multi-item scales. Four items were considered to evaluate information reciprocity

($\alpha = .91$), five items were taken to assess information capture ($\alpha = .90$), four items were used to evaluate information integration ($\alpha = .92$), four items were considered to evaluate information access ($\alpha = .91$) and seven items were used to evaluate information use ($\alpha = .95$). These five sub dimensions were then clubbed under individual scale scores and were taken as a single indicator for relational information processing capability construct, which represented an adequate reliability ($\alpha = .92$).

We used Vorhies and Morgan (2005) scale to measure market sensing capability. The respondents have to answer that how well their own firm performed market sensing activities relative to their competitors. A seven point Likert type and relative to the competitor anchors scale was used. Five items were used to assess market sensing capability

($\alpha = .87$).

The specific measures for customer linking capability used scale items adapted from Hooley et al. (2005) and were designed to capture how well a firm takes on customer linking activities in relation to its closest competitors. Five items were considered to evaluate customer linking capability ($\alpha = .83$). At five-point Likert type scale anchored at (1 = "strong competitors' advantage" and 5 = "our strong advantage") each item on a scale was measured.

We operationalized social service and support capability of adapting scaling from Sarason, Sarason, Shearin and Pierce (1987). The respondents were requested rate their firm on social service performance as compared to their competitors. Six items were considered to evaluate social service and support capability ($\alpha = .94$). Each item on a scale was measured using five-point Likert type that was anchored relative to competitor.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The particular measures for social innovation capability used scale items adapted from Bulut, Eren and Halac (2013). Eight items were considered to evaluate social innovation capability ($\alpha = .86$). A seven point Likert scale labeled at (1 = "strongly disagree" and 5 = "Strongly agree") was used.

Social selling capability was operationalized using an adapted scale from Rowley (2014). We used five items, namely "users' social presence", "social selling view", "quality and size of network", "source of deal to CRM" and "content sharing". Klout scores measure users' social presence. Social selling view is based on four things; engage with insights, professional brand development, find the right people and building strong relationships. The reliability was adequate for all five items ($\alpha = .82$). A five point Likert type scale was used to measure at what degree the respondents agree or disagree with the statements given in the questionnaire.

Co-created customer experiences were measured using an adapted scale from Prahalad and Ramaswamy (2004). It is considered as higher-order construct consisting of innovation co-creation and collaborative support.

Customer based relational performance (CBRP) and Customer based profit performance (CBPP) was measured by adopting a scale developed by, Ramani and Kumar (2008). We measured both of these constructs using three items for each with CBRP ($\alpha = .88$) and CBPP ($\alpha = .92$). CBRP measured the extent of customer ownership, satisfaction and their word of mouth in a firm. CBPP represented the efficiency of a firm in forecasting customer-based profitability, balancing acquiring and maintenance profitably, and converting loss-making customers into profit delivering ones. On a five point Likert scale, respondent's agreement or disagreement was asked.

We adapted Cooper and Kleinschmidt (1995) scale to measure new product performance. Four items were used ($\alpha = .86$) and these were measured on a seven point Likert type scale ranging (1= "very weak" and 7 = "very strong").

RESULTS

In this study, data analyzed at different levels; firstly, confirmatory factor analysis (CFA) with AMOS 20.0. Were applied to the measurement model. All items of eleven constructs loaded in the measurement model significantly. The measurement model generated a model fit with $x^2 = 218.5$, $p < 0.001$and acceptable values of CFI = .96, GFI = .92 and RMSEA = .05 Thereafter, structural model was developed, then mediation test was conducted and lastly, developed hypotheses were checked through structural model. In this study, to test the proposed hypothesis, we considered a two-step method of Anderson and Gerbing (1988). The resulting values of hypothesis testing are presented in table 1 and 2. As depicted from these tables sales or marketing and customer centric technologies, has both a positive as well as substantial impact on relational information processing, market sensing and customer linking capabilities, which support H1, H2, H3 and H4. Similarly, customer centric technologies have a positive as well as substantial impact on social service and support, social innovation capabilities, and for social selling capabilities it has insignificant impact. Therefore, it fully supports H5 and H7 and partially to H6 also.

Baron and Kenny (1986) analysis was applied for finding out the mediating impact of co-created customer experiences between social CRM capabilities and firm performance outcomes. For this, a chronological sequence of SEM models (with and without mediator) was generated that are depicted in

Table 1 and 2. The results in table 1 show that Social CRM capabilities have a positive impact on firm performance outcomes.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Results of structural equation model without mediator

	SMT	CT	RC	MSC	CLC	SSC	SC	SIC	CRP	CPP	NPP
SMT			.220 (3.17)**	.138 (2.08)*	-.008(-.135) NS	___	___	___	___	___	___
CT			.560 8.51)***	.590 (9.19)***	.686 (10.15)***	.681(12.6)***	.559 (9.42) NS	.256 (3.46)***	___	___	___
RC									___	___	___
MSC									___	___	___
CLC									___	___	___
SSC									.032 (.37) NS	.071(.91) NS	.107 (1.32) NS
SC									.172 (1.97)*	.270 (3.39)***	.278 (3.39)***
SIC									.402 (6.06)***	.426 (7.06)***	.191(3.06)**
CRP									___	___	___
CPP									___	___	___
NPP									___	___	___

Model fit

Model: $\chi 2$ (51.9), CMIN/DF = 1.854, p <. 00; GFI = .954, NFI = .956, RFI = .913, IFI = .979, TLI = .958, CFI = .979; RMSEA = .06.

*Statistically significant $\alpha = .05$, **statistically significant $\alpha = .01$, ***statistically significant $\alpha = .001$, NS = Non-Significant.

SMT = sales/marketing technology, CT = Customer centric technology, RC = Relational information processing capabilities, MSC = Market sensing capabilities, CLC = Customer linking capabilities, SSC = Social service & support capability, SC = Social selling capabilities, SIC = Social innovation capabilities, CRP = Customer based relational performance, CPP = Customer based profit performance, NPP = New product performance.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Results of structural equation model with a mediator

	SMT	CT	RC	MSC	CLC	SSC	SC	SIC	CCE	CRP	CPP	NPP
SMT	___	___	.205 (2.96)**	.113 (1.70)**	.010 (.167)**	___	___	___	___	___	___	___
CT	___	___	.569 (8.65)***	.606 (9.40)***	.674 (9.96)***	.681 (12.5)***	.696 (1.5) NS	.256 (3.44)***	___	___	___	___
RC									___	___	___	___
MSC									___	___	___	___
CLC									___	___	___	___
SSC									.089 (1.47)**	___	___	___
SC									.192 (3.02)**	___	___	___
SIC									.454 (8.62)***	___	___	___
CCE										.633 (9.96)***	.877 (7.08)***	.677 (5.11)***
CRP										___	___	___
CPP										___	___	___
NPP										___	___	___

Model Fit

Model: $\chi 2$ (55.8), CMIN/DF=1.550, p<.00; GFI=.955, NFI=.957, RFI=.922, IFI=.984, TLI=.971, CFI=.984; RMSEA=.05.

*Statistically significant α =.05, **Statistically significant α =.01, ***Statistically significant α =.001, CCE= co-created customer experiences.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

On customer based relation performance the impact of social service and support capability was found insignificant, whereas social selling capability ($\beta = .172$, $p < .05$) and social innovation capability ($\beta = .402$, $p < .001$) was significant. Similarly, on customer based profit performance the impact of social service and support capability were founded insignificant.

Whereas social selling capability ($\beta = .270$, $p < .001$) and social innovation capability ($\beta = .426$, $p < .001$) was significant. For new product performance also the impact of social service and support capability was found insignificant, whereas social selling capability ($\beta = .278$, $p < .001$) and social innovation capability ($\beta = .191$, $p < .001$) was also found significant.

Whereas in table 2 when co-created customer experiences is added into the model, it depicts that all three social CRM capabilities has a positive and substantial influence on co-created customer experiences and which in turn have a significant impact on all three firms performance outcomes. Therefore, the linkage from social CRM capabilities to firm performance outcomes is indirect and mediated by co-created customer experiences, which fully support H7 and H8.

DISCUSSION AND IMPLICATIONS

This paper contributes to the body of CRM and social media literature. This study contributes to the dearth of empirical studies on social CRM. It is the first study to investigate the mediating role of co-created customer experiences between social CRM capabilities and firm performance. Our study is in conformation with previous studies (Raman et al., 2006; Vorhies et al., 2011) stating the role of various customer focused new technologies implementation and thereby renovating the role of CRM from a technological capability to advantage generating capability. Our study is in conformance with a recent study by Trainor et al. (2014) that social CRM capability affect customer relationship performance, also this study has adopted a holistic approach by investigating the impact of social CRM capability on customer based relational performance, customer based profit performance and new product performance.

The theoretical operationalization and evaluation of social CRM capabilities provide evidence for the argument that as a resource, social media technology positively affects firm performance. This finding is in conformance with the previous IT literature which argued that technology itself, not able to create competitive advantage. Similarly, social media technology only facilitates the capabilities, which in turn enable firms to perform effectively.

Although the existing marketing literature has highlighted the significance of information processes (Moorman, 1995) information processes pertinent to CRM have not obtained adequate consideration (Jayachandran et al., 2005). This article contributes to conceptualize and provide the measurement of relational information processes with the demonstration of its antecedents. We also developed a measure for Sales/marketing and customer centric technology resources and showed that Sales/marketing centric technology resources significantly influence the four dimensions (information integration, capture, access and usage) of the relational information processing capability. Similarly, customer centric technology resources also significantly affect the two dimensions (information capture and reciprocity) of the relational information processing capability. Overall, the findings of this study support the argument that relational information processes give guidelines to assist firms interact with customers and manage customer information in line with the demands of CRM. These processes are essential to improve customer relationship performance whereas CRM technologies carry out a supportive role. Reinartz, Krafft and Hoyer (2004), consider that CRM technology use may have a negative impact on performance

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

outcomes, and this study entails the same that this may occur if suitable relational information processes are not put into practice.

The findings also depict that there is the positive influence of sales/marketing and customer centric technology resources on customer linking and market sensing capabilities. Similar to recent research, the findings of this study are consistent with the conception that the superior market knowledge resulting from strong market-sensing capabilities is significantly valuable while determining firm performance. (Hult, Ketchen, & Slater, 2005; Morgan, Slotegraaf, & Vorhies, 2009). Whereas, customer centric technology found to have a positive influence on social CRM capabilities. This finding is conformance to Trainor et al. (2014) and support the notion that information collected from close communication and customer's collaboration may facilitate an advantage to better understand the needs of customer and provide appropriate responses towards these needs. A blend of customer-centric technology, business resources and relationship-focused strategy may relate directly to the marketing capability of maintaining strong customer relationships.

Another crucial contribution of this research is the assessment of the mediating role of co-created customer experiences on social CRM capabilities and firm performance outcomes. The results show that co-created customer experiences fully mediates between social CRM capabilities (social service and support, social selling and social innovation capabilities) and firm performance outcomes (customer based relational and customer based profit performance). The results are in line with previous studies (Prahalad & Ramaswamy, 2004; Trainor, 2012; Trainor et al., 2014). This study will act as a source and initiation point for future researchers and managers to find out how social CRM technologies can be utilize strategically to enhance firm performance.

This study offers important implications for managers. Managers should pay proper attention on their customers as well as their competitors, and should explore that what is the current and future relevance and importance of social media technologies in their industry. This study presents an evidence that investing in social media technologies can facilitate firm with an extensive CRM benefits. Hence companies not focusing in social media technologies are definitely missing an opportunity to enhance their firm's performance. The findings also suggest that social media technologies itself do not affect these performance outcomes concerned with customers directly. Instead, the usage of these technologies enables firms to develop capabilities that allow them to serve their customers better. Hence managers should not take it for granted that investing in social media technology alone is going to enhance firm performance.

The findings also suggests that mangers should not only utilize these social media technologies in developing firm level social CRM capabilities but also these technologies can be utilized as a source of valuable information for competitive intelligence and in turn better customer relationships and profit generation. The managers should take proper care in the integration of social media technologies into the existing CRM system to produce synergistic effect and enhance firm level capability. It is because the VRIO frame work (Barney, 1991) of resource based view the letter 'O' suggest organized for usage, hence the mangers should scan the internal and external capabilities of the firm with regard to integration of social media technologies so that the organization can make the best out of the Social CRM capability. Various companies implement CRM systems with social media presence but are not organized for its proper usage, hence the purpose of competency/capability development is defeated. Managers should develop social CRM capabilities, which complement the organization's objectives.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study does have limitations like other studies of this type, many of these offer exciting opportunities for further research. The sample used for the study was diverse. Therefore, across the industry this study results may be true, but it may not the same to specific industries that may not view much potential for social media use. In context of it, the differences were realized between B2B and B2C firms, specifically with regard to social CRM capabilities. Thus, it can treat as an interesting avenue for further research that it may explore the applicability of this research results to different industries, settings and contexts. Similarly, this article did not take into account the other contingent factors like position of a firm in industry, competitive environment. It is possible this article is considered an effect, which is applicable to firms who involves in taking initiatives in respect of their customer orientation strategy. The outcomes of this research can be less applicable to the firms, which are at the initial stage to adopt social media initiatives.

In addition, this study considered the self-reported technology, but in reality, this may be different from the actual technology use (Ahearne, Jones, Rapp, & Mathieu, 2008). The respondent reported that they used a specific social media technology, but the real or actual use of technology can be minimized. Therefore, future studies can focus on the actual usage of social media activities so to present a complete picture of the usage of technology across the firm. Another approach for measurement can be the usage of perceptual measure, which not only confined to technology usage, but also captures the usage intensity and the extent to which these technologies are used in the form (Wu, Mahajan, & Balasubramanian, 2003). Therefore, as a future research a more robust measure can be use for technology usage that can present a complete view of how social media technology linked to the different capabilities of firm and performance outcomes.

CONCLUSION

In the present era of social media and Web 2.0 various emerging social technologies, which facilitates building, maintaining and enhancing customer relationships, it has become quite crucial for firms to rethink the CRM perspective and to develop new capabilities that can assist in customer value co-creation. This research broadens an existing perspective of CRM by integrating social media technologies, which in turn facilitates increased firm performance. This study attempts to expand the perspective that how CRM have an impact on firm performance in the era of social customer. This research empirically examines the impact of social CRM capability on customer based relational performance, customer based profit performance and new product performance. The findings of this study depict a significant impact of social CRM capabilities on performance outcomes where co-created customer experiences contributed as a fully mediator.

REFERENCES

Ahearne, M., Jones, E., Rapp, A., & Mathieu, J. (2008). High touch through high tech: The impact of salesperson technology usage on sales performance via mediating mechanism. *Management Science*, *54*(4), 671–685. doi:10.1287/mnsc.1070.0783

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ahearne, M., & Rapp, A. (2010). The role of technology at the interface between salespeople and consumers. *Journal of Personal Selling & Sales Management*, *30*(2), 111–120. doi:10.2753/PSS0885-3134300202

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120. doi:10.1177/014920639101700108

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. doi:10.1037/0022-3514.51.6.1173 PMID:3806354

Boulding, W., Staelin, R., Ehret, M., & Johnston, W. J. (2005). A customer relationship management roadmap: What is known, potential pitfalls, and where to go? *Journal of Marketing*, *69*(4), 155–166. doi:10.1509/jmkg.2005.69.4.155

Bulut, C., Eren, H., & Halac, D. S. (2013). Social innovation and psychometric analysis. *Procedia: Social and Behavioral Sciences*, *82*(1), 122–130. doi:10.1016/j.sbspro.2013.06.235

Cooper, R. G., & Kleinschmidt, E. J. (1995). Benchmarking the firm's critical success factors in new product development. *Journal of Product Innovation Management*, *12*(5), 374–391. doi:10.1016/0737-6782(95)00059-3

Day, G. S. (1994). The capabilities of market-driven organizations. *Journal of Marketing*, *58*(4), 37–52. doi:10.2307/1251915

Ernst, H., Hoyer, W. D., Krafft, M., & Krieger, K. (2011). Customer relationship management and company performance: The mediating role of new product performance. *Journal of the Academy of Marketing Science*, *39*(2), 290–306. doi:10.100711747-010-0194-5

Greenberg, P. (2010). The impact of CRM 2.0 on customer insight. *Journal of Business and Industrial Marketing*, *25*(6), 410–419. doi:10.1108/08858621011066008

Hooley, G. J., Greenley, G. E., Cadogan, J. W., & Fahy, J. (2005). The performance impact of marketing resources. *Journal of Business Research*, *58*(1), 18–27. doi:10.1016/S0148-2963(03)00109-7

Hult, G. T. M., Ketchen, D. J., & Slater, S. F. (2005). Market orientation and performance: An integration of disparate approaches. *Strategic Management Journal*, *26*(12), 1173–1181. doi:10.1002mj.494

Jayachandran, S., Sharma, S., Kaufman, P., & Raman, P. (2005). The role of relational information processes and technology use in customer relationship management. *Journal of Marketing*, *69*(4), 177–192. doi:10.1509/jmkg.2005.69.4.177

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, *53*(1), 59–68. doi:10.1016/j.bushor.2009.09.003

Kingstone, S. (2010). *Social media is changing the face of customer service*. Retrieved January 29, 2015, fromhttp://ww w.yankeegroup.com/ResearchDocument.do?id=53990

Kozinets, R. V., De Valck, K., Wojnicki, A. C., & Wilner, S. J. (2010). Networked narratives: Understanding word-of-mouth marketing in online communities. *Journal of Marketing*, *74*(2), 71–89. doi:10.1509/jmkg.74.2.71

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2010). *Social media and mobile internet use among teens and young adults.* Retrieved from www.pewinternet.org/Reports/2010/Social-Media-and-Young-Adults.aspx

Li, T., & Calantone, R. J. (1998). The impact of market knowledge competence on new product advantage: Conceptualization and empirical examination. *Journal of Marketing*, *62*(4), 13–29. doi:10.2307/1252284

Mintel Group. (2011). *Social Networking-US-August 2011.* London. Retrieved from http://reports.mintel.com/display/543389/

Moorman, C. (1995). Organizational market information processes: Cultural antecedents and new product outcomes. *JMR, Journal of Marketing Research*, *32*(3), 318–335. doi:10.2307/3151984

Morgan, N. A., Slotegraaf, R. J., & Vorhies, D. W. (2009). Linking marketing capabilities with profit growth. *International Journal of Research in Marketing*, *26*(4), 284–293. doi:10.1016/j.ijresmar.2009.06.005

Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *Journal of Marketing*, *58*(3), 20–38. doi:10.2307/1252308

Nath, P., Nachiappan, S., & Ramanathan, R. (2010). The impact of marketing capability, operations capability and diversification strategy on performance: A resource-based view. *Industrial Marketing Management*, *39*(2), 317–329. doi:10.1016/j.indmarman.2008.09.001

Prahalad, C. K., & Ramaswamy, V. (2004). Co-creation experiences: The next practice in value creation. *Journal of Interactive Marketing*, *18*(3), 5–14. doi:10.1002/dir.20015

Raman, P., Wittmann, C. M., & Rauseo, N. A. (2006). Leveraging CRM for sales: The role of organizational capabilities in successful CRM implementation. *Journal of Personal Selling & Sales Management*, *26*(1), 39–53. doi:10.2753/PSS0885-3134260104

Ramani, G., & Kumar, V. (2008). Interaction orientation and firm performance. *Journal of Marketing*, *72*(1), 27–45. doi:10.1509/jmkg.72.1.27

Rapp, A., Trainor, K. J., & Agnihotri, R. (2010). Performance implications of customer-linking capabilities: Examining the complementary role of customer orientation and CRM technology. *Journal of Business Research*, *63*(11), 1229–1236. doi:10.1016/j.jbusres.2009.11.002

Reinartz, W., Krafft, M., & Hoyer, W. D. (2004). The customer relationship management process: Its measurement and impact on performance. *JMR, Journal of Marketing Research*, *41*(3), 293–305. doi:10.1509/jmkr.41.3.293.35991

Rowley, J. (2014, October 2). *Social Selling Pillar #5: Measure Meaningful Metrics*. Retrieved from http://blog.hubspot.com/sales/social-selling-pillar-5-measure-meaningful-metrics

Sarason, I. G., Sarason, B. R., Shearin, E. N., & Pierce, G. R. (1987). A brief measure of social support: Practical and theoretical implications. *Journal of Social and Personal Relationships*, *4*(4), 497–510. doi:10.1177/0265407587044007

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sawhney, M., Verona, G., & Prandelli, E. (2005). Collaborating to create: The Internet as a platform for customer engagement in product innovation. *Journal of Interactive Marketing*, *19*(4), 4–17. doi:10.1002/dir.20046

Trainor, K. J. (2012). Relating social media technologies to performance: A capabilities-based perspective. *Journal of Personal Selling & Sales Management*, *32*(3), 317–331. doi:10.2753/PSS0885-3134320303

Trainor, K. J., Andzulis, J. M., Rapp, A., & Agnihotri, R. (2014). Social media technology usage and customer relationship performance: A capabilities-based examination of social CRM. *Journal of Business Research*, *67*(6), 1201–1208. doi:10.1016/j.jbusres.2013.05.002

Trainor, K. J., Rapp, A., Beitelspacher, L. S., & Schillewaert, N. (2011). Integrating information technology and marketing: An examination of the drivers and outcomes of e-marketing capability. *Industrial Marketing Management*, *40*(1), 162–174. doi:10.1016/j.indmarman.2010.05.001

Ustuner, T., & Godes, D. (2006). Better sales networks. *Harvard Business Review*, *84*(7-8), 102–112. PMID:16846193

VanBoskirk, S., Overby, C. S., & McGann, J. J. (2009). *U.S. Interactive marketing forecast, 2009 to 2014*. Retrieved from https://www.forrester.com/US+Interactive+Marketing+Forecast+2009+To+2014/fulltext/-/E-res47730

Von Hippel, E. (1986). Lead users: A source of novel product concepts. *Management Science*, *32*(7), 791–805. doi:10.1287/mnsc.32.7.791

Von Hippel, E., & Katz, R. (2002). Shifting innovation to users via toolkits. *Management Science*, *48*(7), 821–833. doi:10.1287/mnsc.48.7.821.2817

Vorhies, D. W., & Morgan, N. A. (2005). Benchmarking marketing capabilities for sustainable competitive advantage. *Journal of Marketing*, *69*(1), 80–94. doi:10.1509/jmkg.69.1.80.55505

Vorhies, D. W., Orr, L. M., & Bush, V. D. (2011). Improving customer-focused marketing capabilities and firm financial performance via marketing exploration and exploitation. *Journal of the Academy of Marketing Science*, *39*(5), 736–756. doi:10.100711747-010-0228-z

Wu, F., Mahajan, V., & Balasubramanian, S. (2003). An analysis of e-business adoption and its impact on business performance. *Journal of the Academy of Marketing Science*, *31*(4), 425–447. doi:10.1177/0092070303255379

Zablah, A. R., Bellenger, D. N., & Johnston, W. J. (2004). An evaluation of divergent perspectives on customer relationship management: Towards a common understanding of an emerging phenomenon. *Industrial Marketing Management*, *33*(6), 475–489. doi:10.1016/j.indmarman.2004.01.006

This research was previously published in the International Journal of Information Systems in the Service Sector (IJISSS), 8(4); pages 1-16, copyright year 2016 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 51
Policies Information Literacy, Equality, and Gender: The Case of Spanish Prisons

María Antonia Agúndez-Soriano
Colegio Universitario de Estudios Financieros, Spain

Aurora Cuevas-Cerveró
Universidad Complutense de Madrid, Spain

ABSTRACT

The development of information and communication technologies (ICT), especially the internet, means that not all the population has the same opportunities of access and use of these technologies or the training necessary to use them effectively. These technologies are producing socio-economic transformations. They also bring about important changes in the way they work, communicate, behave, and socialize. All these changes constitute a factor of social exclusion and have led to the emergence of the so-called digital divide (BD). This BD has accentuated the social gap and has contributed to the fact that certain population groups, such as female inmates, are considered to be "socially excluded" or "excluded digital," and in the case of these female inmates the gender gap would also be present. The authors presented results of the analysis carried out to know the policies, projects, and programs that are being carried out both in Europe and in Spain in the field of informational and digital literacy for social and labor inclusion, as well as equality and gender policies.

INTRODUCTION

The implementation of Information and Communication Technologies (TIC) requires citizens to acquire the necessary skills and abilities to ensure the proper use of TIC, training them to manage the large amount of available information and thus being able to solve their information problems on a daily and work basis throughout their life.

DOI: 10.4018/978-1-7998-7297-9.ch051

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

These technological changes bring a risk that can cause and increase the digital social exclusion of some groups or population groups. One of these population groups are women prisoners, these inmates are in clear risk of social and labor exclusion. As a woman and as a prisoner, we must add that most of these women are very poorly qualified, with a low self-esteem profile, school failure, most of them dependent on the male figure, with family, social, psychological problems and lack of freedom. All this causes them to have fewer opportunities of accessing the labor market, being doomed to unemployment or low-paid jobs, all of which makes it difficult to achieve their social and labor integration once they have obtained their freedom.

In prisons where women prisoners are deprived of their liberty, contact with the outside world is usually very limited or completely non-existent. Since they spend several years of their lives in these centers, they should be prepared to live in the information society that awaits them outside once they obtain their freedom. The knowledge about informational competences that they may already have is acquired before entering prison, so that in a brief time these will become obsolete. Therefore, their social and digital exclusion will be greater, the greater their sentence, becoming part of the group called "none -liners" "(Buchmueller et al, 2011).

Therefore, information literacy is presented as a great challenge to solve this situation of inequality for these women prisoners with their subsequent inclusion in society and the acquisition of the necessary knowledge and skills to become informationally literate. The objectives pursued by this research are:

- Determine and know the policies, projects and programs that are being carried out both in Europe and in Spain in the field of information and digital literacy for social and labor inclusion, as well as equality and gender policies.
- Diagnose if these policies are being carried out in the prisons of Spanish women.

The methodology used is a research and analysis methodology to identify existing policies on information literacy at a European level and at a Spanish level and see if they have reached the level of implementation in Spanish female prisons.

BACKGROUND

Information Literacy for Social Inclusion

The European Union (2006) links information literacy with lifelong learning, in its "Action Program in the field of lifelong learning", where it points out that new technologies are an instrument that can lead to social inclusion and that, therefore, people who do not use them for different reasons are excluded from a society of information that is increasingly digitized. Marzal (2007), states that information literacy is closely linked to other contexts such as economic, cultural and social, for this author a person informationally literate should be able to know what information is relevant to evaluate, select and communicate for this way to be able to participate actively within society. Another author Abid (2012), adds a new denomination of information literacy, calls it "information culture", this information culture is the sum of informational, digital and graphic literacy as well as reading and writing, it is a culture of collective exchange and enrichment. Authors such as (Bernhard, 2002, Gómez Hernández, 2002, Ponjuán, 2002) refer to the culture of information in an educational sense. Agúndez (2016: 60) defines information

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

literacy in the following way: "Information literacy comprises a set of competencies that lead to an adequate, reflective, critical and responsible use of information and that contribute to the social inclusion of citizens. For his part, Cuevas (2007) believes that this concept is linked to the historical, economic, cultural and social context, and points out that a person will be informationally literate when he or she is able to decode the relevant information and codify a new message to communicate.

The policies developed in relation to information and digital literacy for social and labor inclusion, as well as equality and gender policies, have generated different programs, projects and plans that aim at literacy in digital skills for the most disadvantaged groups, promoting equality between women and men in terms of training and employment and promoting the social and labor inclusion of population groups at risk of exclusion.

However, it has been possible to see how these policies, more than the acquisition of information skills and abilities that contribute to the digital and informational inclusion of female inmates, are aimed at increasing the connectivity to the internet.

Rights Derived From Tic: A New Human Right

The digital and social exclusion generated by information and communication technologies encourages the creation of a new human right that ensures equality among all citizens. In this sense, information literacy has been supported by different statements that recognize this type of literacy and lifelong learning, and point to it as an essential element for social, cultural and economic development. In addition, it is of mutual agreement that information literacy can end inequality between certain groups and countries by reducing the digital gap between them. The Prague Declaration (2003) states that information literacy encompasses knowledge of one's own information problems and needs, as well as the ability to identify, locate, evaluate, organize and effectively create, use and communicate information to address the issues or problems that arise; it constitutes a prerequisite for effective participation in the Information Society, and is part of the basic human right to lifelong learning. Similarly, the Declaration of Alexandria (2005) considers that information literacy is at the heart of lifelong learning and constitutes a basic human right in the digital world, as well as promotes the social inclusion of all nations. In the same line the Declaration of Fez (2011) highlights the importance of information literacy for social, economic and cultural development. They consider that it is the key for all citizens to participate actively in society.

Information Policies

The information policies initially arose in the face of the transformation of society with the arrival of new technologies. The objective of these policies was and still is to include all citizens in the information society, but this initial objective is still far from being fulfilled, especially in groups such as women prisoners. That is why we will have to continue formulating policies and plans that also include this group and that are truly effective. The definitions on information policies have been numerous, among them Almada de Ascencio, which understands these policies as "the study of guidelines that govern the actions of different sectors or groups of society in the information transfer, its availability, access and recovery as a means of communicating information between creators and users of information ". In the case of Michael W. Hill (1995:279) he describes this concept saying that: Information policies are designed to meet the needs and regulate the activities of individuals, industry and commerce, of all types of institutions and organizations and of national, local, or supranational governments. They must

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

regulate the ability and freedom to acquire, own and store their own information, use it and transmit it. Rowlands (1996) considers that the methodological processes in information policy studies are diverse and speaks of five methodological research instruments that are: Classification, identification of policy issues, reduction of complexity, prospection and reduction of scenarios and oriented research to the case study processes. Years later, this same author groups information policies into five groups: 1. Protection of government information. 2. Information market. 3. Broadcasting and telecommunication. 4. Access to public official information. 5. Information society and information infrastructure. For Cornellá (1997: 39), the information policies "could be framed in three areas: a) informational legislation, b) actions to promote and stimulate the use of information by public agents and c) improvement of the management of information resources in Public Administrations ".

In Europe, regarding these policies, different action plans have been drawn up in recent years that bear some relation to social digital exclusion, since they have literacy goals in digital skills of the most disadvantaged groups, although there are It should be noted that none of these plans have been designed exclusively for the collective of women prisoners. Important references about the information policies have been:

- **The Delors White Paper (1993):** "Growth, competitiveness and employment in Europe: challenges and clues to enter the XXI century" which proposed the strengthening of education and training throughout life.
- **The Bagemann Report:** "Europe and the Global Information Society", commissioned by the European Council, in which a strategic move was made for teleworking and the creation of companies of remote professional training services.
- **The Action Plan of the Commission of the European Communities:** "Europe in progress towards the information society", which presents guidelines for incorporating Europe into the information society. These references were points of reference for European information policies.

Since then, different plans and programs have been developed that seek to promote training in digital and information skills so that the entire population can be an active part of society. In the case of Europe, the Digital Agenda for Europe and the Europe 2020 Strategy must be cited as undisputed references.

Digital Agenda for Europe

The European Union has set out to achieve a series of challenges for the development of ICT, which are reflected in the European Digital Agenda, these challenges should be completed by the year 2020. On March 25th, 2010, a resolution draft was presented by the Committee on Industry, Research and Energy to the European Parliament for the creation of a new digital agenda for Europe, which was called Agenda 2015. The objectives of this resolution draft focus on literacy and digital skills and the access to digital technologies by the most disadvantaged social groups as a means of social inclusion and the fight against poverty and inequality. To this end, the entire population must be trained in these skills, contributing to the disappearance of differences between different social groups in terms of digital literacy and Internet use.

With the intention of meeting these objectives, the European Commission proposes a digital literacy and inclusion action plan on level with the EU and the Member States. This action plan includes training in digital literacy for the unemployed and groups at risk of exclusion, increasing accessibility to digital public services, ensuring that equality between women and men in the Information Society is a fact, and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

contributing to the participation in digital inclusion activities by the civil society. Similarly, among the objectives of the European Digital Agenda 2020, the promotion of digital literacy, training and inclusion is also present. To this end, the Commission proposes that member countries prioritize skills and digital culture within the framework of the European Social Fund by promoting ICT training courses and providing equal access to the digital common space. Other objectives of the Europe 2020 Strategy are:

- Achieve a minimum employment rate of 75% of people from 20 to 64 years.
- Reduce by at least 20 million, the number of people living below the poverty line or at risk of social exclusion, ensuring that the skills required to continue training and the labor market are recognized throughout general education, professional, superior and adult, including non-formal and informal learning and developing collaborations between the educational / training world and the labor world, especially through the involvement of the social partners in the planning of education and the delivery of training.

We understand that these objectives could refer to the inmate population (although no specific mention is made) because it is a disadvantaged group and supports training in digital skills to achieve social and occupational integration.

Following this same line marked by Europe, in Spain there are also policies that establish ICT learning as a way to reduce the social, digital and labor exclusion suffered by some disadvantaged population groups, for which a series of projects and programs have been developed in relation to digital literacy and social and labor inclusion.

All these policies are aimed at literacy training in digital skills of the most disadvantaged groups, including women prisoners. Another objective is to promote equality between women and men in terms of training and employment. Its goal is to promote the social and labor inclusion of these population groups.

National Plan of Action for Social Inclusion (Pnain)

This Plan has among its objectives to promote the social inclusion of the most disadvantaged groups as well as to promote equality and non-discrimination, having the same opportunities in access to education, training and employment. In the elaboration of this Plan, different public bodies have intervened, such as the Ministry of Health and the Secretary of State for Social Services and Equality and have had the participation of the General State Administration through the ministries involved, as well as the State Council of ONG of Social Action and the Economic and Social Council (CES). The PNAIN follows the recommendations of the Council of the European Union for Spain regarding the National Reform Program, specifically addressing recommendation 6 on the need to adopt and apply measures to reduce the number of people at risk of poverty or social exclusion, as well as measures that reinforce policies aimed at increasing the employment of those who do not have access to the labor market. The plan is organized through a series of strategic objectives and specific actions to achieve its final objective, which is the social inclusion of the most disadvantaged groups and equal opportunities in education, training and employment. This plan devotes a section to the prison population in its actions 237 to 240, establishing in actions 238 and 240 respectively, that it is necessary to seek resources to promote the participation of the prison population in training, cultural and labor programs, among others, through the Participation of the Third Social Action Sector (non-profit associations) to achieve this group's social and labor

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

insertion. At the same time, it is intended to guide and educate prison staff and women prisoners on issues of gender violence to alleviate the consequences of this problem.

Throughout this document, the need to achieve social inclusion of the most vulnerable groups and achieve equality is emphasized. As for the prison population, they see, like us, the need to participate in training and work programs to achieve social and labor reintegration.

Inclusion Strategy of the Community of Madrid 2016-2021

The Office of Social Policies and Family of the Community of Madrid has the mission of favoring the integration and social inclusion of people who are in an inferior situation. For this purpose, it has developed a social inclusion strategy. This strategy is based on the principles of active inclusion, such as a sufficient income, employment opportunities and quality social services. It includes four groups of objectives. The first group refers to the development of inclusive policies in employment, education, health or housing; the second group is aimed at strengthening social services and supporting those population groups in situations of exclusion; the third focuses on organizational improvements to improve efficiency; and the last group is dedicated to active participation. Among these social policies are those aimed at the elderly or people with disabilities, to alleviate situations of dependency, to prevent and address situations of abuse and promote gender equality, to guarantee a minimum income in those households that lack resources and work for the inclusion of people who for various reasons cannot be integrated into society, whether for ethnic reasons, sexual orientation or gender or other circumstances that may jeopardize this inclusion.

Digital Agenda for Spain: Inclusion and Digital Literacy

This digital agenda for Spain currently in force has among its objectives to promote inclusion and digital literacy so that all people have access to ICT. In 2013, and following the steps set by Europe, a Digital Inclusion and Employability Plan was drawn up with the aim of improving the digital skills of those most disadvantaged groups of the population, regardless of their age, economic situation or place of residence who cannot or do not know how to use TIC. In this way they can incorporate them into their daily lives and cover their needs both personally and professionally. The way to achieve this goal is to encourage and promote digital literacy programs, advance in terms of equality between men and women and encourage the participation of these groups in digital inclusion activities to reduce their risk of social and digital exclusion. This plan is structured around four axes, among which is providing the most disadvantaged groups access to the Internet and ICT tools to reduce the risk of exclusion; provide the population with the basic digital skills needed to use ICT with emphasis on the older and less qualified population; reduce inequality between men and women regarding the use and access to ICT; allocate resources to acquire digital competences and reorient professional training related to ICT to be able to train future professionals. Each year a review of the plan is made to evaluate the results and determine if it is necessary or not to make any changes or evaluate a possible adaptation of objectives and measures and, if applicable, extend the time scope to meet the objectives already marked in the Digital Agenda for Europe or any new additional objectives that may arise.

It must be said that, although one of the objectives of this plan is to ensure that the most disadvantaged groups have access to the Internet and learn how to use TIC, we find that inmates do not have access to TIC and they do not have an Internet connection in prisons for security reasons.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Even so, we consider that these four axes in which this digital agenda is structured, are necessary to digitally and informationally literate the inmates; contribute to gender equity and achieve their social and labor inclusion by facilitating the learning of the necessary information and digital skills to achieve the full participation of these inmates in society.

Plan of Action for the Equality of Women and Men in the Society of Information

In June 2014, the action plan for equality of women and men in the information society was drawn up (2014-2017). The main objective of this plan developed by the Women's Institute, is the digital inclusion of women in equal opportunities than men to participate actively in the information society. To achieve this goal, measures are taken to provide Internet access as well as training programs to train women in ICT. Likewise, these programs should include learning about access to electronic administration and online public services.

This plan is already at a very advanced stage, but so far these measures have not been carried out in women's prisons. During the development of this chapter, it was found that the inmates still do not have an Internet connection and still do not have formative courses in information literacy. Therefore, it is difficult for these women to actively participate in an information society for which they have not been prepared.

Nowadays, information literacy is considered as one of the requirements to participate actively in society and reduce the risk of exclusion of the most vulnerable groups, as is the case of female inmates. The objectives of all these policies coincide in promoting the social and digital inclusion of these groups through courses or training programs and promoting equality between men and women. But the reality that women prisoners live in Spanish prisons about training in information literacy and even regarding equality between prisoners and inmates is quite different.

Solidarity Ciberaulas Project

The Ministry of the Interior and the "la Caixa" Foundation have signed different collaboration agreements in recent years, the last dated on August 23, 2017. The objective of these agreements is to proceed with the development of the CiberCaixa Solidarias Program, also named EspacioCaixa, in different Spanish penitentiary centers carrying out informative training activities for male and female inmates both young and old who are serving sentences in Spanish prisons. These activities are carried out both by professionals and by seniors who are already retired and who have been trained for this purpose. To achieve these objectives, they have planned to develop a "Preparation for freedom" program, instructing the inmates for their life in freedom. Basic computer courses and workshops are held to bring these inmate population groups closer to new technologies to ease their social and labor inclusion. To carry out this project, the "Fundación la Caixa" installs computer rooms in the prisons. The implementation of the program is carried out in different penitentiary centers, in closed regime: Teixeiro, Villabona, Badajoz, Valencia, Zaragoza, Las Palmas, Seville and Palma de Mallorca, and in open regime: the Centers of Social Insertion of Victoria Kent in Madrid, Guillermo Miranda in Murcia, Dulce Chacón in Cáceres, Mercedes Pinto from Santa Cruz de Tenerife, Carmen Avendaño from Vigo, Evaristo Martín Nieto from Málaga, Marcos Ana in Albacete, Alfredo Jorge Suar Wall from Jerez de la Frontera, Concepción Arenal from Ciudad Real and Jesús Hadad Blanco de León. It must be said that this project does not reach all Spanish prisons.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Equality and Gender Policies

Given that the inequality of opportunities between women and men in training and employment issues within women's prisons exists, this research is directly linked to equality policies and to normative references related to this concept. Equality between women and men is a universal legal principle recognized in various international texts on human rights, including the Convention on the Elimination of All Forms of Discrimination against Women, adopted by the General Assembly of the United Nations in December 1979 and ratified by Spain in 1983. For the European Union it is also a fundamental right and it was expressed in the Treaty of Amsterdam. This treaty enters into force on May 1st, 1999 and it can be seen how measures are adopted to fight against all types of discrimination based on sex, race, religion, disability, age or sexual inclination. This Treaty includes the obligation to promote equality of opportunities between men and women in all Union policies.

Equality Policies in Europe

As for the policies of equality in Europe, from the year 2000, the European Union adopts different directives to fight against gender inequality. These directives are: Directive 2000/43 / EC, on the application of equal treatment of persons in order to fight against discrimination; Directive 2000/78 / EC on the application of the principle of equal treatment in employment and occupation; Directive 2002 / 73CE on the application of the principle of equal treatment for men and women with regard to access to employment, training and working conditions and Directive 2006/54 / EC on the application of the principle of equal treatment between men and women in matters of employment and occupation. Years later, in 2010, the European Commission adopted the strategy of the European Commission for the equality of women and men. This strategy consists of five objectives that are: economic independence; equal salary for the same job; equality in decision-making; dignity, integrity and the end of sexist violence; and equality in foreign action. Likewise, this strategy addresses very important issues related to the roles assigned to the sexes and the instruments necessary to achieve gender equality. A year later, the Council of the EU adopted the second European Pact for Gender Equality (2011-2020).

In addition to these policies, there are institutional bodies that fight for equality between women and men. Among them are the UN Women, created by the United Nations General Assembly for Gender Equality and the Empowerment of Women and the European Institute for Gender Equality. In 2006, the European Parliament and the European Council created this Institute with the aim of elaborating measures in favor of gender equality throughout the European Union. In this struggle is also the Committee for the Elimination of Discrimination against Women (CEDAW), consisting of experts on women's issues from different member states of the UN, whose objective is to end discrimination against women.

Equality Policies and Normative References in Spain

The Spanish Constitution in its article 14, promulgates the right to equality and non-discrimination based on sex. In article 9.2 of this same Constitution, it attributes the obligation of the public powers to promote the conditions so that the equality of the individual and the groups in which they are integrated is real and effective. In Spain, in 1983, the Women's Institute was created with the objective of promoting equality between both sexes. The creation of this institute was the starting point of public policies on gender equality in Spain (Gil, 1996). Thanks to this effort, Spanish society and the different institu-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tions are becoming aware of gender discrimination and inequalities between men and women. In 2007, a law comes into force whose main objective is the right to equal treatment and opportunities between women and men. This new law is known as Organic Law 3/2007, of March 22, for Equal Opportunities between women and men (LOIEMH). This law was a great step forward for society in terms of equality. In its article 1.1 it establishes that women and men are equal in human dignity, and equal in rights and duties. The purpose of this Law is to give effect to the right to equal treatment and opportunities between women and men, through the elimination of discrimination against women, whatever their circumstance or condition, in any area of life. and, singularly, in the political, civil, labor, economic, social and cultural spheres. (LOIEMH, art.1.1).

In relation to education for the equality of women and men, article 23 of this same law includes the elimination of obstacles that hinder effective equality between women and men and the promotion of full equality between them. Another point to highlight within the LOIEMH is related to the Information Society. In its article 28.2, it is established that the Government will promote the full incorporation of women in the Information Society through the development of specific programs, which include access and training in information and communication technologies. This article also includes women at risk of exclusion.

We do not know to what extent the application of this article is effective for all Spanish women. What we can affirm, in the light of this investigation is that, in the case of the group of women prisoners, the article is not respected in what refers to their informational training.

From this law on, different plans and programs arise, such as the Program of actions for equality between women and men in the penitentiary (PAIHMAP). This program is carried out with the collaboration of the Ministry of Equality. The objectives of this law are aimed at eradicating the discriminations that could be detected due to gender, as well as knowing the characteristics of women inmates to adequately attend to their needs, reducing their vulnerability to situations of violence. To develop this program, a Mixed-Observatory Technical Commission was created in 2009, made up of 25 members from different fields (Women's Institute, Universities, Associations, Public Prosecution Staff and Prison Professionals) to examine and evaluate the impact of the program. The most important objective of the program consisted of promoting, examining and evaluating the impact of the program, the diversity of its composition guaranteed us the interconnection with the different social realities, which allowed us to have specialized advice on each of the topics that were undertaken and add a wide social network of collaborators. (Yagüe 2012: 2).

This Technical Committee must meet at least once a year, or when its members deem it necessary, and should promote the formation of working groups to deal with issues in a more specific manner and advance the proposals on the actions that the program contains. In 2014, the Government of Spain approved the Equal Opportunities Strategic Plan. Among the areas of action of this plan is political, economic and social participation; Education; and development of actions within the framework of other sectoral policies. There are also institutional equality bodies. Among these organisms is the Ministry of Health, Social Services and Equality. It is up to this Ministry to propose and carry out government policies on cohesion and social inclusion and equality, as well as to fight against all kinds of discrimination and against gender violence.

Other organizations committed to equality policies are the Women's Institute, a body under the Ministry of Health, Social Services and Equality. Its function is to promote the conditions that make possible the social equality between women and men and the participation of women in political, cultural, economic and social life, and the General Directorate of Women. This body depends on the Office of Social Affairs

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of the Community of Madrid and aims to achieve real and effective equality between men and women in the different areas of political, economic and social life of the Community of Madrid.

Prison Context

The prison is considered as a social institution oriented to reeducation and social reinsertion, as reflected in article 25.2 of the Spanish Constitution (CE): "prison sentences and security measures will be oriented towards re-education and social reintegration". On the other hand, Article 44.1 of the EC provides "that public authorities promote and protect access to culture, to which everyone has the right". Therefore, it is a fundamental right of the inmates to be able to access the necessary training for their subsequent reinsertion and it is the prison administration that must guarantee compliance. Likewise, the General Penitentiary Organic Law (LOGP) of September 1979, in its article 1 of the preamble, establishes that the penitentiary institutions regulated in said law have as their primary objective the reeducation and the social reinsertion of those sentenced to custodial penalties and penal measures. In article 59 of the same it is enacted that the prison treatment consists of the set of activities directly directed to the attainment of the reeducation and social reinsertion of the convicts. However, even though inmates have the right to training that facilitates their social reintegration, in reality we find that in Spanish prisons access to the Internet is prohibited due to security reasons. This situation leads to a total isolation of women prisoners in the field of ICT, whose knowledge and use is nowadays necessary both to integrate the labor market and to keep informed of what is happening in society. This situation also prevents women prisoners from developing the knowledge and skills necessary to use ICT. Therefore, it is very important to provide these women with adequate resources so that they can access training with the objective of acquiring the necessary information and digital skills to be an active part of the Society the moment they obtain their freedom.

In relation to the activities that are carried out in Spanish prisons, we observe that there are few experiences of training inmates in informational and digital competencies. We have only found seven focused on digital competences, none of which is oriented towards information competencies. 1) Ómnia prisons, is taught in Barcelona and focuses on notions of digital literacy and the construction of a blog for young inmates. 2) Alfadigital, taught in Barcelona, focuses on audiovisual workshops (radio, video, photography and music). 3) Alfablog Digital, this blog aims to compile all the creative productions made by the inmates of the different prisons in Catalonia. 4) Blog of the prison of Al lama, is given in the jail of Al lama (Pontevedra), collects the experiences lived by the prisoners of the modules of coexistence. In addition, it publishes poems and everything related to the activities that take place in the prison. 5) Cyberaula (promoted by la Caixa), extends throughout Spain and includes programs that cover digital literacy. These last two programs are taught to inmates and inmates. 6) The voice of mako, is a blog written by inmates of the penitentiary center of Albolote (Granada). They also have a digital literacy workshop conducted by social education students from the University of Granada. 7) Predis, takes place in the prison of Alcalá-Meco (Madrid) and covers digital literacy. This last experience is imparted to prisoners and disabled prisoners, which limits the scope of the activity. Of these seven experiences, in the Community of Madrid, only the Cyberaula and Predis programs are taught. Catalan penitentiaries have Internet connection in the classrooms since 2000, although they have filters so that inmates and inmates can not access certain pages. During the classes, it is only controlled that the prisoners and prisoners are connected to specific pages to carry out the activity. In the Community of Madrid, we find only one

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

penitentiary center, in which the program "Aula mentor" is developed. Aula Mentor, is a resource center where inmates have a computer room with Internet connect

CONCLUSION

Throughout these pages, the policies of information and digital literacy, equality policies and gender policies for social inclusion that are being developed both in Europe and in Spain have been projected. Perhaps this is a good time to reflect on whether these policies are being done well or if they could be improved. In the current social context, it seems necessary to raise awareness among the population about women prisoners and their reintegration into society. Equality policies, plans and programs in the penitentiary area advance very slowly. It would be necessary to turn these plans and programs into concrete facts, to move from the legislative to the real. These policies should be more than a mere set of good purposes.

It would be very important to be able to evaluate and analyze the achievements made in the application of these plans, as well as the objectives achieved after carrying out the implementation of these policies. Public administrations should give priority to this population group by investing and getting involved in achieving the social and labor reintegration of these women deprived of their liberty.

Currently, information literacy policies in the penitentiary area could be effective and obtain positive results, adapting the formation of prisons to the demands of the information society and the labor market. We are talking about a specific training in information skills, since most of the jobs currently use ICT and the Internet. Considering that the educational level of the inmates is low, access to work is limited, so the information literacy training programs will serve them to be able to adapt to the current demands of society. A necessary condition for these programs to be delivered is to improve technological resources so that they are up to date and ensure free access to the Internet (currently prohibited for security reasons) in prisons during the development of information and digital skills training for female inmates, taking the security and surveillance measures deemed appropriate. In addition, the policies and action models that are applied in the penitentiary centers continue to be oriented and designed for a male profile. Once she enters prison, a woman suffers a double discrimination, that of being a woman and that of being a recluse since we move in a society that still prioritizes the figure and patriarchal schemes and this is taken to all areas including the police, judicial and even in the penitentiary legislation itself (Piñeiro Zabala, 2010). Both in the penitentiary regulations and in the general organic prison law, there is very little presence of articles dedicated to women prisoners. In relation to this, it must be said that Penitentiary Institutions, through the program of actions for equality between women and men in the penitentiary, has committed to introduce the gender perspective in penitentiary policy, as well as a comprehensive plan to adapt the architectural structures where convicted female inmates serve their sentence. Hopefully this will be effective as soon as possible since it is necessary to build exclusive prisons for women with suitable facilities for them, as well as policies that are really aimed at the social and labor reintegration of this group, with training programs that can help meet this objective.

REFERENCES

Abid, A. (2012). *Hacia una cultura de la información*. Universidad de Toluca.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Agenda Digital para Europa. (n.d.). Retrieved October, 15, 2017 from http://www.europarl.europa.eu/ftu/pdf/es/FTU_5.9.3.pdf

Agúndez, M. A. (2016). *Alfabetización informacional para la inclusión social de las mujeres reclusas de la Comunidad de Madrid: un estudio de caso* (Unpublished doctoral dissertation). Universidad Complutense de Madrid, Madrid, Spain.

Almada, M. (1999). Políticas de información y políticas educativas: un vínculo importante para el desarrollo hemisférico. *Boletín de política informática*, *23*(6), 34.

Bernhard, P. (2002). La formación en el uso de la información: una ventaja en la enseñanza superior. Situación actual. *Anales de Documentación*, *5*, 409-435. Retrieved March, 31, 2018 from http://revistas.um.es/Analesdoc/article/view/2271/2261

Buchmueller, S., Joost, G., Bessing, N., & Stein, S. (2011). Bridging the gender and generation gap by ICT applying a participatory design process. *Personal and Ubiquitous Computing*, *15*(7), 743–758. doi:10.100700779-011-0388-y

Comisión Europea. (n.d.a). *Agenda Digital para Europa: 2015.eu, 2010*. Retrieved October 14, 2017 from http://www.europarl.europa.eu/sides/getDoc.do?pubRef=- //EP//NONSGML+REPORT+A7-2010-0066+0+DOC+PDF+V0//ES

Comisión Europea. (n.d.b). *Europa 2020: la estrategia de la Unión Europea para el crecimiento y la ocupación*. Retrieved October, 14, 2017 from http://eur-lex.europa.eu/legal-content/ES/TXT/?uri=LEGISSUM:em0028

Cornellá, A. (1997). *Políticas de información en España*. Barcelona: ESADE.

Cuevas, A. (2007). *La promoción de la lectura como modelo de alfabetización en información en bibliotecas escolares*. Gijón: Ediciones Trea.

Declaración de Alejandría. (2005). Acerca de la alfabetización informacional y el aprendizaje de por vida. *Faros de la sociedad de la información*. Retrieved October, 14, 2017 from http://www.cobdc.org/grups/alfincat/documents.html

Declaración de Fez. (2011). *Alfabetización informacional y mediática*. Retrieved October, 14, 2017 from http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/news/Fez%20Declaration.pdf

Declaración de Praga. (2003). *Hacía una sociedad alfabetizada en información*. Retrieved October, 18, 2017 from http://www.cobdc.org/grups/alfincat/documents.html

Delors, J. Libro Blanco (1993). *Crecimiento, competitividad, empleo. Retos y pistas para entrar en el siglo XXI*. Comunidad Europea. Retrieved October, 5, 2017 from http://biblioteca.cunef.edu/gestion/catalogo/doc_num.php?explnum_id=449

Directiva 2000/43/CE, de 29 de junio de 2000. Aplicación del Principio de Igualdad de Trato de las Personas independientemente de su origen racial o étnico (DOCE L nº 180, de 19 de julio de 2000). (n.d.). Retrieved October, 18, 2017 from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:180:0022:0026:es:PDF

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Directiva 2000/78/CE de 27 de noviembre de 2000, relativa al establecimiento de un marco general para la igualdad de trato en el empleo y la ocupación étnico (DOCE L nº 303/16, de 2 de diciembre de 2000). (n.d.). Retrieved October, 18, 2017 from https://www.boe.es/buscar/doc.php?id=DOUE-L-2000-82357

Directiva 2002/73CE del Parlamento Europeo y del Consejo Europeo de 23 de septiembre de 2002, relativa a la aplicación del principio de igualdad de trato entre hombres y mujeres en lo que se refiere al acceso al empleo, a la formación y a las condiciones de trabajo étnico (DOCE L nº 269/15, de 5 de octubre de 2002). (n.d.). Retrieved October, 18, 2017 from https://www.boe.es/buscar/doc.php?id=DOUE-L-2002-81758

Directiva 2006/54/CE del Parlamento Europeo y del Consejo Europeo de 5 de julio de 2006, relativa a la aplicación del principio de igualdad de trato entre hombres y mujeres en asuntos de empleo y ocupación, la finalidad de esta Directiva es garantizar la aplicación de dicho principio (DOCE L nº 204/23, de 26 de julio de 2006). (n.d.). Retrieved October, 18, 2017 from https://www.boe.es/buscar/doc.php?id=DOUE-L-2006-81416

España Constitución (BOE núm. 311, de 29 de diciembre de 1978). (n.d.). Retrieved October, 15, 2017 from http://www.boe.es/buscar/act.php?id=BOE-A-1978-31229

España Ley Orgánica 1/1979, de 26 de septiembre, General Penitenciaria. (BOE núm. 239 de, 16 de octubre de 1979). (n.d.). Retrieved October, 15, 2017 from http://www.boe.es/buscar/act.php?id=BOE-A-1979-23708

España Ley Orgánica 3/2007, de 22 de marzo, para la igualdad efectiva de mujeres y hombres. (BOE núm. 71 de, 23 de marzo de 2007). (n.d.). Retrieved October, 5, 2017 from http://www.boe.es/buscar/doc.php?id=BOE-A-2007-6115

España Comunidad de Madrid. Consejería de Políticas Sociales y familia. Estrategia de inclusión social de la Comunidad de Madrid 2016-2021. (n.d.). Retrieved October, 25, 2017 from http://www.madrid.org/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobheadername1=Content-Disposition&blobheadervalue1=filename%3DEstrategia+de+Inclusi%C3%B3n+Social+CM.pdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1352918600937&ssbinary=true

España Ministerio del interior. (2017). *Convenio de colaboración entre la Secretaría General de Instituciones Penitenciarias y la Fundación Bancaria La Caixa para la implementación de «Ciberaulas Solidarias» en centros penitenciarios*. Retrieved October, 5, 2017 from https://www.boe.es/boe/dias/2017/09/20/pdfs/BOE-A-2017-10729.pdf

España Ministerio sanidad, servicios sociales e igualdad. (n.d.). *Plan de Acción para la Igualdad entre mujeres y hombres en la Sociedad de la Información 2014-2017*. Retrieved October, 5, 2017 from http://www.inmujer.gob.es/actualidad/NovedadesNuevas/docs/BorradIIPlanAccionSocInf.pdf

Gil, J.M. (1996). *Las políticas de igualdad en España: avances y retrocesos*. Servicio de Publicaciones de la Universidad de Granada: Instituto Andaluz de la Mujer.

Gómez Hernández, J.A. (2002). La alfabetización informacional como servicio de las bibliotecas. *Referencia*, *7*(1).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hill, M. W. (1995). Information policies: Premonitions and prospects. *Journal of Information Science*, *21*(4), 273–282. doi:10.1177/016555159502100403

Instituto de la Mujer. (n.d.). Retrieved October, 15, 2017 from http://www.inmujer.gob.es/

Instituto Europeo de la Igualdad de género. (n.d.). Retrieved October, 3, 2017 from http://europa.eu/legislation_summaries/employment_and_social_policy/equality_between_men_and_women/c10938_es.htm

Marzal, M. A. (2007). Proyectos y realidades de la alfabetización en información: una perspectiva conceptual y aplicativa desde España. XVII Encuentro de Bibliotecas de Cajas de Compensación Familiar (Cofenalco) Alfabetización informacional: desafíos y posibilidades.

Naciones Unidas Comité para la eliminación de la discriminación de la mujer. (n.d.). Retrieved October, 15, 2017 from http://www.cinu.org.mx/temas/mujer/cedaw.htm

Organización de las Naciones Unidas mujeres. (n.d.). Retrieved October, 3, 2017 from http://www.unwomen.org/es

Parlamento Europeo. (n.d.). Recomendación 2006/962/CE del Parlamento Europeo y del Consejo, de 18 de diciembre de 2006, sobre las competencias clave para el aprendizaje permanente [Diario Oficial L 394 de 30.12.2006]. Retrieved October, 15, 2017 from http://eur-lex.europa.eu/legal-content/ES/TXT/?uri=CELEX%3A52013DC0359>

Piñeiro, I. (2010). Derecho penitenciario y mujeres. *Noticias jurídicas*. Retrieved October, 16, 2017 from http://noticias.juridicas.com/conocimiento/articulos-doctrinales/4608-derecho-penitenciario-y-mujeres-/

Plan Nacional de acción para la inclusión social. (n.d.). Retrieved October, 10, 2017 from https://www.msssi.gob.es/ssi/familiasInfancia/inclusionSocial/docs/PlanNacionalAccionInclusionSocial_2013_2016.pdf

Ponjuán Dante, G. (2002). De la alfabetización a la cultura informacional: Rol del profesional de la información. In *Congreso Internacional de Información Info 2002*. IDICT.

Programa de acciones para la igualdad entre mujeres y hombres en el ámbito penitenciario. (n.d.). Retrieved October, 15, 2017 from http://www.institucionpenitenciaria.es/web/export/sites/default/datos/descargables/publicaciones/Programa_para_la_igualdad_accesible.pdf

Programa de Intervención con Mujeres. (n.d.). Retrieved October, 15, 2017 from http://www.institucionpenitenciaria.es/web/portal/Reeducacion/ProgramasEspecificos/mujeres.html

Rowlands, I. (1996). Understanding information policy: Concepts, framework and research tools. *Journal of Information Science*, *22*(1), 13–25. doi:10.1177/016555159602200102

Rowlands, I. (1998). Some compass bearing for information policy orienteering. *Aslib Proceedings*, *50*(8), 230–237. doi:10.1108/eb051501

Segundo Pacto Europeo por la Igualdad de Género. (2011-2020). Retrieved October, 15, 2017 from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:155:0010:0013:ES:PDF

Unión Europea. (1997). *Tratado de Ámsterdam*. Retrieved October, 15, 2017 from http://www.europarl.europa.eu/topics/treaty/pdf/amst-es.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Unión Europea Decisión Nº 1720/2006/CE del Parlamento Europeo y del Consejo de 15 de noviembre de 2006, por la que se establece un programa de acción en el ámbito del aprendizaje permanente. Diario Oficial de la Unión Europea, 24/11/2006. (n.d.). Retrieved October, 15, 2017 from http://europa.eu/legislation_summaries/education_training_youth/general_framework/c11082_es .htm

Yagüe, C. (2012). Políticas de Género y prisión en España. In Condenadas desigualdad: sistema de indicadores de discriminación penitenciaria. Icaria editorial.

KEY TERMS AND DEFINITIONS

Digital Inclusion: Focuses on those population groups that have many difficulties in accessing new information and communication technologies, facilitating access to ICT for incorporation into society.

Equality Policies: These are specific measures implemented by public institutions in order to help overcome inequality between men and women and ensure equal opportunities.

Female Inmates: Women serving a prison sentence for committing some type of crime. Once obtained the freedom suffers of social/labor exclusion.

Gender Gap: The gender gap is present in work, in the economy, in new technologies, etc. The greater the gap, the greater the differences and inequalities between men and women.

Information Literacy: Is to acquire the necessary skills to know how to search, select, evaluate and communicate information in a responsible and critical way to be able to actively participate in the information society. It contributes to the social inclusion of citizenship and therefore of women prisoners.

Information Literacy Policies: These are policies aimed at ending inequalities among citizens in relation to access and use of new technologies, avoiding the so-called digital divide or information gap.

Prisons: The prison is an enclosure where people who have been convicted of committing a crime to serve a custodial sentence are imprisoned. They represent a danger to society.

Social Inclusion: Process to ensure that socially excluded groups of people have the necessary opportunities to be active people in society.

This research was previously published in Infocommunication Skills as a Rehabilitation and Social Reintegration Tool for Inmates; pages 126-145, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 52
Culture, Technology, and Education in the Digital Age:
A Conceptual Framework

Mehmet Kesim
Anadolu University, Turkey

ABSTRACT

The accumulation of information formed by the scientific studies whose foundation stones were put during the Enlightenment period, caused the Industrial Revolution. The most important feature of the modern era was to have a deterministic science approach. The period we are in is called the Postmodern Era. General and Special Relativity Theories, new findings in Quantum Physics and the advances in communication technology caused deep and rooted social, cultural, political and economic change and transformation, and ultimately led to a significant paradigm change. The most important feature of this period is that it has a Relative science approach. While change and transformation are continuing, it is not enough to simply feel and be aware of the rapid change and transformation of culture, education and training. In this study, changes and transformations during the Renaissance up to the present has been tried to be indicated by the results of scientific studies.

INTRODUCTION

As a historically new phenomenon, globalization has emerged at various periods of global interaction in different ways for hundreds of years (Reed, 2014, p.3). As a process that has continued for hundreds of years, globalization is a process that began in the 15th century. This process was accelerated by sailors from European countries with access to the ocean, who traversed distant sea voyages and established communication and trade relations with the continents they reached. Friedman indicates that there are three great periods of globalization (Friedman, 2007, pp.9-10).

DOI: 10.4018/978-1-7998-7297-9.ch052

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Globalization 1.0, 1492-1800: The world was reduced from a large scale to a medium scale. The muscle power of nations carries great importance in global coalescence. Ownership of muscle power, in accordance with the development of the industrial revolution, gave way to horse power, wind power, and steam power. Previously inaccessible places beyond the oceans were reached, merchandise with monetary value retrieved from these places livened economies. During this period, the globalization of countries and competition between countries stands out. Globalization 2.0, 1800-2000: The world shrank a little more, from medium scale to small scale. During this period, the world went through three great disasters; The Great Depression, The First World War, and The Second World War. The driving force behind this period was multinational corporations. The primary agenda is the globalization of companies. Globalization 3.0, 2000 and Beyond: The world is scaled down even further during this period, from small to miniscule scale. Individuals are now the driving force of this period. During the third age of globalization, the number of individuals raised well and whom understand the world in accordance with the age we live in within a country is considered measure of development. Individuals must be creative. They must provide alternative solutions to problems. These all depend on the individual being open to learning.

It has been approximately 500 centuries since Friedman's first instance of globalization. The tools and utilities used by people have developed rapidly in each century, and the exchange of tools and utilities have changed and transformed societies. Globalization 3.0 may be defined as the age in which individuals became globalized. Various significant authors and intellectuals express the change in mankind and societies in different terms.

Toffler emphasizes that there are three significant waves of change in the history of mankind. The first wave, the Agricultural Revolution, was a process that took approximately one thousand years. The Industrial Revolution, on the other hand, lasted three hundred years. Toffler indicates that the Third wave in which we currently reside will be complete in even less time (Toffler, 2008, p.16). The understanding and definition of time varies in each wave according to Toffler. In agricultural societies, time was sliced into shifts and time was developed based on workload. Time itself was not divided into sections such as hours, minutes, and seconds. It was during industrialization that time was accepted as a linear concept (Toffler, 2008, pp.132-134). Hours, minutes, and seconds became important concepts in the definition of time. The use of machines in production initiated the age of mass production, and time became an important factor in the procurement of raw materials, stocking products, supplying products to consumers, just in time delivery and production planning. Both production and consumption is now global, and raw materials used in production are physical objects.

Within the third wave, the primary raw material is an endless supply of knowledge and imagination. This wave period is interactive, individual, and far from massification (Toffler, 2008, p.437). Even if raw materials used in production are physical constructs, the soul and appeal lies in the knowledge and imagination used in production. During this wave, the question of whether it is the product or the image of the product that is being consumed becomes extremely relevant.

Globalization carries a political weight as much as it does economic (Hassan, 2004, p.23). Today, the concept of globalization refers primarily to two processes: The globalization of the world economy and the global dissemination of cultural forms and meanings (Tubella, 2001, p.385). Globalization brings with it inevitable change in every aspect of human life. Each new technology, when it enters global use, carries with it the culture of the place and era in which it was produced. Regardless of which aspect of life it is used in, technology and the expectations from it remain misunderstood without an understanding of the culture that it carries (Kesim, 2007, p.376).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THE INDUSTRIAL REVOLUTION AND THE MECHANICAL ETHOS

Understanding the Industrial Revolution, which triggered globalization, along with its mechanical ethos carries great importance. The driving force behind the Industrial Revolution was the European Renaissance. There are, of course, various other periods of Renaissance in Europe such as the Carolingian Renaissance, however the European Renaissance that emerged in the 15th and 16th Century is an era that has made a significant mark in human history and taken its rightful place in the pages of history. The developments in art, science and philosophy that took place during this period paved the way for the Industrial Revolution.

Significant historic periods also require that we mention the defining thinkers and their approaches, or in other words their theories of those periods. The two foremost names that set the foundation of the age of industry, whom pioneered the mechanical ethos were René Descartes (1596-1650) and Isaac Newton (1642-1727). It was also Descartes whom explained in detail the concept of natural law (Hawking & Mladinow, 2011, p.37).

The mechanical ethos defines a world that is simple and easily understood. In this world, objects are mathematically defined through scientific observation and order is based on this understanding (Rifkin & Howard, 2010, p.27). If the founders of mechanical philosophy were to be ranked, Descartes would be at the top of the list. Mechanical philosophy itself, however, was not founded by Descartes. The basis of mechanical philosophy in Europe dates back to antiquity (Dobbs & Jacob, 2000, p.14). Descartes stands out as the first philosopher to express natural law in a way we understand today (Hawking & Mlodinow, 2012, p. 26). His mark on the world of science was his statement that phenomenon may be calculated and categorized in an exact manner via mathematical formulae (Rifkin & Howards, 2010, p.227). He is therefore considered to be the father of rationalism and the founder of 17th century philosophy. The source of rationalism in this century was mathematics and physics. Developments made during this period materialized the thought that nature may also be understood through mathematical formulae and mathematical expressions. The revered rationalist thought process was achieved through the notion that compatibility lies between the nature and logic, matter and the mind. Descartes adopted a determinist approach. He followed the notion that nature is a machine that operates on the rules of mathematics. This historically significant approach was a clear departure from the past. Descartes marginal approach was not just the beginning of modernity, but also the foundation of the theory of modernity (Jameson, 2004, p.33). Another significant acknowledgement was the departure of the antiquated notion that objects and subjects are intertwined, and the acceptance of differing approaches to objects and subjects. As such, Descartes was not only the founder of modernity, but is also considered the initiator of the separation of subjects and objects (Jameson, 2004, p.43).

Sir Isaac Newton was the most influential person in the European Industrial Revolution, and he himself was greatly influenced by Descartes. The Newtonian approach also evaluates nature from a mathematical perspective (Dobbs & Jacob, 2000, p.118). His Newtonian Mechanics inspired the Industrial Revolution. Newton, who left his mark on the modern definition of space and time, states that space and time are absolute. He indicates that space and time are independent and constant. Newtonian understanding is based on this notion that space and time are absolute (Russel, 2011, p.16). Thus, through mathematical models, everything – even the future – may be determined. As a follower of Descartes, he too followed a determinist approach.

In later years, Isaac Newton explained natural law through his three laws of motion (Hawking & Mladinow, 2011, p.39). From the 1680s to the early 20th century, Isaac Newton's "law of gravitation"

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

remained the foremost of explanations. However, during the dawn of the 20th century, Newton's scientific explanations began to crack. Namely, gravitational law which was sufficient on earth did not hold up regarding space. Albert Einstein tackled gravitational pull in space through his "theory of general relativity". This new approach does not necessarily negate the validity of Newton's model though. Calculating the trajectory of a rocket, for example, still utilizes Newton's theories (Gribbin, 2006, p. 17). Today, while Newton's laws are generally accepted in calculations below the speed of light, motion at or beyond the speed of light reveals the shortcomings of Newtonian physics in that they are simply insufficient (Hawking & Mladinow, 2011, p. 41).

Freyer mentions that industry emerged initially from relatively smaller regions of Europe such as Scotland, Middle England, Eastern France and the Rhine Province (Freyer, 2014, p. 12). The European continent stood out as a fountain of change previously unseen in any other part of the world. This new era initiated by the Industrial Revolution entails its own waves of change. Freyer indicates that there are seven waves within the age of industry. The first wave, which began with the textile industry in the first half of the 18th century has transformed and developed all the way up to nuclear power into the first half of the 20th century. The sequential waves in this timeline are; Textile, Iron, Steel, Transportation, Chemistry, Electricity, Internal Combustion and Nuclear Power. In approximately two hundred years, developments and changes have taken place at a rapid pace (Freyer, 2014, pp. 40-45).

When scrutinized further, we can see that within the periods mentioned by Freyer's waves of change, tools and equipment designed mechanically give way to those which are electronically controlled, and in recent years these controls have become entirely computer controlled. It is inevitable that the tools and equipment that we use cause change in our lives in accordance with developments in technical fields. Advances in techniques have altered and transformed societies in a previously unheard fashion. The most prominent example of this is the emergence of the working class.

One of the most significant structural changes in the 19th century was the birth of the working class. In Europe, various theories and programs that studied these emerging changes were established. Karl Marx, trained in the Hegel School, attempted to determine the anatomy of the bourgeois society and explain the laws of motion of this era known as the age of capitalism. The interesting aspect of this is that he recognized the superiority of large businesses over smaller businesses and machine manufacturing over manual (handmade) manufacturing. The situation, which Marx explained as the tendency for pooling of capital, posited that small and medium size businesses would not be able to compete with the rapid growth of large businesses (Freyer, 2014, pp. 37-38).

In the 19th century, previously nonexistent new classes also emerged. Civil servants, servants and the ruling class are some of these new classes. In time, the working class also began to divide into qualified and unqualified workers (Freyer, 2014, pp. 62-65). The importance of the deep social change around the world enabled by technical changes resulting from the Industrial Revolution may therefore be better understood.

FRANKFURT SCHOOL

Associated with the Institute for Social Research but more commonly known as the Frankfurt School, this institution was established in 1923 in Frankfurt. With World War I drawing to a close and the failure of working class movements in West Europe, the need for the re-evaluation of social circumstances not emphasized by Marx arose. Thinkers of the school developed critical theory in opposition to traditional

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

positivist understanding. Critical Theory, with a critical approach to dogmatic positivism and dogmatic scientific socialism, re-emphasizes the subject, which had fallen from grace. Some prominent members of the Frankfurt School were Max Horkheimer, Theodor Adorno, Herbert Marcuse, Walter Benjamin and Jürgen Habermas.

This movement differs from the traditional Marxist superstructure establishment based on Hegelian dialectics. The tradition of Enlightenment basically attributes superiority to nature, saves man from legends and myths, and in essence forces the individual to live in accordance with the law of predetermined relationships. The magical veil of the world was lifted with Enlightenment. The Frankfurt School posits that the cost of lifting this veil and disposing of myths and legends was paid in the creation of new legends. This meant a new kind of subservience to non-human powers, resulting in alienation. This new alienation also influenced the field of science, reducing everything to technical usefulness and personal gain.

The Frankfurt School placed emphasis on three primary subjects. The first was the critique of positivism in social sciences. The second was criticism towards the ideological influence of science and technology. The third was the culture industry. While criticism of the culture industry began in Europe, it developed in the United States of America. Society in the U.S.A. is on a different plane to that of Europe regarding production and consumption culture. The consumerist society established through Fordist mass manufacturing mechanisms has caused mass communication tools to be used as tools of oppression for political purposes. On the other hand, the appeal of cinema and the world of entertainment by the masses has caused entertainment itself to become an industry.

The Marxist theorists of the Frankfurt School state that "Fordist" philosophy is apparent in all aspects of mass culture, such as in exhibitions, cinema, and magazines. Their statements on the Culture Industry clearly portrays their dismay for these industrialized products and stereotyped packaging (Creeber, 2009, p.13).

RELATIVITY AND QUANTUM MECHANICS

With scientific research accelerating as a result of the Industrial Revolution, important theories in the fields of theoretical mathematics and physics were being developed and significant experiments and observations were made based on these theories. Most prominently, electronic tools and equipment allow the study of space and the macrocosm as well as subatomic particles and the microcosm. It was understood that the mechanical approach responsible for the establishment of the Industrial Revolution would not suffice for the macro and microcosm. Scientific research conducted early in the 20th century led to the development of important theories. These studies revealed the fact that the previously acknowledged mechanical world view was insufficient in its acceptance of space and time as absolutes. While theories of physics that expressed the traditional understanding of the universe were determinant in daily life, by the 1920s, it failed to explain the behavior of atomic and subatomic particles (Hawking & Mladinow, 2011, p.14).

It was therefore understood by the early 20th century that Newton's Laws would lack explanatory power regarding the world of the vast, such as the universe, along with the world of the miniscule, such as atoms and subatomic particles. For the vast, Einstein's theories of Relativity entered a previously undisturbed realm of bent time and space, an expanding universe, and black holes (Thorne, 2014, p.42-43). The conceptual understanding of absolutes and the acceptance of these approaches were changing in both the realm of the massive and that of the miniscule.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THEORY OF SPECIAL RELATIVITY

While Newton claimed space and time to be absolute and unchanging, he was also emphasizing the need for the existence of an absolute space and an absolute time. The concept of absoluteness itself refers to the concrete lack of change under any state and circumstance. This was the foremost scientific understanding of the 18th and 19th centuries, and influenced all aspects of science. During this era, theories in physical sciences influenced the social sciences, and determinism became the integral approach of the field of social sciences.

In the early 20th century, certain scientists focused their research on the study of light. There were, of course, studies conducted on the speed of light in previous centuries. The Danish astronomer Ole Christensen (1644-1710) discovered that light travels at a very high, but finite speed (Hawking, 1988, p.18). This was a defining moment in the realm of science. Set to be the foundation of countless studies in later years, James Clark Maxwell (1831-1879) indicated that light is an electromagnetic wave travelling at almost 300,000 kilometers per second. Consequent research determined that electromagnetic waves travel at the speed of light when in a vacuum (Hawking, 2015, p.50). These revelations were the beginning of a new age for the field of communication technologies.

In Newton's model, time and space were separate, infinite, and absolute (Hawking, 2015, p.40). Albert Einstein's (1879-1955) Theory of Special Relativity, however, posits that Newton's absolute time is out of the question. Time is relative, and related to the speed of a moving object. The inexistence of absolute time was proven in 1905 through Einstein's Theory of Special Relativity. This theory states that two observers travelling at differing speeds experience distinct measures of time through the distance they travel (Hawking, 2015, p.117). Einstein stated that no matter how fast the observers were moving, the speed of light must be considered constant. "Time" was previously considered a universal construct. However everyone had a personal time. Two static people would have congruent times, but they would lose this congruence if they were in motion relative to each other (Hawking, 2015, p.17).

In Einstein's Theory of Special Relativity, he pressed on an important point by stating that each observer would have their own measure of time. When an observer takes a measurement, the period of time that passes depends on that observer. In a clock travelling near the speed of light, the time that this clock measures also slows down (Neffe, 2009, p. 165). As objects approach the speed of light, a lengthwise constriction is observed. For an outside observer, the object appears to become shorter (Neffe, 2009, p. 179). This can be interpreted as understanding that approaching the speed of light, time nearly comes to a standstill.

In Einstein's model of the universe, light travels at 300,000 kilometers per second and the speed of light is the only physical scale that is measurable and absolute in the universe. Special Relativity also indicates that the speed of matter may never exceed the speed of light, and all astronomical objects travel slower than the speed of light. Thus, Einstein concluded that the maximum achievable speed in the universe was the speed of light. He posited that as the speed of an object increased, so would it's mass; when the speed of light is achieved, the mass of an object would be infinite (Kaku, 2012, pp. 40-41).

Einstein had proven that there is no absolute stasis, and no absolute time. When energy is used to accelerate an object, it increases in mass and it becomes more difficult to accelerate. Accelerating an object to the speed of light would require infinite energy and therefore this cannot be attained (Hawking, 2015, p.20). An object can never achieve the speed of light. Or rather more distinctly, any object with mass can not move at the speed of light. Only light, or waves lacking mass may move at the speed of light (Hawk-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ing, 1988, p.21). Today's most powerful rockets can only achieve speeds of 15 kilometers per second. It is estimated that this may rise to 300 kilometers per second in the near future (Thorne, 2014, p. 86).

THEORY OF GENERAL RELATIVITY

Another key aspect of Albert Einstein was his work on gravitational pull in space. Einstein had proven that unlike Newton's assertion, there can be no absolute regarding time and space, and they cannot be expressed independently. Einstein likens space-time to a flexible and foldable cloth. This explanation draws heavily from curved surface geometry. Bernhard Riemann (1826-1866) was a scientist who studied curved surfaces. Riemann indicated that the sum of the interior angles of a triangle on a plane was 180 degrees, but it was greater than 180 degrees on convex surfaces and less than 180 degrees on concave surfaces. Einstein's supposition was that space is like a taut cloth. Large objects cause sagging in space. Light that is passing by these objects is thus influenced by their gravitational pull and the light is bent. With large astronomical objects bending space, time is also bent. This is called space-time interaction. General relativity states that the field of gravitational pull bends light. Thus, if space is bent, so is time.

Non-Euclidian geometric theory had saved Einstein. Movement in Newtonian equations are determined by Euclidian geometry. In Einstein's equations, nonlinear space-time is defined through Riemann geometry (Yalçın, 2008, p.113). In Newtonian laws, as long as gravitational pull does not influence them, objects such as planets in space move on a straight line. Einstein however indicates that the curvature caused by a planet bending space-time itself creates gravitational pull (Hawking & Mladinow, 2011, p.130). General Relativity uprooted our concepts of space and time previously defined by Newton. In his Theory of General Relativity, Einstein states that heavy objects bend the space around them due to their mass, and thus time is also bent.

Light travels at 300,000km per second. The distance it covers in a year is expressed as a light year rather than in kilometers. The spatial distances of astronomical objects are also expressed in light years. A beam of light would cover 186,000 miles (300,000 kilometers) every second. The closest star to us beyond our solar system, Alpha Centauri C, is four light years away. Getting there, even with the fastest spacecraft we have, would take ten thousand years. NASA's Voyager I spacecraft entered space in 1977. It has been travelling for 39 years, and is now 20.5 billion kilometers (38 light hours) away from us. The data sent from Voyager I at the speed of light takes 38 hours to reach us. (Nasa, 2016)

Alpha Centauri is 4 light years, Sirius is 9 light years, and the Andromeda Galaxy is 2 million light years away from us. Light is only able to reach us from these stars in the aforementioned time. Thus, we are only able to observe the states of these stars from 4, 9, and 2 million years ago respectively (Gott, 2005, p.75). While we assume we are looking into the distance when we peer through the lens of a telescope we are actually looking back through time. Looking forward into space in a sense brings us closer to the past.

QUANTUM MECHANICS

Another important field that progressed greatly in the 20th century was the study of the miniscule, atoms and subatomic particles. The behavior of subatomic particles is studied through Quantum Mechanics. An atom comprises of a nucleus of protons and neutrons, and electrons that orbit that nucleus. Protons and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

neutrons are made up of quarks, which themselves are established through the combination of strings. String Theory states that in particles are not necessarily points or dots, but one dimensional strings. These strings vibrate at differing frequencies, and each distinct frequency creates a different particle. The greater the vibration of the string, the greater the mass of that particle (Hawking, 2015, p. 61).

Max Planck discovered in the early 20th century that light disperses as small particles, known as quantum packets. At the time, it was believed that light moved as a wave, or an electromagnetic vibration (Gribbin, 2006, p. 19). Light does not exhibit one specific behavior. Sometimes it behaves like a wave, and sometimes like a particle. This situation is called the wave-particle duality (Gribbin, 2006, pp.20-22). Heisenberg's Uncertainty Principle states that the location and speed of an electron cannot be measured with the same accuracy. This simply isn't possible on a microscopic scale. In essence, in quantum mechanics, the location of a particle and the momentum of a particle cannot be measured simultaneously. Werner Heisenberg's (1937-1976) Uncertainty Principle indicates that the speed and location of subatomic particles cannot be stated definitively. When their speed is measured definitively, their location remains uncertain and vice versa (Hawking, 2015, p.34). Heisenberg thus formulated one of the basic principles of quantum physics. His Uncertainty Principle establishes that the location and speed of a particle cannot be measured simultaneously (Hawking & Mladinow, 2011, p.90).

Quantum physics indicates that until it is measured by an observer, a particle has no specific location or velocity. When the measurement is conducted, the result of that measurement is only valid for the particular instance in which the measurement was made. Classical science assumes the existence of an external world with determined qualities, and that these assumed qualities are independent from the perception of the observer. The principles of quantum physics, however, indicate that until it is measured by an observer, no determinations can be made regarding the location and velocity of a particle (Hawking & Mladinow, 2011, pp.8-59). Quantum physics states that an object is itself influenced by the act of observation. Interaction with an object is therefore inevitable (Hawking & Mladinow, 2011, p.103).

Newtonian physics expresses that each particle emitted from a source follows a single predetermined path until it reaches an intersecting plane. Quantum physics, however, indicates that it is difficult to state the exact location of a particle in the time it takes to reach the plane from the source. Richard Feynman (1918-1988) posited that while travelling from the source to the plane, a particle uses all possible routes. Thus, he continues, if we wish to calculate the probability of a result, we must calculate all of the possibilities of that result. If done this way, it would mean that all events that may result in the same outcome are possible (Gott, 2005, p.16).

Each subatomic particle has an opposing antiparticle. An electron is negatively charged, and the corresponding antiparticle is the positively charged positron. These particles and antiparticles, however, eliminate each other. Renowned physicist Paul Dirac (1903-1984) contributed antimatter to physics. The opposing particle of an electron, which is in orbit in an atom, is called a positron. While both have similar characteristics, electrons are negatively charged while positrons are positively charged. One field of application for positrons is PET (positron emitting tomography) imaging systems (Yalçın, 2008, p.10).

In a design they constructed in the 1960's, physicists S. Tanaka, O. M. O. Blaniuk, V. K. Deshpande, and E. C. G. Sudarshan purported that there were virtual particles that moved faster than light, called tachyons (Gott, 2005, p. 124). Science is deducing that if virtual integers can exist in mathematics, virtual particles must also exist thereby inferring that the speed of light may be exceeded. From a theoretical perspective, the concept of time may be altered in unexpected ways when approaching, achieving, or exceeding the speed of light.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Virtual numbers and virtual time are actually mathematical concepts. Virtual numbers are perpendicular to real numbers. Since virtual time is perpendicular to real time, it acts as a fourth spatial dimension (Hawking, 2015, pp.67-68). In this second construct of time, namely virtual time, each past refers to a past in real time. As a result, a multitude of possibilities for the universe are obtained (Hawking, 2015, p.93).

APPROACHES POST RELATIVITY

The end of the 20th and the beginning of the 21st century saw acceleration in research in space and astronomy. Detailed studies of planets and space travel projects were prepared. Research on space in every field of science produced technological developments that were to be used both in space and on earth. A thorough analysis of outer space was necessary for future space travel. Many questions and many approaches followed each other. One of the questions that stood out was whether or not there was a beginning to the universe. The Big Bang Theory is one of the most significant approaches regarding the creation of the universe today. This theory posits that the universe started as a single point with immense density, and suddenly expanded, and this approach leads us to believe that there must be a beginning to the universe.

When Edwin Hubble (1889-1953) observed that galaxies were rapidly getting further apart, he observed that the universe is not static and is in fact expanding. This, in turn, was an indication that the universe has a beginning (Hawking, 1988, p.8). So the universe was expanding. The notion that the universe is stable and static, and will continue to exist as it is was abandoned through observations. The universe began with a finite time, and would end in a finite time. In short, the universe was not static but rather a dynamic universe (Hawking, 1988, pp.33-34). These explanations also show us that the concept of time began to exist with the creation of the universe, and that there was no such entity precluding the universe (Hawking, 1988, p.8).

There are billions of galaxies in the visible universe. The Milky Way galaxy, in which our solar system and the earth we live on resides, covers an expanse of 100,000 light years. The closest other galaxy to us is the Andromeda galaxy, and it is 2.5 million light years from us. The closest star to earth other than the Sun is Proxima Centauri, and is 4.24 light years away. Light travels at 300,000 kilometers per second. If we recall, one light year is the distance light covers in a year while travelling at 300,000 kilometers per second. Each galaxy has a massive Black Hole at their epicenter. When stars consume all their material fuel, they collapse into themselves, forming a black hole (Thorne, 2014, p.33-36). Black holes comprise of bent space and bent time (Thorne, 2014, p. 63). In other words, black holes are regions of space which have been bent to the point that light cannot escape them (Hawking, 2015, p.32).

During the same time period in which space and astronomy gained traction, important research was being conducted in the field of theoretical mathematics. New approaches that were previously unheard of were published. One such researcher, the renowned mathematician Kurt Gödel (1906-1978) published proof of his incompleteness theorems in 1931. The repercussions were quite interesting. Gödel had proven that problems which could not be solved with any rules or operation sets existed (Hawking, 2015, p.147). In other words, this proof shows that propositions which can not be proven right or wrong are possible.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

MODERNISM AND POSTMODERNISM

Max Weber's (1864-1920) utilization of the term "disenchantment", together with the emergence of modernity, emphasizes that meaning itself has been cast away from the earthly realm. With this disenchantment, people were trapped in what Weber referred to as an iron cage. Modernity has been defined in many different ways by many different authors and thinkers. While Weber uses modernity to define the disenchantment of the world, Marx defines the world as the evaporation of everything solid. The lifestyles that emerge as a result of modernity have torn us from traditional types of social structure (Giddens, 2012, p.12). Giddens postulates that we live not in a postmodern era, but in an era in which the consequences of modernity have radicalized and become universal. Creeber defines modernism as an umbrella term, as society's reaction to the industrial revolution towards the end of the 19th century (Creeber, 2009, p. 11).

In the time from the industrial revolution to today, developments and shifts in technologies have also caused deep alterations in many aspects of society, from economy to education. The modern era began with the emergence of the mechanical world view. Modernism, enlightenment, and the industrial revolution made many promises such as development, prosperity, and progress. This was a grand and significant narrative. However, following the tragedies of the Great Depression and two World Wars, averse reactions to modernism emerged throughout the world. Positivist and determinist approaches were criticized heavily. Following the aforementioned disasters of the mid 20th century, a new era was ushered in. In this new age, some considered the period a continuation of the modern era, while others categorized the period as the "next era", namely "the postmodern age".

Primarily, four pairs of concepts must be expanded upon to accurately define what is modern and what is postmodern (Şaylan, 2002, p. 55).

- **Modern/Postmodern:** The adjectives that refer to the period.
- **Modernization/Postmodernization:** Refers to a process, the emergence of two different stages.
- **Modernism/Postmodernism:** Refers to the ideological aspect of the narrative.
- **Modernity/Postmodernity:** Refers to two distinct periods.

Even though these four concept pairs are used interchangeably, they signify different understandings, acceptances, manufacturing and consumptions of two different eras. Emphasis should be made on the differences in settings and narratives.

Some authors accept the Age of Enlightenment as the beginning of the period of modernity. Institutionalization occurred through the Industrial Revolution, while politicization occurred with the 1789 French Revolution. It came under heavy criticism in the 1960s, and is considered to have ended with the fall of the Berlin Wall in 1989. The most prominent feature of modernism was that it prioritized the human mind. The trust placed in human intellect is immense. It follows a rhetoric of constant and uninterrupted progress. Modernity is considered to mean the rise of man compared to the premodern era.

Causality is a defining characteristic of modernity. Newton's universe is also founded in causality, absolute time, and absolute space. Modernism replaced traditional structures with reliable and certain rules, an approach known as rationalism. Rationality expresses definitiveness. Postmodernism, however, lacks clarity and does not express any form of precision or accuracy. Thus, the state of being definite and indefinite brings with it issues of understanding and interpretation today. Therefore, in both the modern and postmodern era, settings and narratives matter.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The characteristics of settings relating to modern and postmodern concepts may be summarized with the following pairs of terms (Hand, 2008, p.53): Material/discursive, continuous/discrete, objects/spaces, determined/undetermined, neutral (instrumental)/cultural, actual/virtual, centered/decentered, fixed/mobile, governable/un-governable, effects/performances.

While the modern terms are more apparent in these word pairings, there is a certain ambiguity to postmodern terms. The postmodern concept of virtuality especially has entered our lives in recent years as virtual reality products, finding widespread use in entertainment and education.

The narrative basis for modern and postmodern terminology may be more explanatory (Hand, 2008, p. 83):

- **Modern Discourse:**
  - **Collections:** The conservation of cultural values, universal knowledge and legitimate culture.
  - **Pedagogy:** Public education and knowledge sites relating to education.
  - **Legitimization:** The legitimate providers of symbolic and cultural capital.
  - **Gatekeeping:** Keeping track of the flow of history and collective memory.
- **Postmodern Discourse:**
  - **Interfaces:** The dispersion of gathered knowledge throughout social space in the form of cultural aggregates and information.
  - **Empowerment:** Self education rather than teaching, based on equal citizenship rights.
  - **Democratization:** The encouragement of multicultural heritage and tradition.
  - **Communitarianism:** From legitimization to applications possessed by society.

While universality, public legitimization and collective culture form the basis of modern narrative, these are replaced in postmodern narrative by social media, self-learning, and multiculturalism.

The definition of postmodernism draws back to the 1950s. At the time, Irving Howe and Harry Levin used the term as the destruction of the modernist movement. This definition was used in the 1960s by critics such as Leslie Fiedler and Ihab Hassan to explain postmodern literature. Postmodernism entered the arts initially through architecture, and was influential in other fields of the arts by the 1970s (Huyssen, 1994, p. 108). Huyssen asserts that modernism is not outdated, and that it is not the intention of postmodernism to do so. On the contrary, postmodernism shines new light on modernism, allowing the integration of different strategies and tactics (Huyssen, 1994, p.126).

Some thinkers emphasize that the understanding of knowledge and science of the modern era does not provide freedom to a person, and that this understanding must be reestablished. In the postmodernist approach, a new understanding of knowledge cannot be considered to express the truth. Careful study will show that many groups of truthfulness can exist side by side. Mankind therefore faces a plethora of paradoxes in the postmodern era. This situation may be defined as the "self reproduction paradox" (Şaylan, 2002, p.47).

Postmodernism may be associated with various changes that emerged following the industrial revolution. The new post-industrial or post-Fordist economy is an economic transition in which production based economy gave way to service based economy. The culture and politics created by a post-industrial society may be observed to be significantly different than the modern era culture and politics put forth by the industrial revolution (Creeber, 2009, p.15).

There has been plenty said regarding the modern and postmodern eras. The rapidity of technical developments, and the rapid manufacture and consumption of products of these developments has had

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

widespread influence from cultural to behavioral in the people that use these products, regardless of which culture they come from. In fact, neither has the modern era truly ended, nor has the postmodern era taken its place. Even the rarely mentioned premodern era continues in many societies. In essence, the premodern, modern, and postmodern periods are sometimes experienced as a sequence, and sometimes intertwined with each other within history. This is, in fact, the state that allows events to astonish us and escape meaning. If we know these periods and the circumstances surrounding their emergence, it will be easier for us to gauge events.

SIMULACRA AND SIMULATION

Abstraction has been an important form of expression for a very long time. "Abstraction today is no longer that of the map, the double, the mirror or the concept" (Baudrillard, 1994, p.1). We can feel the existence of the abstract, but cannot perceive its existence through our physical senses. In essence, it is the opposite of the tangible. Abstraction is the process of reducing the knowledge content of a concept, or in other words the process of reduction or simplification. Abstraction usually confronts us in the arts. Abstractions produced in primeval ages were object and figure abstractions that expressed the fear, curiosity, respect, and passion felt towards nature. Today's abstractions are more connected to technical advancements. Developments in the sciences are rapidly separating mankind from nature, triggering the proliferation of abstract works especially in the arts. While the subject matter of graphic novels and animations in our daily lives are established of abstract characters, abstraction itself is increasing. Another field prolific in abstraction is the abstractions conducted in advertising for all manners of production.

With the emergence of the photographic technique during the industrial revolution, we tend to consider photographs to be relational to the real world. Painting and drawing, however, is related to the imagination and creativity of whomever created them (Toffoletti, 2011, p. 13). Technological advances that emerged in the mid 19th century drove artists into new searches. The invention of the film camera allowed nature to be portrayed perfectly on paper. For an extended period, artists had strived to replicate nature on their canvas until the invention of the camera. Thus, they had to find new ways of expression rather than create these attempts at replication. Towards the end of the 19th century, we therefore observe in these arts the simplification and disruption of forms, and the increase of abstractions.

Today, global media has transformed art into an easily accessed and easily copied meta. Art is no longer confined to a certain space as it once was, and the elimination of spatial constraints has allowed more people to access it. These questions began emerging along with the significant changes in the creation, interpretation, circulation and consumption of images. Who are these images for, and what function do they serve? Unfortunately, there are no singular concrete answers to these questions (Toffoletti, 2011, p. 13). In the modern era, pretty much everything was expressed through the tangible, and perception was concrete. During this period, signs primarily had certain functions. Signs are abstractions of a tangible concept and are real. The postmodern era, however, deals more with images. An image is the mental copy and figment of something perceived by the senses. Thus, it is now images that are produced, circulated, and consumed.

In his studies and critiques of the postmodern era, Jean Baudrillard (1929-2007) emphasizes the terms simulacra and simulation. Simulation is the artificial reproduction of a tool, machine, system or the functioning of a phenomenon through a model or computer program for the purpose of its study, exhibition, or explanation. Simulacra means image, imitation, similarity and semblance. To simulate

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is to try to present something that isn't real as if it were. To dissimulate means to behave as if one does not possess something they actually do. Simulation, on the other hand, is to behave as if one possesses something they do not. One represents that which is, and the other represents that which isn't (Baudrillard, 1994, p. 2). An important distinction lies between the concepts of simulation and dissimulation. Baudrillard emphasizes the mind bending cycle of production, circulation and consumption regarding acting as if something not possessed is so. Simulation is no longer the simulation of a region, a referred thing, or a material. It is the production of a reality through models, but without any past or truth: this is called Hyperreal (Baudrillard, 1994, p. 1). It is trying to explain a world in which untrue realities roam through ruthless criticism.

While placing important emphasis on simulation, or hyper reality in other words, Baudrillard states that the reality created has no origin and lacks reality. This unreal, origin-less reality is derived through models. Disneyland may be provided as an example for hyperreality. Disneyland is a perfect model in which all the formations of simulacra are intertwined (Baudrillard, 1994, p. 12). It is neither imaginary, nor is it reality. It is a perfect model where arrays of appearances (simulacra) that want to be perceived as a reality are intertwined. To the question of whether or not it is real, we cannot say that it is real. To the question of whether or not it is unreal, we also cannot say that it is unreal. In short, it is neither real, nor unreal. If something is simultaneously neither real, nor unreal, the solution is that it is hyperreal.

Baudrillard proposes four orders of simulacra. His theory of simulacra may help understand images' perception of reality of proponents of visual arts and what they represent (Toffoletti, 2011, p.17).

1. **First-Order Simulacrum:** The first order is the period between the Renaissance and the industrial revolution. In this period, called the pre-modern period, social relationships are formed through symbolic exchange (Toffoletti, 2011, p.17). During this era, objects in nature are imitated, thereby reproducing nature. Especially in the use of stucco in baroque décor, nature is mimicked and recreated through an architectural work (Toffoletti, 2011, p.20). In the reproduction of nature, the material used in the décor may be marble or plaster. While the wealthy use marble, people with more modest incomes use plaster.
2. **Second-Order Simulacrum:** The second order begins with the Industrial Revolution. Mass production techniques caused the mass production of images as well. Thus, the way objects and images are made along with their values and functions changed (Toffoletti, 2011, p. 20). Andy Warhol, an American painter, filmmaker, and publisher, is considered to be one of the most significant representatives of the pop art movement. He designs artworks in which mass production and objects of mass production are frequently used. His *Campbell's Soup Cans* work in the 1960s may help better understand the characteristics of Baudrillard's second order simulacrum. In this artwork, which resides in the New York Museum of Modern Art, there are 32 seemingly identical cans of soup with differing labels. While the cans containing Campbell's soup are identical, there are many different kinds of soup in them and they are named differently. The emphasis of this order is that despite differing ingredients, the meta that is produced is a product of mass production (Toffoletti, 2011, p.21).
3. **Third-Order Simulacrum:** The third order is the period of hyperreality, in which the discernible difference between image and reality has either disappeared or completely collapsed. Images are not connected to objects in the real world, and freely move about. Their ability to create meaning is only possible through their developing a relationship with one another (Toffoletti, 2011, p.24). Hyperreality is the production of a reality that lacks any reality. It is now possible to have infinite

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

production through advanced electronic devices. Rather than refer to reality, it may be more apt to state that the products that emerge are operational realities. As an example for hyperreality, the aforementioned Disneyland may be suggested. Most of the products we consume in our daily lives are products of hyperreality. We cannot decide whether or not they are real, but consume them with great pleasure. That which is consumed, however, is the hyperreality of the product rather than the product itself. Transcending exaggeration, all emotions and expressions have become hyper.

4. **Fourth-Order Simulacrum:** The fourth order is a period called ultra reality. Image has forgone it's unique function and objects are now forced to enter the image. One of the most meaningful examples of this is virtual worlds such as Second Life. Now ultra reality puts an end to both reality and illusion. This is ultra reality (Toffoletti, 2011, pp.29-30). Today, virtual worlds such as Second Life are multiplying. The most distinct examples of this are augmented reality and 4K resolutions on digital televisions. Augmented reality technologies have multiple definitions. One of the definitions that stand out is "wearable reality". By having a real body wear a non-real technology, ultra reality is created. 4K refers to Ultra High Definition, and carries greater image quality that High Definition. The feeling of ultra reality may be felt especially in large, curved displays. People are no longer simply observers of the image, they enter it, break from reality, and live a dream in worlds created virtually.

TECHNOLOGY AND DIGITAL CULTURE

The term "technology" is used frequently in our daily lives, in scientific and in applied works. Communication technologies, information technologies and educational technologies may be provided as examples.

Etymologically, the term technology is derived from the Greek words "techne" and "logos". Techne refers to art or craftsmanship while logos refers to discourse over something. Technology is the application of knowledge or science in a specific field. In other words, the contemporary meaning of technology is more abstract and unique than that which was afforded to it towards the end of the nineteenth century. In the contemporary world, technology carries cultural values, ideologies, and ethical concerns while being shaped by political and economic determinants (Murphie & Potts, 2003, p. 3-4). Thus, the meaning afforded to the term "technology" changes in time from antiquity to today and during all periods in between. It is especially meaningful that technology refers to a more abstract and unique concept in its contemporary form. It is abstract because rather than defining a new tool or utility it is the discourse it represents that matters. The discourse instilled on it is itself also unique. It holds a special place in its field of application that expresses its own era.

Technology incorporates the culture in which it was created. Therefore the relationship between technology and culture is inseparable, neither may be taken individually and applied thusly. The Latin "cultura" refers to either inclination or cultivation. While the phrase came to mean agricultural cultivation when it was adopted into the English language from French in the fifteenth century, the intellectual and artistic aspect of civilization was emphasized by the early nineteenth century. Culture is ideas and values, is dynamic, and therefore changes in time (Murphie & Potts, 2003, p. 7). It is traditional, developable, transformable, and expresses something different with the technology of each era. Premodern, modern, and postmodern cultures are determined by the technologies created in that particular era. Baudrillard states that contemporary culture is increasingly being determined by 'simulacra' created by technol-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ogy, while reality itself is being usurped. Baudrillard modified McLuhan's famous "the medium is the message" statement, instead indicating that "the medium is the model" (Murphie & Potts, 2003, p. 15).

Information communication technologies have opened many communication channels that overcome any national boundaries. Despite existing in different regions of the world at different densities and speeds, information has created an incredible number of new, fast-paced images and new cultural habits (Tubella, 2001, p.385). Developments in communication technologies in the early twentieth century rapidly found places of application, influencing societies and portraying different situations in the four generations leading up to today. Tapscott defines four generations from 1946 to today as follows (Tapscott, 2009, p.16):

1. The Baby Boom Generation (1946-1964).
2. Generation X (1965-1976).
3. The Net Generation or Generation Y (1977-1997).
4. Generation Next or Generation Z (1998-present).

The communication technologies of the first generation, the Baby Boom (1946-1964) were analog. This was the period in which electronic devices began developing. Radio was a widespread mass communication tool. Television broadcasts, on the other hand, were sparse and black and white. Both provide one way communication without interaction. Long range communication was conducted wirelessly. The determinist characteristics of the modern era continued. A new order was being established on a global scale following World War II, the economy was livening, and global consumption products were being manufactured more rapidly. The space race began with the Soviet Sputnik I satellite. Gere elaborates on this situation: The Second World War did not only accelerate the invention of the binary based computer, it also led to important developments in cybernetics, information theory, general systems theory, molecular biology, and artificial intelligence (Gere, 2008, p.51). The erection of the Berlin Wall in 1961 symbolized a binary world and initiated the Cold War Era.

The communication technologies of the second generation, Generation X (1965-1976) are also analog. While radio broadcasts continued, color TV broadcasting began in the U.S., Europe, and Japan. The prominent feature of this era is the emphasis on work in the field of ICTs. ICTs are primarily used in very large systems and work with large amounts of data. From a social perspective, developed nations began their critique of the modern era and postmodern works began proliferating in art and literature.

The third generation, Generation Y (1977-1997) is defined as The Net Generation. ICT networks achieved national and international prevalence. ICTs are becoming digitized. With the development of network protocols, systems and individuals have begun communicating seamlessly and continuously through common ICT languages. Regardless of whether they are systems or individuals, interaction is taking place between them. Desktop computers and individual terminals have become widespread. ICTs have mandated the use of automation systems in every field. Socially, the most significant development was the demolition of the Berlin Wall in 1989. In his statement that "walls were demolished and windows opened" in his book The World is Flat, Friedman in fact emphasized the globalization of the Windows program.

People born into the fourth generation, Generation Z (1998-present) are regarded to be Digital Natives. In this era, analog technologies are beginning to be abandoned and digital technologies proliferate rapidly. Both wired and wireless ICT networks are entrenched in every aspect of life. Hundreds of communication satellites orbiting the earth ensure continuous global communication. The Cyber Era gained

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

speed in the first quarter of the twenty first century. Production and consumption cultures changed, with products of hyper and ultra reality gaining prevalence. Virtual products have spread through all aspects of life via communication technologies, creating previously unheard of habits, transforming its own culture into a global one. Social networks are paramount for both people and institutions. Mobile technologies allow just-in-time access to everything, everywhere. They open all doors. Tapscott elaborates on this, stating that today's telephones are like Swiss Army knives, capable of much more than a phone call (Tapscott, 2009, p. 48).

When discussing the importance of digital technologies in our lives, we rarely consider the meaning of the term "digital". "Digital may be expressed as; metonym or rhetoric, equipped with virtual imitations, ensuring instant communication, creating the era in which we exist and which exists everywhere" (Gere, 2008, p. 15). Through digital communication technologies, the production of visuals, audio, graphics, games and written text is increasing rapidly. Cinema films are now digital. Everything produced within this scope complements each other. While cinema films previously could only be experienced in theaters, today small spaces and homes have become their own movie theaters. Adorno states that film aims to create a facsimile of the world of daily perception, and thus the outside world is a seamless continuation of that which is portrayed on the silver screen (Adorno, 2007, p.5). In other words, digital information is in global circulation. The global circulation of digital information is causing fundamental shifts in social and cultural organizations (Hand, 2008, p.18).

Digital culture is formed through the influence of existing and available digital technology. In the digital world, machines are more of a social phenomenon than a technical one. Digital culture is established on the objectification and specialization of the current sociopolitical status, culture, and economy (Han, 39). Digital communication technologies play an important role in the structuring of current economics and culture (Reed, 2014, p.3).

Industrialization is the driving force of the modern era. Electricity replaced machines that previously ran on steam power, and production transitioned to mass production. While the industrialization of the modern era focused on materials, it also created a Mass Culture. Today, with the manufacture of digital products, a Culture Industry has become a more prominent point of discussion. The term culture industry was coined by Adorno and Horkheimer in their 1947 book Dialectic of Enlightenment (Adorno, 2007, p.109). Culture industry refers to something other than mass culture. It forces the long separate fields of high and low cultures to unite to the detriment of both (Adorno, 2007, p. 110). The term culture industry is a critique of the standardization of culture – a characteristic of the paradigm of the modern era – by members of the Frankfurt School in social sciences. The concept of culture was a collection of values such as traditions, art, and literature produced internally through a dynamic process by each society before the industrial era. This culture was differentiated by the different societies in which they were created. Therefore, for an extended period of time the fields of high and low culture were distinct, with structures consistent within themselves. The culture industry emerging in the modern era standardized culture as a whole, causing changes and degradation in both cultural fields, forcing these different fields together.

The fourth generation, Generation Z, lives within cyberspace. Cyberspace is a place to which previous generations immigrated, but Generation Z was born into. In other words it is the world of Virtual Reality. Cyberspace is a term coined by science fiction author William Gibson to define virtual realities created by computers (Hassan, 2004, p.141). The virtual is another dimension of reality, but today the term "virtual" is used to refer to that which is not real. The word "real" implies certain material arrangements, a concrete and tangible existence. The term "virtual reality" however utilizes to contradictory concepts (Lévy, 2001, p.29). Virtual reality currently has applications in nearly every aspect of life. The

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Matrix, for example, is a science fiction film that covers how people living in a virtual reality come to the awareness and realization of this. Another exemplification of the popularity of virtual reality is Second Life, which many people live in (Hawking & Mladinow, 2011, p.57). In the film The Matrix, the protagonist Neo aims to save people from the slavery of an artificial intelligence of which they are unaware (Irwin, 2002, p. 6). In science fiction, despite the attempts to cover scientific possibilities, the Harry Potter film series also contains scientific fantasies that far exceed the subject matter of that which is truly scientific (Thorne, 2014, p.80).

Second Life is a completely virtual world in which people who exist in the real world may create a whole new life, either as themselves or as other personas. Everything within this world, even the currency utilized within it, is virtual. Individuals may exist as two distinct persons, one real and one virtual, in two distinct worlds. Thus, anything unachievable in this life becomes possible in virtual life. As a current field of science, artificial intelligence is dramatically portrayed in the film The Matrix as having enslaved mankind. Harry Potter films, however, are portrayed as a sequence of scientific fantasies.

THE NETWORK SOCIETY

The world has undergone a process of structural transformation for more than the past twenty years. This process is multifaceted and multidimensional, and is determined by the shaping and proliferation of ICTs in the 1970's as a new technological paradigm (Castells, 2005, p.3). The structural transformation is caused by the convergence of multiple mediums with very different characteristics. Simply put, it is ensuring different mediums speak a common language.

Electronic communication networks have been added to the list of requirements of daily life such as roads, electricity, water, sanitation, telephones and cable television. For the youth of developed nations, a world devoid of mobile phones, the Internet, and social networks such as Facebook in their daily lives is unfathomable. A single day of their absence may result in serious symptoms (Dijk, 2012, p.1-2). The most significant structural characteristic of new media is that it is the unification of data and mass communication in a single medium, and this unison is referred to as convergence. The stages of this unification may be summarized as infrastructure, transportation, management, services, and types of data (Dijk, 2012, p.7-8). Infrastructure is the foundation established by the convergence of different communication systems. Transportation refers to various media connections and their transportation. Management refers to the administration of different media and carries great importance. Services is the unifications of marketing and services such as information, communication, transaction and entertainment services. Types of data refers to the unification of sounds, data, text and images into what is known as multimedia.

Just as with the stages of convergence in new media, the stages of interaction also portray important qualities. The stages of interaction may be summarized as place, time, action, mental, digital code, and hypertext (Dijk, 2012, pp.10-11). Place is a multidirectional exchange. Time refers to a synchronous, equal and long circulation. Action is the equal controllability of action and reaction. Mental refers to mutual understanding. Digital code and hypertexts are two terms that complement each other. Digital code is the coding of all types of data in digital media as bits and bytes. Hypertext is the transformation of the connections between all types of data in digital media to code with a single structure. At the heart of this current revolution lies terms regarding the integration and interaction aspects along with the technical terms of digital code and hypertext that define the characteristics of new media (Dijk, 2012, p.7).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Within this process, the definitions of Information Society, Knowledge Society and Network Society are also significant. It is well established that in communication, the differentiation between the definitions of symbols, data, information and knowledge are important. Symbols come together to create data. The meaningful interpretation of data results in information. All communication tools today, in developed, developing and underdeveloped nations are capable of providing information. While highly valuable, information does not actually refer to knowledge. Information retained on a certain subject creates an accumulation of this information. Without this accumulation, the information obtained cannot be interpreted. In recent years, individuals have been bombarded with information. It is therefore plausible to state that individuals that lack a permanent store of information along with the society they establish is an information society. A knowledge society, however, is one that strives for production through a combination of their readily available stores of information and their transformation of information it receives into knowledge. Thus, not all network societies are knowledge societies. Athique, referring to this differentiation, states that the terms "knowledge society" and "network society" refer to the meeting point between technical passion and sociological understanding. Despite their close relation, there are important differences between them (Athique, 2013, p.17).

The information society is an expression of the industrial logic of Fordism while the network society defines the social structure of a Post-Fordist field (Athique, 2013, p.17). Network societies are formed upon communication networks and reach far beyond boundaries and borders. Therefore network societies are global (Castells, 2005, p.4). A network society is one that is fortified by ICTS based on microelectronics. A network is a cluster that is formed by the unison of nodes connected to each other. Nodes themselves to not have centers. They are simply nodes. The importance of nodes within a network increases based on their degree of internalization and efficient processing of information on a specific subject (Castells, 2001, p.3). Manuel Castells indicates that the culture of a network society is a culture of communication protocols between all cultures around the world (Castells, 2001, p.40). New cultures are established not by content, but by processes (Castells, 2001, p.39).

LEARNING IN THE DIGITAL AGE

As with many common words in the English language, the etymology of "pedagogy" is rooted in ancient Greek. Wealthy Greek families had many servants (usually slaves) among which one was tasked with the care of children. These servants usually accompanied them to educational facilities, or guided the children themselves. The Greek word for child (usually referring to male children) is "pais" (the root of which is "paid") and the word for guides is "agogus"; thus the meaning of "paid-agogus" or "pedagogue" (educator) is "guide of children". The term pedagogue later became synonymous with the teaching of youth. In essence, pedagogy involves the education of children. In the digital age, pedagogy is more of a social matter and joint learning process that involves questioning meaning and structuring knowledge in accordance. True pedagogy is educators providing opportunities of the age they live in to ensure they reach places that will amaze them in the future (Wheeler, 2015, p. 32).

Currently, people may utilize technology in the act of learning. This approach is quite different from traditional educational models. Lev Vygotsky stated that learning by oneself can not be as powerful as learning from the more knowledgeable other. The more knowledgeable other may be a peer, older brother or parent of the learner. Vygotsky's Zone of Proximal Development Theory (ZPD) hypothesizes that children learn in a broader scope when within a social context. Learning from a more knowledgeable

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

other increases in breadth and speed through the dialogue between them (Wheeler, 2015, pp.47-48). Vygotsky states that the act of learning takes place in a critical field which the individual is not aware of with their current knowledge, and defines this field as the Zone of Proximal Development. The more knowledgeable other that Vygotsky defined has for the most part been replaced by technology today. Now the interaction between the learner and the more knowledgeable other takes place via technology. From a Vygotskian perspective, this technology itself has become the more knowledgeable other in the ZPD due to it's facilitation of the learning process (Wheeler, 2015, p.49).

The need for learning has recently risen greatly compared to the past. Depending on the qualities of the era, various learning theories have been developed throughout history. From a theoretical perspective, learning was defined by Behaviorist approaches in industrial society, Cognitive approaches during the transition from industrial society to information society, and Constructivist approaches in the knowledge society. In the network society, Connectivist learning approaches stand out. George Siemens proposes Connectivism as a learning paradigm for the 21st Century and digital age. In this era, learning takes places on networks.

Learning is defined by Siemens as follows (Siemens, 2006, pp.27-28):

- **Chaotic:** Diverse and messy, not necessarily neatly packaged and arranged.
- **Continual:** Ongoing in development and communication. The model of "go to a course" is being replaced with learning and knowledge at the point of need.
- **Co-Creation:** Instead of content consumption (or passive learners involved in knowledge acquisition), experts and amateurs are now co-creators in knowledge.
- **Complexity:** Learning is a multi-faceted, integrated process where changes with any one element alters the larger network. Knowledge is subject to the nuances of complex, adaptive systems.
- **Connected Specialization:** Complexity and diversity results in specialized nodes (a single entity can no longer know all required elements). The act of knowledge growth and learning involves connected specialized nodes.
- **Continual Suspended Certainty:** We know in part. An attitude of tolerance for ambiguity and uncertainty is required. Certainty is for a season, not a lifetime.

Mobile technology is a key element in learning through networks. Mobile technology is a new facilitator that provides the opportunities required of connectivist learning environments. It incites the unison of mobility, social media and learning by providing a basic infrastructure. These changes in learning environments facilitated by mobile information and communication technologies allows for the determination of the needs of new learners. Learners now feel the need to ask these questions: How may I learn in a network environment? How may I manage the learning process on a network? How can I exist in a network environment? How can I utilize the tools of the network society? (Ozan, Kesim, 2013, p.116).

Connectivism has been praised as a learning theory for the digital age. Compared to previous generations, it attempts to explain how learners who use personalized, online and collaborative tools learn through different means and methods. It focuses on how knowledge is disseminated to an audience wider than ever through digital media. What matters today is not the personal internalization of knowledge by students, but for them to know where to access it when they need to (Wheeler, 2015, pp.36-37).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

This study aimed to express the changes and transformations from the Renaissance to today based on scientific studies. Each era encompasses their own assumptions and understandings. The assumptions and understandings of an era is usually expressed by the term "paradigm". Kuhn defines the paradigm as a model in a scientific field consisting of scientifically accepted elements, which is generally accepted for a period of time (Kuhn, 1970, p.42). In other words, they are competing scientific approaches. Based on Kuhn's definition, the comparison of the scientific approach of one era with that of the next era depends on knowing both eras very well. Individuals whom comprise today's society face serious issues regarding facing, understanding and assigning meaning to new developments. The mechanical and determinist understanding of the modern era continues to be effective. On the other hand, developments in fields such as Relativity and Quantum Mechanics, along with their products already available in markets, are rapidly changing and transforming societies. New products present their own culture along with the products themselves. Individuals in every aspect of the field of education must be able to understand and create meaning from these rapid changes. It is the teachers and academics of the world who will explain these rapid changes with a strong scientific foundation. People in teaching positions must effectively internalize the premodern, modern and postmodern eras. Otherwise, they will struggle to understand the behavior and understanding of the students that they are teaching and training, causing irreparable ruptures in the communication between them.

REFERENCES

Adorno, T. W. (2007). *Kültür Endüstrisi [The Culture Industry].* Mustafa Tüzel, Elçin Gen, İletişim Yayınları.

Athique, A. (2013). *Digital Media and Society: An Introduction*. Polity Press.

Baudrillard, J. (1994). *Simulacra and Simulation*. The University of Michigan.

Castells, M. (2001). *Informationalism, networks, and the network society: a theoretical blueprint. In The Network Society, A Cross-cultural Perspective*. Edward Elgar Publications.

Castells, M. (2005). *The Network Society: From Knowledge to Policy*. Gustavo Cardoso Center for Transatlantic Relations.

Creeber, G. (2009). *Digital Theory: Theorizing New Media. In Digital Cultures*. Open University Press.

Dijk, J. V. (2012). *The Network Society*. SAGE Publication Ltd.

Dobbs, B. J. T., & Jacob, M. C. (2000). *Newton ve Netwonculuk Kültürü [Newton and the Culture of Newtonianism].* İzdüşüm Yayınları.

Freyer, H. (2014). *Sanayi Çağı*. Doğu Batı Yayınları.

Friedman, T. L. (2007). *The World is Flat, A Brief History of the Twenty-first Century*. Picador.

Gere, C. (2008). *Digital Culture*. Reaktion Books Ltd.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Giddens, A. (2012). *Modernliğin Sonuçları [The Consequences of Modernity].* Ayrıntı Yayınları.

Gott, J. R. (2005). Einstein Evreninde Zaman Yolculuğu, Zamanda Yolculuk Olasılığı [Time Travel in Einstein's Universe: The Physical Possibilities of Travel Through Time]. Erdem Kamil Yıldırım, Arkadaş Yayınevi.

Gribbin, J. (2006). *Evren, Bir Biyografi [The Universe A Biography].* Alfa Bilim.

Hand, M. (2008). *Making Digital Cultures- Access, Interactivity, and Authenticity*. Farnham, UK: Ashgate Publishing Ltd.

Hassan, R. (2004). *Media, Politics and the Network Society*. Open University Press.

Hawking, S., & Leonard, M. (2011). *The Grand Design*. Bantom Books.

Hawking, S., & Mlodinow, L. (2012). *Büyük Tasarım [The Grand Design]*. Doğan Kitap.

Hawking, S. W. (1988). *A Brief History of Time, From the Big Bang to Black Holes*. Bantam Books.

Hawking, S. W. (2015). *Ceviz Kabuğundaki Evren [The Universe in a Nutshell]*. Alfa Bilim.

Huyssen, A. (1994). *Postmodernin Haritasını Yapmak [Mapping the Postmodern]*. Vadi Yayınları.

Irwin, W. (2002). *The Matrix and Philosophy: Welcome to the Desert of the Real*. Open Court Publishing.

Jameson, F. (2004). *Biricik Modernite, Şimdinin Ontolojisi Üzerine İnceleme [A Singular Modernity, Essay on the Ontology of the Present]*. Epos Yayınları.

Kaku, M. (2012). *Einstein'in Evreni*. ODTÜ Gelişim Vakfı.

Kesim, M. (2007). e-Öğrenme- Bir Harften Öte Bir Paradigma Değişimi ve Herkes İçin Her Zaman Her Yerde Öğrenme [e-Learning- A Paradigmatic Change More than a Letter and Learning Anytime Anywhere for Anyone] in Coşkun Can Aktan (Ed), Değişim Çağında Yükseköğretim, Global Trendler-Paradigmal Yönelimler [Higher Education in Transformation-Global and Paradigmatic Trends]. Turkey: Yasar University.

Kuhn, T. S. (1970). *Bilimsel Devrimlerin Yapısı [The Structure of Scientific Revolutions].* Alan Yayıncılık.

Lévy, P. (2001). Cyberculture (R. Bononno, Trans.). University of Minnesota Press.

Murphie, A., & Potts, J. (2003). *Culture and Technology*. Palgrave Macmillan. doi:10.1007/978-1-137-08938-0

Nasa. (2016). Retrieved from http://voyager.jpl.nasa.gov/where/

Neffe, J. (2009). *Einstein, Bir Yaşam Öyküsü*. İletişim Yayınları.

Ozan, O., & Kesim, M. (2013). Rethinking Scaffolding in Mobile, Connectivist Learning Environments. In Handbook of Mobile Learning. Routledge, Taylor & Francis Group.

Reed, T. V. (2014). *Digitized Lives: Culture, Power and Social Change in the Internet Era*. Routledge.

Rifkin, J., & Howard, T. (2010). *Entropi, Dünyaya Yeni bir Bakış* [Entropy: A New World View]. İz Yayıncılık.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Russel, B. (2011). *Rölativitenin ABC'si [ABC of Relativity].* Sarmal Yayınevi.

Şaylan, G. (2002). *Postmodernizm*. İmge Kitabevi.

Siemens, G. (2006). *Knowing Knowledge*. Retrieved from www.knowingknowledge.com

Tapscott, D. (2009). *Growing Up Digital, How the Net Generation is Changing Your World*. McGraw Hill.

Thorne, K. (2014). *Yıldızlararası Bilim [The Science of Interstellar].* Alfa Bilim.

Toffler, A. (n.d.). *Üçüncü Dalga* [The Third Wave]. Koridor Yayıncılık.

Toffoletti, K. (2011). *Baudrillard Reframed*. London: I.B. Tauris & Co. Ltd.

Tubella, I. (2001). Television, the internet, and the construction of identity. In The Network Society, A Cross-cultural Perspective. Edward Elgar Publications.

Wheeler, S. (2015). *Learning with 'e's, Educational Theory and Practice in the Digital Age*. Crown House Publishing.

Yalçın, C. (2008). *Evren ve Yaratılış*. Arkadaş Yayınevi.

KEY TERMS AND DEFINITIONS

Big Bang Theory: The Big Bang Theory is one of the most significant approaches regarding the creation of the universe today. This theory posits that the universe started as a single point with immense density, and suddenly expanded, and this approach leads us to believe that there must be a beginning to the universe.

Connectivism: Connectivism has been praised as a learning theory for the digital age. It attempts to explain how learners who use personalized, online and collaborative tools learn through different means and methods. It focuses on how knowledge is disseminated to an audience wider than ever through digital media (Wheeler, 2015, p. 36-37).

Digital Culture: Digital culture is formed through the influence of existing and available digital technology. In the digital world, machines are more of a social phenomenon than a technical one. Digital culture is established on the objectification and specialization of the current sociopolitical status, culture, and economy (Han, 39).

Frankfurt School: It was established in 1923 in Frankfurt. Thinkers of the school developed critical theory in opposition to traditional positivist understanding. Some prominent members of the Frankfurt School were Max Horkheimer, Theodor Adorno, Herbert Marcuse, Walter Benjamin and Jürgen Habermas.

General Relativity: There can be no absolute regarding time and space, and they cannot be expressed independently. With large astronomical objects bending space, time is also bent. This is called space-time interaction. General relativity states that the field of gravitational pull bends light. Thus, if space is bent, so is time.

Modernism: Modernism is an umbrella term, as society's reaction to the industrial revolution towards the end of the 19th century (Creeber, 2009, p. 11). The modern era began with the emergence of the mechanical world view. Causality is a defining characteristic of modernity. The characteristics of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

settings relating to modern concepts can be summarized as: material, continuous, objects, determined, neutral, actual, centered, fixed, governable and effects (Hand, 2008, p.53).

Newtonian Mechanics: Newtonian Mechanics inspired the Industrial Revolution. Newton, who left his mark on the modern definition of space and time, states that space and time are absolute. He indicates that space and time are independent and constant.

Postmodernism: Postmodernism lacks clarity and does not express any form of precision or accuracy. The characteristics of settings relating to postmodern concepts can be summarized as: discursive, discrete, spaces, undetermined, cultural, virtual, decentered, mobile, un-governable and performances (Hand, 2008, p.53).

Simulacra: Simulacra are image, imitation, similarity and semblance. (Baudrillard, 1994, p. 2)

Simulation: Simulation is the artificial reproduction of a tool, machine, system or the functioning of a phenomenon through a model or computer program for the purpose of its study, exhibition, or explanation. (Baudrillard, 1994, p. 2)

Special Relativity: Time is relative, and related to the speed of a moving object. Light travels at 300,000 kilometers per second. The speed of matter may never exceed the speed of light.

String Theory: String Theory states that particles are not necessarily points or dots, but one-dimensional strings. These strings vibrate at differing frequencies, and each distinct frequency creates a different particle. The greater the vibration of the string, the greater the mass of that particle (Hawking, 2015, p. 61).

Uncertainty Principle: Heisenberg's Uncertainty Principle states that the location and speed of an electron cannot be measured with the same accuracy. Heisenberg formulated one of the basic principles of quantum physics. His Uncertainty Principle establishes that the location and speed of a particle cannot be measured simultaneously (Hawking & Mladinow, 2011, p.90).

This research was previously published in Supporting Multiculturalism in Open and Distance Learning Spaces; pages 83-105, copyright year 2018 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 53
Digital and Collaborative Work: Winning Couple?

Christelle Lison
Université de Sherbrooke, Canada

Constance Denis
Université de Sherbrooke, Canada

ABSTRACT

Do digital and collaborative work go hand in hand? This chapter combines the practical experience of two university teachers and literature to answer this question. Basic notions are revisited: Collaborative work, Distance learning, Social constructivism, Authentic learning to establish the winning conditions. Collaborative work implies three types of action, i.e. communicating, coordinating, and producing. Digital technology finds its place in each of these, given the great diversity of tools available. To promote collaborative work with digital, the authors propose to clarify teaching objectives, to vary digital and pedagogical tools, and to develop the evaluation of collaborative work. The practical experience helps to clarify the main constraints of remote collaborative work and to identify some key elements to be aware of. Several concrete examples illustrate the problems and possible solutions.

INTRODUCTION

Digital technology and technological tools (ICT) are proliferating. They are as much a part of our daily life as of our professional life. Smartphones, tablets, computers: the possibilities are manifold, varied and often easy to use. Furthermore, social networks reunite us with our childhood friends whom we had lost track of 20 years ago, our old university friends, colleagues we met during our first job. Online search engines enable us to research something we are passionate about, or the country we will visit on our next holiday, or even the symptoms we are suffering from. According to a recent survey, *digital life links people to people, knowledge, education and entertainment anywhere globally at any time in a nearly frictionless manner* (Pew Research Center, 2018, p. 3). But what happens when it comes to

DOI: 10.4018/978-1-7998-7297-9.ch053

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

learning? We would use the technologies in a different way (Duguet & Morlaix, 2018) and probably less easily (Lison & Meyer, 2014), although digital uses are partly developed based on personal practices (Gremmo & Kellner, 2011).

When we think about learning into the context of higher education, it automatically calls for quality. So, many institutions of higher education nowadays choose to integrate digital technology into the courses they offer, even sometimes to "save" certain programmes by starting to offer them in a distance learning. Often conceived first and foremost in an economic perspective, this practice should above all be an opportunity to view teaching and learning differently (Puentedura, 2009), to question practices and to foster the development of new cognitive strategies, particularly in terms of information processing. These are elements that constitute part of the quality of education. In parallel with this movement linked to technologies, institutions of higher education in North America, but also in many countries across the world, increasingly consider the importance of implementing the foundations of constructivism and of social constructivism, thus assuming that what is learned is notably the "product" of social interactions. In this respect, Engeström (1987), in his model of collective activity, sees the subject as an individual or a group that carries out actions based on a collective objective. Thus, collaborative work may be regarded as a space in which the learners communicate, coordinate their activities and produce "a result". Considering the importance, today, of what one could call the "teamwork competency" on the labour market, it is not surprising that this is one of the configurations of the current academic reality. In this reality, it seems to us that digital tools may support or facilitate students' learning and teachers' practices, in a context that is intended to be authentic. This is at least what we would like, as a teacher and a researcher (Michaut & Roche, 2017). But what happens in the field? Can digital and collaborative work really be a winning couple?

This chapter supports the marriage of digital and collaborative work, at the level of a course or a program. It combines our experience in higher education with literature. We teach at all three university levels, including fully online programs in education. In such programs, learners must use technology to learn and collaborate with each other. The objective of this chapter is to provide a picture of the current pedagodigital context before defining collaborative work. The fundamental concepts are presented, e.g., distance learning, social constructivism and authentic context. Collaboration and cooperation are made explicit in order to distinguish them. The main issue is to respond to the question raised in the title of the chapter: is the marriage of digital and collaborative work possible? Our experience and literature allow us to present the main obstacles and winning conditions. To do this, it is important to clarify learning targets, use the right technologies and plan the assessment. Several constraints are presented to facilitate collaborative work in the pedagodigital context. The conclusion suggests presenting some examples of the use of digital technology in the francophone American university context in a reality of collaborative work.

BACKGROUND

This section of the chapter puts forward the current pedagodigital context as well as certain definitions, specifically with respect to collaborative work.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Current Pedagodigital Context

At the beginning of the century, if few people knew the modern social networks, they are omnipresent today. How many of us live "hooked on" our phones, having difficulty in restraining ourselves from consulting them at very frequent intervals? In 2017, Canadian Broadcasting Corporation revealed that Canadians spent about four hours per day on their smartphone, including in the bathroom (50%), during family meals (60%), in bed (90%). If this may seem extreme, we must imagine that students do not escape this reality. Besides, how many teachers complain about the distractions linked to digital tools (Houart et al., 2019)? Others feel uncomfortable when students contradict them, "validating" what they say as they go along with the help of their phone, sometimes mobilising quality resources, and at other times sources that would be described as unreliable. How to react when faced with these "new" reactions in class? The institution or teacher often responds by imposing a ban: blocking Internet in the classrooms or even banning laptop computers in class. But is this a "good" solution or a realistic solution in view of the omnipresence of the technologies?

Distance Learning

Although ICT may have negative effects on the involvement of students in class, it seems to us that they must also be regarded by the academic world as opportunities to adapt pedagogical practices and even to put forward things that were unthinkable in the past (Puentedura, 2009). For example, Distance Learning (DL), but also co-modal or hybrid courses, are gaining ground in universities every year. In class or DL, teachers are now able to offer interactive quizzes in class with different software packages or free sites, such as Kahoot or Socrative. We can also quote the Massive Open Online Courses (MOOCs) which have experienced an explosion in popularity over the past few years (Karsenti & Bugmann, 2016). Both in personal and professional life, it is important to emphasize that the technologies facilitate, closer ties between the users from different backgrounds. That is to say that technologies have an impact on the activities of daily life just as well as on teaching or learning strategies in the academic world (Lameul, 2017). It remains to be observed whether this impact is positive or not.

Manzoor (2017) mentions that curiosity is an important factor in the use of digital technology in pedagogy. *According to Dede et al. (2005) student curiosity is a very important feature […] for motivation. Designs of scenarios around some topics of interest can help develop this curiosity. […] Students also value other features such as collaboration with teammates, autonomy, and communication with others, actively working like a [professional] and using tools. More interestingly, the use of virtual worlds in education decreased students' absenteeism and even students who disliked [the subject area] become engaged and felt they could learn [more]* (Manzoor, 2017, p. 148). In DL, the interactivity made possible by digital tools improves the learning experience.

Social Constructivism

Let us take the example of the training programmes in mandatory education. For several years in North America, these have been based on the principles of constructivism and of social constructivism, with social interactions as well as cognitive and affective processes supporting the students' learning. Learning as such is intended to be a modification of what has been learned before or a reorganisation of the structure based on social interactions in the framework of an approach of personal knowledge ownership.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In other words, the student learns alone, but seldom without other people. Exchanges between learners in the framework of authentic learning situations, i.e. complex and significant, are presented as a context that is conducive to learning. In the digital age, these exchanges may be face-to-face or remote, in synchronous or asynchronous mode, with students from the same group, from the same institution or indeed from an institution from anywhere in the world. How can one fail to imagine the potential wealth of this type of solution?

Authentic Context

In a predominantly social constructivist pedagogical context, the learners engage in their learning in different ways, notably emotionally, socially and intellectually. This engagement implies a rethinking of teaching and learning situations in order to foster the set-up of an authentic context. On this basis, the learner finds him or herself in the heart of situations that are intended to be as close as possible to the tasks carried out in the practice environment. In today's digital age, *Students learn in authentic contexts, do tasks of their choosing, collaborate with others, and have access to peers who share expertise in the particular technology they wish to learn. This creates collaborative construction of knowledge, coaching and scaffolding, and embeds assessment within the learning process* (Barber, King, & Buchanan, 2015, p. 60). Learning in an authentic context benefits the learners in a collaborative construction of knowledge and an articulation of the process, while moving away from the focus on the product. As a matter of fact, the product is not the learning outcomes, but the result of the situation to learning. In other words, we will have probably never been as close to the famous "learning to learn", in a perspective in which we are preparing students for jobs that do not yet exist.

If the task is intended to be authentic, so is the context. It is therefore important that the learners familiarise themselves with the ICT available to them. Once again, this by contrast sometimes puts the teacher into a position that may trouble him or her: from the moment when the students master ICT that are unknown to him or her, the teacher may feel that he or she is losing control, the holder of knowledge no longer being the one we can envisage. But as Lameul (2015) emphasises, does the teacher have to take on absolutely everything? In other words, is it acceptable that the students choose, in an autonomous way, a work tool beyond the choices of the teacher? What resources are available to the teacher to allow him or her to support learning without the digital tool becoming a constraint?

Since learning in the digital age aims to be authentic, by proposing the most real possible tasks, the teacher concentrates on the way the student learns, reflects, structures, creates. He or she takes an interest in the process or the approach and not only in the product or the result. He or she thus focuses on high-level cognitive and meta-cognitive learning strategies. For his part, the learner, plunged into the heart of authentic situations, utilises the technologies to be active, make discoveries, check his hypotheses and reflect on the learning process. In addition, the technologies enable him of her to share and to exchange with the other learners while adopting a stance that may be qualified as social constructivist. For example, Chi, Kang and Yaghmourian (2017) have shown that *tutorial dialogue-videos enhanced observing students' learning more so than lecture-style monologue-videos, [bringing students] to be more constructive and interactive compared to watching monologue-videos* (p. 39). This study reveals that students will become learning models of for their peer when they are in collaborative work. In our opinion, this is a real added value.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Communication With Technologies in Education

In the academic world, technologies should therefore be regarded as tools, and not as an end in themselves, to be implemented in order to simplify and/or facilitate, but above all to optimise teaching and learning. In this respect, they are sometimes used in tasks that would be impossible to carry out without them (Calixte, Gronier, Ben Rajeb, & Leclercq, 2018). We only have to think of the use of *Google Earth* in class to work on topics such as urbanism, agricultural systems or history (Demirci, Karaburun, & Kilar, 2013). We can also think about what they make possible in a flipped classroom type of philosophy. More than 20 years ago, Bates (1997) already drew attention to the fact that technologies were gaining in popularity, given the possibility of reducing the spatio and temporal aspects of teaching and of learning compared to that in face-to-face training. More recently, Patel and Patel (2017) mentioned that ICT provides tools to facilitate learning anywhere at any time. In our experience, we can say that the movement has only accelerated, although teachers' training has not always followed. Yet, what seems important to us, in the use of digital technology, is the meaning that this makes it possible to return to the teaching presence. In other words, what is the added value of face-to-face training? This is a question that should inspire teachers!

Communication with ICT is divided into two modes: synchronous and asynchronous (Johansen, 1988). In the first case, the learners can communicate at the same time, given a synchronised virtual presence; this is typically the chat. Communications are conveyed instantaneously, for example, with the help of videoconferencing tools, or of tools like Slack, WhatsApp or Zoom. In the second case, communications are not simultaneous. As they are available, the learners interact by sending files, emails, messages. In this way, information is picked up at different times, remotely, sometimes in places and at times that are completely outside academic time. Depending on the circumstances and the contexts, one of the two modes may be more effective. We have noted, specifically based on practices in different courses we teach, that synchronous and asynchronous information is not at the same level. If synchronous mode makes it possible to solve problems rapidly or to obtain brief responses to specific questions, asynchronous mode is better suited to exchanges that require reflection and greater depth. Otherwise, the synchronous sessions should be prepared to enable students to reflect on the questions they will be asked, for example by sharing them in advance. Furthermore, the length of the messages in themselves is significant. It is sometimes even important to remind students of the context of the exchanges, to avoid language that is too familiar or exchanges that are insufficiently based on the course matter or reliable sources. In our opinion, the question is not to know whether one mode is better than the other, but rather to use them in a pertinent way according to the teaching or learning objectives. If we use Facebook as an example, it must be noted that research is not yet clear with respect to the effect on students' learning of using this platform. Moreover, there is some ethical and/or copyright issues to discuss with the use of social media (Henderson, Auld, & Johnson, 2014). However, as emphasised by Lampe, Wohn, Vitak, Ellison, & Wash (2011), *While we do not expect Facebook to independently cause a paradigmatic shift in students' educational experiences, the repurposing of a tool that the vast majority of students are accessing on a daily basis has the potential to support new forms of interaction between students and instructors* (p. 346). This means that the teacher must demonstrate creativity in the pedagogical use of certain tools from the learners' daily lives. Of course, this creativity must work hand-in-hand with the targeted learning objectives. It is also important for the teacher to demonstrate a basic comfort level with the selected technologies in order to avoid technical problems and frustration for him of her and for his students. Particularly in the form of DL, certain training programmes or resources could be consulted, to facilitate the use of the various digital tools.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In this extent, the diversity of digital tools makes it possible to group most learners according to their comfort level with the technologies. Of course, in certain cases, this leads to a reorganisation of teaching or learning practices. The means of communicating, collaborating and producing are then numerous (Ellis & Wainer, 1994). Pavlovskaya and Perkins (2016) mention that there is important *to find effective ways to increase the students' level of socio-cultural competence that would allow them to communicate successfully in a new virtual learning environment* (p. 16). In the case of the younger generations, the use of ICT aims to be a way to reach, appeal and attract them, but also to break with the tradition and sometimes the isolation of the learners. We ourselves, as teachers in a specific discipline, sometimes appreciate being able to follow, from the comfort of our own living room, a course given by a specialist in our field via a MOOC or a YouTube video.

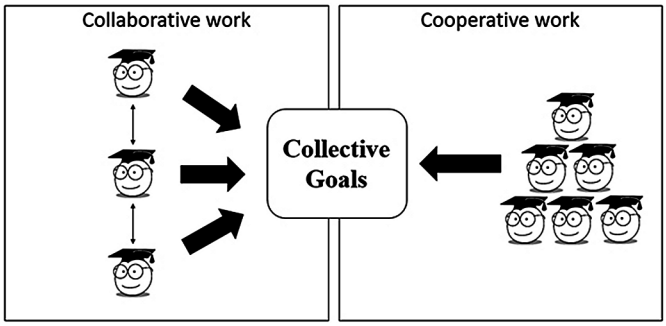
Collaborative Work: Theoretical Milestones

In the digital age, *it is possible today to work together, on a very large scale, on the same project, but remotely, synchronously or asynchronously, on modifiable supports while making it possible to have a direct relationship between the "collaborators" or "cooperants" thanks to the Internet* (Gangloff-Ziegler, 2009, p. 95). Collaborative work, irrespective of the domain, implies a horizontal organisation of the tasks to be carried out. In this way, the mutual commitment and responsibilities are distributed in a way considered to be uniform between the members of the team in a coordinated effort (Durand, 2009; Gangloff-Ziegler, 2009). Collaborative work implies the absence of a hierarchy where the roles are allocated under the supervision of a controller. It is therefore no longer up to the teacher to play this role. It is for the learners to put in place a structure that allows them to function in an effective and efficient way (Durand, 2009). In our experience, it is worth noting that they nevertheless sometimes need to be guided in the set-up of collaborative work because it does not suffice to simply put people together to make them work. Kozar (2010) explains that *While working together, students build new understanding by challenging others' ideas and defending their own. When successful, this creates a product that is different from what any individual could produce alone* (p. 17). In this context, the members of the team must regard themselves as partners who must help one another to produce a shared result that everyone endorses, thereby making them interdependent (Lanarès & Daele, 2013). It is therefore a challenge for the teacher who is in the habit of creating working teams or allocating roles in these teams. Indeed, in collaborative work, the tasks are not divided between the members with the aim of producing a common achievement but are instead worked on collectively. The tasks may be segmented but the result is a common "recomposition" by the adoption of a global point of view that is discussed and shared (Durand, 2009). For example, in our experience, teachers will have already received a "piece of teamwork" that is more like a patchwork than a real piece of teamwork; the style of writing differs from one section to the next or parts are repeated or contradict one another. It then rapidly becomes clear that this piece of work was not developed by a team but by individuals.

Figure 1 is inspired by the work of Henri and Lundgren-Cayrol (2001). It presents a comparison between collaboration and cooperation. In cooperative work, team members individually carry out part of the collective work. They have a group responsibility and not an individual responsibility. There is mutual interdependence between them. In collaborative work, everyone has individual responsibilities. They are associatively interdependent. Everyone does the task in their own way. Global production is discussed, negotiated and accepted by all (Henri and Lundgren-Cayrol, 2001).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

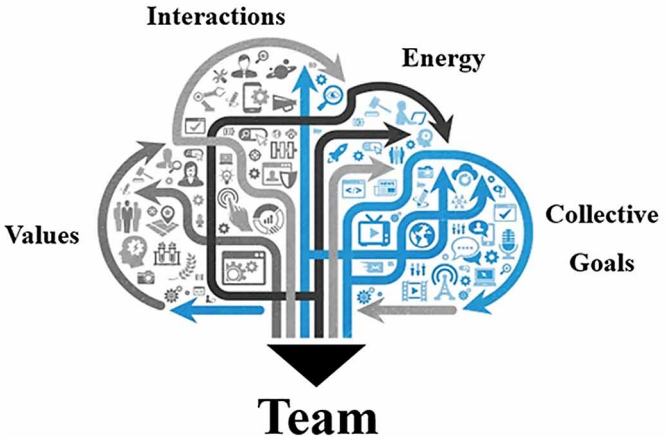
Figure 1. Comparison between collaborative and cooperative work
(Henri et Lundgren-Cayrol, 2001)



Common Values for a Collective Work

For collaborative work to be made possible, the common objective must be underpinned by shared values and constant interactions. It is particularly through these interactions that the group will be nurtured, thus producing collective energy and cohesion, enabling it to achieve its objective.

Figure 2. Team in collaborative work



In Figure 2, adapted from St-Arnaud (2008), the team shares common values. It is the team that produces a certain energy to mobilize interactions and cohesion around common objectives. Results can then be obtained in line with the team's values. There is no need for these interactions to systematically be in synchronous mode. Both modes of distance interaction can complement each other and can even add up to being present in class. This of course leads the student to contend with different timescales (Lesourd, 2009). Collective work might bring constraints that are sometimes onerous in the current context of life. In the light of the above, it is possible to appreciate the complexity of collaborative work. Its achievement compels the teacher to think this work through and to prepare the learners who will need to carry it out (Long & Meglich, 2013). Beware anyone who believes that improvisation is possible in carrying out such work.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Teacher's Role

In this context, collaborative work aims at individual and collective learning of varied skills, notably methodological, organisational, cognitive and metacognitive. Thus, as mentioned above, the focus is not on the result, but rather on the approach or the process. The teacher avoids focusing his energies and those of the learners on the solution or the result. Collaborative work may thus be the object of a - formative or summative - validation or of phased discussions. It is therefore important that the students avoid being absent during certain stages of the process of the collaborative work (i.e. definition of the roles, the common goals or the common values). Each person's tasks depend on those of the others. Furthermore, as a teacher, it is not appropriate to conduct one single assessment at the end of the training path. When reading the above, we recognise that the problems of collaborative work can be multiple i.e. organisational, temporal, technical, human. In order to prevent these, it is vital to take the time to discuss the values of each person and to provide the framework for the collaboration. Thus, this type of work must be presented by the teacher and adopted by the learners. This may require additional energy and time. Nevertheless, the multiple and complex learning that will arise from this, particularly through what may be called social-cognitive conflict, should exceed what the learner can achieve on his own and by listening to a teacher.

In the context of human resource management, Blais and Pouliot (2009) mention the importance, in order to foster teamwork, of concentrating on three pillars:

1. A common target that is understood and accepted by all, fostering the mobilisation of the individuals;
2. A clear and defined organisation of the task that is reviewed periodically, fostering the effectiveness of the team; and
3. Healthy relationships, with a view to ensuring the cohesion of the group.

We consider that these characteristics are completely transferable to the situations of teaching and learning. It is, in our opinion, up to the teacher to put these conditions in place so that the students can embark on effective, quality collaborative work. Furthermore, as in the case of many companies today, working teams do not always meet in the same location or do not always have schedules that foster face-to-face group meetings. Remote working and the recourse to digital tools may thus be elements fostering collaboration and reducing certain frustrations, particularly the impression that the work has not been done in an equitable way by the different members of the team. This means that collective learning with digital tools is work in an authentic situation.

Technologies in Collaborative Work

Technologies, used in a collaborative context, foster three types of action, i.e. they make it possible to communicate, to coordinate and to produce (Ellis & Wainer, 1994). Indeed, the learners exchange ideas in a formal way but sometimes also informal. Those exchanges are about the common work, as well as their understanding, as for example, of the teacher's instructions. By this very fact, they organise and coordinate their actions, giving themselves an operating structure and a calendar of work. As a result of collaboration, a concrete production arises from this which each person assumes his or her responsibility with respect to the production. In certain cases, several ICT are used in order to make the three types of action possible. Nevertheless, the present digital age makes available to learners certain tools that can

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

bring together the three types of action, as is the case, for example, with *GoogleDocs*. With this tool, it is important to consider intellectual property and confidentiality of information. Indeed, on this free platform, the learners can exchange ideas in synchronous or asynchronous mode with the help of a chat window, but also share feedback on the work produced. The different members of the team can easily monitor the changes that are made. Suggestions or comments can be proposed to facilitate a common understanding. Depending on the nature of the output, it may take the form of online files made available to the users. A tool of this kind makes it possible to support collaborative activities between learners who are located remotely. We can imagine how this can also be very useful for colleagues working together, pooling their pedagogical activities, exchanging resources or setting-up research projects in a team.

It is important to remember that collaborative work is a form of solidary organisation of work where each person is responsible for the whole thing, without it being possible to systematically isolate the individual share, coordination being made by mutual adjustment (Gangloff-Ziegler, 2009, p. 97). It therefore seems legitimate to ask oneself about the real potential of using ICT to support collaborative work. In this case, the technologies may present themselves as tools to communicate or to share information. We can think about discussion forums, instant messaging, online storage (cloud), shared site (wiki), organisational applications (shared calendars), online office suite with possible collaboration. Their diversity makes them appealing. The possibilities may be manifold, but the question of the winning couple remains.

DIGITAL AND COLLABORATIVE WORK: WINNING COUPLE?

Issues, Controversies, Problems

The three types of action in collaborative work: communicating, coordinating and producing (Ellis & Wainer, 1994), call for a wide range of competencies on the part of the learners, particularly with regard to ICT and their applications. The authentic context, which is intended to be complex and significant, places the learners in an environment where their strength consists of the diversity of competencies, among others, organisational, cognitive, metacognitive, methodological, technological. The success of the group is based on its capacity to take advantage of everyone's competencies. The flexibility of the digital tools then makes it possible to optimise this leverage. Mutual commitment and sharing of responsibilities are facilitated by the synchronous and asynchronous communications despite the possibility of conflicts (Gangloff-Ziegler, 2009). Indeed, although digital technology enables the sharing of messages, it does not always convey the tone of these messages. Feelings and impressions must be discussed in order to avoid a sense of uneasiness arising. Thus, the solidary nature of collaborative work constitutes both a lever and a constraint for learning.

In our experience, if students have a key role to play in the context of collaborative work, it should not be forgotten that teachers are most often the instigators of this. In this respect, they need to delineate it and give the students the keys to carry it out in an appropriate way. Indeed, the learners have only rarely been prepared to carry out collaborative work; even less so when it is remote. In a face-to-face classroom setting, this does not seem particularly complicated to us: give some instructions, move among the groups, allocate some time in class. But remotely, certain dimensions escape us, including the relationship between the technology and the learner (Meyer et Sanchez, 2015). As a teacher, this is more difficult to define and to delineate. However, it is becoming one of the levers of collaborative work.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Moreover, the choice of the technologies used and the way of using them may be sources of conflict or, on the contrary, drivers of productivity. In case of need, the teacher must not forget the role of mediator that he or she must play when necessary.

Explicit Teaching Goals

In the framework of teaching, our years of experience lead us to consider the importance, in the first instance, of defining the training targets. How important it is to collaborate to achieve these targets? How do these targets foster or support collaborative work? Why do we think is it important for the students to collaborate? In certain models of monologue-style DL (Chi, Kang, & Yaghmourian, 2017), as indeed most MOOCs are, the training targets probably do not involve a need for collaboration. Is it, then, relevant to suggest this? What is the added value? In what way will collaborative work be "sold" to the learners? Furthermore, once the teacher considers collaborative work to be relevant, other questions may arise. To what extent may learners circumvent collaborative work? How can one devise authentic situations that necessitate "real" collaborative work? If it is a question of collaborating for the sake of collaborating, it seems to us that this makes little sense. A certain number of students realise this, moreover, when teachers suggest group work simply to reduce the number of papers to mark. And it is reflected in the quality! Subsequently, once the teaching goals have been set, it is important to devise pedagogical methods that foster collaboration. Once again, although this may seem relatively simple to implement when the learners and the teacher are in class, it may become quite a challenge in DL. How can active learning online be fostered? Using the synchronous mode, it is possible, depending on the videoconferencing platforms, for example, to organise activities. This requires a certain dexterity of the teacher to organise this collaboration remotely, but without constituting real complexity. Of course, the first sessions may take more time and sometimes require the expertise of a pedagogical advisor or a more experienced colleague.

Furthermore, it is important to see how the collaboration may be prepared upstream and downstream of the synchronous meeting. It is at this level that students sometimes complain carrying out group work remotely with people you don't know is not easy. Indeed, the difficulty often lies at the level of establishing contact. How do you contact people? How to share values with them? How to state the operating rules? Many papers refer to the fact that a first synchronous meeting (in person, by telephone or by videoconference) is vital. Based on our experience, we consider that it can help things to fall into place. On the other hand, in remote programmes that are completely, in asynchronous mode, it is possible to create what Petit, Deaudelin and Brouillette (2016) call the feeling of remote presence. Jézégou (2010) declines remote presence across three dimensions, which are (1) cognitive presence, (2) social-emotional presence, and (3) pedagogical presence. Having reflected on this question in the context of the supervision of remote traineeships, Petit, Deaudelin and Brouillette (2016) consider that digital technology could enable students to participate in a Community of Practice with the help of videoconferencing tools (synchronous mode), to have instant discussions (synchronous mode) or to collaborate in a discussion forum (asynchronous mode). These interactions could foster the students' learning, remotivate them if they are experiencing a moment of doubt, lead to in-depth reflection, particularly through the confrontation of ideas. In a context of collaborative work, it seems to us that the feeling of remote presence is a guarantor to foster communication, coordination and production.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

A Variety of ICT for a Collaborative Work

Among the methods of active learning that can be implemented remotely, let us mention problem-based learning, case studies, games, simulation and the use of an ePortfolio. In certain areas, particularly in engineering, computing or in health sciences, digital tools may offer the advantage of reducing the material costs and risks to persons. The learners can use the simulators to carry out collaborative work where the abilities of each individual are used to advantage. It is also possible to include activities that involve videos (Lison & Petit, submitted 2019). In this way, the students can film themselves in practice, place their films on a secure platform and receive feedback from their peers. The students can comment on the videos at a time that suits them, and they can take note of the comments as and when they wish. In any case, what is important is to be clear about the instructions so that everyone knows their role and which rules govern the activity. Here, the role of the teacher is crucial as he or she has to clarify the training objectives. Let us not forget that online activities lead the students to mobilise different strategies (Lison, 2017). Indeed, the learners can rapidly access a wealth of human or material resources, including e-books or online audio books. In addition, in order for the students to be able to utilise these resources intelligently, it is important that they develop their intellectual stance across two dimensions that Hofer and Pintrich (1997) call the nature of knowledge (in terms of certitude and simplicity) and the nature of the act of knowing (in terms of source and justification). In this way, we consider that the learners must be trained in critical thinking. This means that such collaborative work cannot take place without preparation (Long & Meglich, 2013). In our own experience of teaching, it is sometimes easier for students and for the teachers to adopt this way of working in a program approach rather than in a single course. Consequently, the students could transfer the competencies they have developed from one course to another progressively.

Assessment of Collaborative Work

Once the activity of teaching and learning has been carried out, we should mention that the assessment of collaborative work often constitutes one of the teachers' main difficulties. First, what must be assessed? Next, how should it be assessed? How can one aim for an authentic training and learning situation by assessment? Let us not forget that the idea is to focus on the approach, the process, and not only on the product. The assessment must therefore correspond to this idea. In this respect, many teachers fear that collective work is primarily the work of a single person on whom the other students have relied. The development of the MLE (more, less, equal) matrix (an assessment that is plus, minus, or equal to that of the student who is assessing in accordance with a pre-established criterion) by teachers at the Faculty of Engineering of the Université de Sherbrooke (Bachelet, 2011; Doucet, 2007) represents an interesting approach (see figure 3).

The PME matrix enables students to self-assess via peer assessment. In brief, it facilitates the work of the teacher who is seeking to gauge the individual and collective contribution to collaborative work. The principle is simple; it is a matter of distributing a total number of points (for example five points for a team of six) between the students according to the perceived contribution (more, equal or less than oneself) (Doucet, 2007). If this seems complicated at first sight, it seems to us that it is difficult to envisage a pedagogical alignment that is tenable without having peer assessment. But when students are in distance learning, it is even more important to provide them quality feedback, including positive

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Example of a MLE matrix – Assessment of teamwork behavior

Student assessor			Colleague 1			Colleague 2			Colleague 3			Colleague n		
			Participation in group work											
	=		+	=	-	+	=	-	+	=	-	+	=	-
			Committing oneself and being reliable											
	=		+	=	-	+	=	-	+	=	-	+	=	-
			Investing in the project											
	=		+	=	-	+	=	-	+	=	-	+	=	-
			Constructive attitude											
	=		+	=	-	+	=	-	+	=	-	+	=	-
			Bringing expertise											
	=		+	=	-	+	=	-	+	=	-	+	=	-

feedback (Halawa et al., 2017) that comes from the teacher or the peers. If collaborative work is only put forward as a teaching and learning strategy, it does not necessarily lead to a group assessment.

With respect to assessment, let us also mention that digital technology makes a diversity of forms of work possible i.e. texts, conceptual maps, diagrams, video presentation, audio commentaries. Indeed, digital technology fosters, to a certain extent, pedagogical differentiation depending on the strengths of the learners and the type of work expected. This is an added value of the technologies. They also enable students to receive feedback from their peers and from the teacher in different forms, using the approach of both formative and summative assessment. In certain cases, the feedback will be more rapid and more frequent, given the use of digital technology. In this respect, Nguyen and Ikeda (2015) maintain that the use of the ePortfolio improves the possibility *for measuring competencies, capturing and sharing self-regulated learning principles, and practicing self-regulated learning processes. The system helps instructors to design programs, create program plans, observe learning activities, evaluate learning outcomes, give feedback, and hold discussions with students* (Nguyen & Ikeda, 2015, p. 201). The possibilities are manifold in the use of digital technology to carry out collaborative work. Indeed, in the case of the ePortfolio, several tools optimise collaboration, such as commentaries and audio feedback in such a way, specifically, to encourage social constructivism (Nguyen & Ikeda, 2015). Furthermore, both for the teacher and for students, oral feedback is sometimes much more effective and rapid than written feedback.

Informal Collaborative Work

We would like to share another example of the collaborative and digital couple. During their studies at graduate level, students often experience a certain isolation which sometimes contributes to them giving up their studies (Halawa et al., 2017; Denis, in press). Our practice leads us to think that setting up a collective, even an informal one, fosters effective collaborative work. It is in fact a matter of pushing the boundaries of projects that are specific to everyone, in order to instead encourage mutual commitment

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

along the process during a training path at graduate level. Several students have drawn our attention to the pertinence of these informal exchanges, organised by means of a digital platform. They also take advantage of them to exchange texts and relevant resources in different areas of their academic life. As a result of this experience, the teacher, or here the director of research, may be effaced, but without jeopardising his or her role or credibility. Nevertheless, the learners continue the three types of action presented by Ellis and Wainer (1994), i.e. communicating, coordinating and producing. In this context, the production approach, the process, proves to be of crucial importance and collaboration helps to make this happen. This example is a good reflection of the horizontal form of organisation where tasks are distributed based on mutual commitment.

Constraints of a Collaborative Work With ICT

Several constraints arise about replicating "real" collaborative work in the academic world. Indeed, thanks to ICT and, because of the very philosophy of the organisation [of collective work*] (a network with, necessarily, a head of the network), the management and the hierarchy are physically absent, but permanently present, virtually* (Gangloff-Ziegler, 2009, p. 95). The project leader or the manager responsible for a group of projects can and must follow the stage of progress of each person's work: *if this monitoring is no longer that of each task, as was the case yesterday […], it is replaced by milestones that punctuate collective work* (Durand, 2009, p. 22). In this way, technologies can facilitate collaborative work, but also prove to be an additional burden by presenting themselves as omnipresent tools to check each person's tasks. By way of example, *GoogleDocs* makes it possible to follow all the modifications and to restore them. These options are pertinent in themselves but could constrain mutual commitment if a learner decides to erase the modifications suggested by his colleagues without discussing this at the outset. Collaborative work can then slip quietly and subtly towards cooperative work (delegated responsibilities) or individual work (individual responsibilities). Moreover, ICT can, on the one hand, facilitate the distribution of tasks without the implication of segmentation. For example, by the use of wiki where creation, modification and collaborative work are put forward. On the other hand, ICT tools can, in a more traditional spirit, encourage the compartmentalisation of tasks and the simple pooling of results, with the objective of joint production with a greater or lesser degree of mutual adjustment.

About the constraints on the marriage of digital and collaborative work, if a learner encounters major technical problems or does not have the basic technological competencies to use the ICT, collective work will be constrained. This is a pre-requisite for communication, as well as for coordination or production. The advantages, for example, the speed of production or the feeling of remote presence, are rapidly reduced in the event of unsatisfactory technological competency. The collective contribution is therefore partly dependent on this. However, in certain cases, particularly with new tools, it can sometimes be difficult to assess the necessary technological abilities. Sometimes, a not "friendly user" technology could be very hard to work with. Where a task may have seemed simple, it turns out to be challenging. Tricot, Plégat-Soutjis, Camps, Amiel, Lutz, and Morcillo (2003) use the terms utility, usability and acceptability of computer and human based learning environments.

For the work to be collaborative, it is also not enough for a single learner to be able to carry out all the tasks. As indicated, mutual commitment is vital for success. It is therefore not a question of possessing the knowledge linked to the product, but of having the competencies relating to handling the digital tools. From the teacher's perspective, it is also important to be able to cope with the technologies that the learners wish to use. He or she must also design collaborative work that is feasible in a remote context.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Is it always easy to mobilise the students in a distance format? No! We only need to think of the forums that are set up and sometimes remain deserted until the teacher ends up writing a message or decides to add points, depending on the participation. It is also sometimes difficult to devise remote collaborative work when the students are not prepared. For example, when they have not read the texts, or if they do not understand the issues of the collaboration. One of the roles' teacher is to make them aware of the importance of preparation and to be careful not to overload them.

SOLUTIONS AND RECOMMENDATIONS

Currently, there are many remote, hybrid, co-modal courses in the academic world. These require a sustained use of digital tools. By way of example, the authors are both involved in a programme that is only offered remotely. Support in synchronous mode is offered to the learners to a greater or lesser extent. Collaborative work is in the spotlight when the time comes to optimise teaching and learning. The exchanges in synchronous or asynchronous mode make a mutual commitment of the learners possible in a context that is often informal. The discussion forums are presented as a convivial space to communicate understanding and to exchange queries. The learning is therefore the fruit of involvement that is both individual (for example, by completing the recommended reading, by popularising what is learned, by giving examples from one's context), but also a collective involvement (for example, by talking about authentic situations). It is quite easy to suggest to the students that they work in small groups in virtual classrooms, to lead them to make a summary or a conceptual map collectively. About work that is assessed summatively, this is often presented in the form of a critical reflection (written, oral or schematic) around practices in a digital portfolio space. The learners can then comment on their colleagues' work and help them to identify gaps or outstanding issues.

The use of digital tools may also be effective in face-to-face classes. In certain cases, universities make classrooms available to encourage collaborative work with digital tools. In such classrooms, the spaces are organised in islands of four to six learners who all have digital access to a screen. They can then easily work together in a digital environment. Without being remote, they can communicate, coordinate and produce with the ICT made available to them. The classrooms offer an environment close to that of the work environment and the problematic situations on which they work are usually authentic. The learners are active in these classrooms that are nicknamed "active learning classrooms" where the flipped classroom regularly makes an appearance. Digital meets traditional through the meeting of individual and shared screens, of diverse applications, of one console facilitating the movement of content to another, of whiteboards - whether digital or not - to reconcile the interventions. If the teacher is present, the mutual commitment of the learners to achieve the common objective remains vital for the success of the collaborative work.

Let us add that collaborative work does not always occur in a formal context. Several communities of practice emerge in graduate training, particularly to respond to the needs for socialisation (Denis, in press). Michaut and Roche (2017) estimate, moreover, that approximately 85% of university learners, at all levels, participate in digital groups. These are formed specifically to bridge the gap between the expectations of the learners and the tools offered by institutions. We can quote at least two examples in our practice. Firstly, a group of learners in continuing education created a team for themselves to exchange ideas on the digital tools that can be pooled between their institutions. Nothing and no one forced them to do this. This initiative arose from a conversation between two learners who invited the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

others to join in their reflections. Secondly, students enrolled in a doctoral research programme met once a month with the help of videoconferencing tools to exchange ideas about their topic. Collaborative work, which is less formal, found its purpose in the learners' need to produce a quality product, but also to communicate about the process in doctoral studies. The mutual commitment enabled a sharing of resources and material. Collaboration between students reflects a stronger commitment in their studies (Michaut & Roche, 2017, p. 9). In both examples, collaborative work, made possible thanks to digital tools given the physical distance between the learners, allowed students to combat social isolation and to share resources.

In the light of the different examples that we have shared in the text, we identify certain winning conditions for and certain constraints to the harmonious marriage between collaborative and digital work. Table 2 puts forward a summary of the main points discussed in the chapter. In our opinion, in order to foster and support this marriage, it is important to register in the Learning Paradigm (Barr & Tagg, 1995), to understand the foundations of collaborative work along with the advantages and limitations of digital work (beyond the tools themselves). In collaborative work, the teacher acts as a moderator, facilitator, facilitator and evaluator (Henri and Lundgren-Cayrol, 2001). It supports the students' approach while keeping a distance. It encourages students' autonomy and control. The teacher's interventions are modulated according to the progress in collaborative work (Henri and Lundgren-Cayrol, 2001).

Table 1. Winning conditions for and constraints on the marriage between digital and collaborative work

Winning Conditions	Constraints
• Good knowledge of the digital tools • Flexibility of the digital tools offered • Diversity of tools used • Clear definition of the training targets • Clarity and realism of the objectives of the collaborative work • Preparation for the collaborative work (for example, with a synchronous meeting) • An understanding of the distinctions between individual work and collaborative work • Peer assessment • Submission in different forms • Shared values • Mutual commitment • Sharing of responsibilities • Feeling of remote presence • Recognition of the collaborative work in a programme approach	• Accessibility to the digital tools • Inadequate technological skills • Poor assessment of the necessary technological abilities • Absence of an authentic task • Difficulty in establishing contact between the remote learners • Adoption of collaborative work in a single course • Single assessment of the final product • Development of a hierarchy within the work group • Presence of omnipresent tools • Segmentation of tasks

Of course, digital technology and collaborative work have one thing in common: the human element. Therefore, the technologies cannot replace the teacher or replace the students. Here, we are involved in actions that above all necessitate pedagogical, even curricular, commitment.

It implies a change in the way of thinking about teaching and learning.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

FUTURE RESEARCH DIRECTIONS

It seems important, in our opinion, to pay attention to pedagogical alignment in order to foster a marriage between digital and collaborative work. It would be pertinent to conduct research in the field concerning the training of teachers for collaborative work via digital technology. Certain initiatives have been taken, but it is important to analyse them in terms of a rigorous research approach. We are nevertheless, based on the literature, but also on our experience over more than ten years now, of the opinion that pedagogical training with the support of digital technology would be pertinent for most teachers in higher education, thus falling into line with what Lison et Paquelin (in press) call the professionalisation of the new job of teacher-researcher. It would also be interesting to set up a study in an epistemological and interactionist perspective (Morissette, Guignon, & Demazière, 2011), studying collaborative work in the digital age from the perspective of the interactions that link the students with one another or the teacher and the students and focusing on the significance that they put into their interactions.

Furthermore, it would be interesting to pursue research on the digital tools that foster the commitment of students in collaborative work. Several studies exist on digital tools in a pedagogical context, without necessarily shedding light on collaborative work at university, although this increasingly constitutes a training reality. The study of collective traces, as Bruillard (2008) defines them, accompanied by other methods of data collection like discussion groups and non-participative observation, could constitute avenues to explore in order to give rise to a model of collaborative work mobilising digital technology fostering lasting learning. The potential influence of data mining analytics on the students' learning processes and outcomes is an interesting research track (Addowah, Al-Samarraie, & Fausy, 2019), especially when it comes to students' commitment in collaborative learning.

CONCLUSION

In the academic world, as in the private sphere, the use of digital technology is omnipresent. Today, it is rare to find students who do not use their computers to write up their course notes or to hand in their work. It is rare to find teachers who do not use their computers for their research or their teaching. In addition, today, many courses are only offered remotely, whether this is for accredited training. However, ICT are not always easy to tame. Their use may remain basic, individualistic and not encourage collaborative work. Indeed, digital technology alone does not alter collaboration. The fact of having the opportunity is not enough. If it is not considered to be relevant, the miracle will not happen.

Collaborative work brings two or more learners together in a context of mutual commitment in order to aim for a common objective and implies three types of action, i.e. communicating, coordinating and producing. Digital technology finds its place in each of these, given the great diversity of tools available. The synchronous and asynchronous modes that are possible with the ICT facilitate communication, if they are used in an appropriate and efficient way. The learners can use instant messaging, videoconferencing tools or discussion forums. Coordination and production can be facilitated using shared documents both in synchronous and in asynchronous mode. Indeed, the amalgamation of the two modes of communication supports a feeling of remote presence. It is then possible to put digital technology to good use, both for the teacher and for the students.

However, obstacles arise in the path of the harmony that collaborative and digital work can offer. Some of the obstacles are the welfare at work, ethical issues and generation management. First, the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

philosophy behind collaborative work must be understood and respected. One must avoid "spying on" learners to validate their commitment or their involvement. It is important to aim for joint production including equitable responsibilities, explicit values, a shared vision of the common production, as well as a defined strategy. Of course, the use of ICT goes hand in hand with adequate technological skills, but this is most likely to be the simplest part. Learning to use a tool, from a technical point of view, is not particularly complicated. Using it in such a way as to promote in-depth and lasting learning is another thing. And when collaboration is added to this question, one sometimes has the impression of having opened Pandora's box.

To end this chapter, we would like to return to the question in the title: Digital and collaborative work is it a winning couple? It seems to us that digital technology, by means of its flexibility in time and space, can form a winning couple with collaborative work. However, this successful marriage is based on the ability of the actors (teacher and students) to take advantage of it within the contexts in which they work. In other words, it can change from a winning couple to ill-fated lovers if the appropriate conditions are not present in the environment. Our experience leads us to believe that digital without pedagogy is rarely a source of success. In these cases, teachers underuse the tools at their disposal. This therefore becomes a responsibility of all the stakeholders in higher education, teachers, students and institutions. It is indeed a mutual commitment!

ACKNOWLEDGMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

Addowah, H., Al-Samarraie, H., & Fausy, W. M. (2019). Educational data mining and learning analytics for 21st century higher education: A review and synthesis. *Telematics and Informatics*, *37*, 13–49. doi:10.1016/j.tele.2019.01.007

Bâchelet, R. (2011). L'évaluation par les pairs en projet [Peer review in project]. In *Congrès de la Société française de génie des procédés* (pp. 1-6). Lille, France.

Barber, W., King, S., & Buchanan, S. (2015). Problem based learning and authentic assessment in digital pedagogy: Embracing the role of collaborative communities. *Electronic Journal of E-Learning*, *13*(2), 59–67. doi:10.1002/tl.7401

Barr, R. B., & Tagg, J. (1995). From teaching to learning: A new paradigm for undergraduate education. *Change*, *27*(6), 13–25. doi:10.1080/00091383.1995.10544672

Bates, A. W. (1997). *Restructuring the university for technological change*. London, UK: The Carnegie Foundation for the Advancement of Teaching.

Blais, R., & Pouliot, F. (2009). *Développer et gérer une équipe de travail* [Develop and manage a work team]. Québec: Presses Inter Universitaires.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bruillard, E. (2008). Travail et apprentissage collaboratifs dans des formations universitaires de type hybride. Éléments de réflexion [Collaborative work and learning in hybrid university courses. Elements of reflection]. *Revue Education – Formation*, (288), 55-64.

Calixte, X., Gronier, G., Ben Rajeb, S., & Leclercq, P. (2018). Impact des outils numériques de communication et d'échanges d'information dans les processus de conception collaborative [Impact of digital tools for communication and information exchange in collaborative design processes]. In *01DESIGN'11* (pp. 1-14). Mons, Belgium. Retrieved from http://hdl.handle.net/2268/229949

Chi, M. T. H., Kang, S., & Yaghmourian, D. L. (2017). Why students learn more from dialogue - than monologue-videos: analyses of peer interactions. *Journal of the Learning Sciences*, *26*(1), 10–50. doi: 10.1080/10508406.2016.1204546

Demirci, A., Karaburun, A., & Kilar, H. (2013). Using Google Earth as an educational tool in secondary school geography lessons. *International Research in Geographical and Environmental Education*, *22*(4), 277–290. doi:10.1080/10382046.2013.846700

Denis, C. (in press). Un pour tous, tous pour un : la collaboration entre les pairs pour assurer la survie au doctorat [One for all, all for one: Peer collaboration to ensure doctoral survival]. *Revue d'éducation de l'Université d'Ottawa*.

Doucet, P. (2007). Outil informatique pour évaluer la contribution individuelle dans les équipes de travail – Phase 1 [Computer tool to assess individual contribution in work teams - Phase 1]. In Les vice-recteurs reçoivent... Sherbrooke, Canada.

Duguet, A., & Morlaix, S. (2018). Le numérique à l'université : facteur explicatif des méthodes pédagogiques ? [Digital technology at the university: explanatory factor for teaching methods?] *Revue Internationale de Pédagogie de l'enseignement Supérieur, 34*(3).

Durand, J.-P. (2009). Le travail collaboratif: des illusions à d'éventuels possibles [Collaborative work: illusions to futur possibilities]. In S. Le Roux (Ed.), Le travail collaboratif. Une innovation générique. (pp. 15-28). Paris, France: Editions L'Harmattan.

Ellis, C., & Wainer, J. (1994). *A conceptual model of groupware. In Proceedings 1994 ACM conference on computer supported cooperative work* (pp. 79–88). Chapel Hill, NC; doi:10.1145/192844.192878

Engeström, Y. (1987). *Learning by expanding*. Helsinki, Finland: Orienta-Konsultit.

Gangloff-Ziegler, C. (2009). Les freins au travail collaboratif [The obstacles to collaborative work]. In S. Le Roux (Ed.), Le travail collaboratif. Une innovation générique (pp. 95-112). Paris, France: Editions L'Harmattan.

Gremmo, M.-J., & Kellner, C. (2011). Pratiques pédagogiques et usages des TIC: enseigner à l'université, un impensé? Pedagogical practices and uses of ICTs: Teaching at university, an unthought? In M.-J. Barbot & L. Massou (Eds.), *TIC et métiers de l'enseignement supérieur: émergences, tranformations* (pp. 35–52). Nancy, France: Presses universitaires de Nancy.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Halawa, A., Sharma, A., Bridson, J. M., Lyon, S., Prescott, D., Guha, A., & Taylor, D. (2017). Constructing quality feedback to the students in distance learning: review of the current evidence with reference to the online master degree in transplantation. *World Journal of Education*, *7*(4), 117–121. doi:10.5430/wje.v7n4p117

Henderson, M., Auld, G., & Johnson, N. F. (2014). *Ethics of teaching with social media*. Paper presented at the Australian Computers in Education Conference. Adelaide, Australia.

Henri, F., & Lundgren-Cayrol, K. (2001). *Apprentissage collaboratif à distance: Pour comprendre et concevoir les environnements d'apprentissage virtuels* [Collaborative distance learning: to understand and design virtual learning environments]. Sainte-Foy, Canada ['Université du Québec.]. *La Presse*, l.

Hofer, B. K., & Pintrich, P. R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research*, *67*(1), 88–140. doi:10.3102/00346543067001088

Houart, M., Bachy, S., Dony, S., Hauzeur, D., Lambert, I., Poncin, C., & Slosse, P. (2019). La volition, entre motivation et cognition: quelle place dans la pratique des étudiants, quels liens avec la motivation et la cognition? [The volition, between motivation and cognition: what place in the practice of students, what links with motivation and cognition?] *Revue internationale de pédagogie de l'enseignement suprieur, 35*(1).

Jézégou, A. (2010). Créer de la présence à distance en e-learning. Cadre théorique, définition, et dimensions clés [Create remote presence in e-learning. Theoretical framework, definition, and key dimensions]. *Distances et savoirs, 2*(8), 257-274.

Johansen, R. (1988). *Groupware: Computer support for business teams*. New York, NY: Free Press.

Karsenti, T., & Bugmann, J. (2016). Soutenir la motivation des participants aux MOOC: Quels rôles pour la ludification, la mobilité et l'aspect social? [Support motivation of MOOC participants: what roles for gamification, mobility and social aspect?]. *International Journal of Technologies in Higher Education*, *13*(2-3), 133–149. doi:10.18162/ritpu-2016-v13n23-09

Kozar, O. (2010). Towards better group work: seeing the difference between cooperation and collaboration. *English Teaching Forum, 48*(2), 16-23. Retrieved from ERIC database. (EJ914888).

Lameul, G. (2015). Travailler sa posture professionnelle pour mieux aborder les situations pédagogiques complexe [Work on his own professional posture to better address complex pedagogical situations]. *Distances et Médiations Des Savoirs, 11*. Retrieved from http://journals.openedition.org/dms/1127

Lameul, G. (2017). Usage pédagogique du numérique : quelles transformations de l'activité de l'enseignant-chercheur? [Pedagogical use of digital technology: what transformations of the activity of the teacher-researcher?] In L. Massou & N. Lavielle-Gutnik (Eds.), *Enseigner à l'université acec le numérique. Savoirs, ressources, médiations* (pp. 225–241). Louvain-la-Neuve, Belgique: De Boeck Supérieur.

Lampe, C., Wohn, D. Y., Vitak, J., Ellison, N. B., & Wash, R. (2011). Student use of Facebook for organizing collaborative classroom activities. *International Journal of Computer-Supported Collaborative Learning*, *6*(3), 329–347. doi:10.100711412-011-9115-y

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lanarès, J., & Daele, A. (2013), Comment organiser le travail en groupe des étudiants? In D. Berthiaume & N. Rege Colet (Eds.), La pédagogie de l'enseignement supérieur: repères théoriques et applications pratiques. Tome 1: Enseigner au supérieur (pp. 135-148). Berne, Switzerland: Peter Lang.

Lesourd, F. (2009). Construire et habiter le temps de l'enseignement en ligne. [Build and live the time of online education] In S. Kim & C. Verrier (Eds.), *Le plaisir d'apprendre en ligne à l'université: implication et pédagogie* (pp. 91–102). Bruxelles, Belgique: De Boeck Supérieur.

Lison, C. (2017, May 11). *Favoriser les stratégies d'apprentissage des étudiants lors d'un enseignement à distance* [Promote students learning strategies in distance teaching]. Guest Speaker at the Université de Nantes, Nantes, France.

Lison, C., & Meyer, F. (2014, Decembre). TIC et enseignement supérieur: l'innovation pour soutenir l'apprentissage [ICT and Higher Education: innovation to support learning]. In *1*er *Colloque international TICE et Pédagogie*, Ouarzazate, Morocco.

Lison, C. et Paqulin, D. (in press). La formation des enseignants du supérieur: un levier de transformation des universités québécoises [The training of Higher Education teachers: a transformation leaver of the universities in Quebec]. *Revue internationale d'éducation de Sèvres*.

Lison, C., & Petit, M. (Submitted). Développer la réflexivité des étudiants en formation professionnelle et technique: un dispositif construit autour d'un outil d'annotation vidéo en ligne. [Develop the reflexivity of students in vocational and technical training: a device built around an online video annotation tool] In S. Beaupré, Y. de Champlain, & J. Lefebvre (Eds.), *L'analyse réflexive en enseignement professionnel et technique. Théorie, pratiques, témoignages*. Québec, Canada: Les Presses de l'Université du Québec.

Long, L., & Meglich, P. (2013). Preparing students to collaborate in the virtual work world. *Higher Education Skills and Work-Based Learning*, *3*(1), 6–16. doi:10.1108/20423891311294948

Meyer, F., & Sanchez, E. (2015, June). Vers de nouvelles dimensions d'hybridation pour la formation des enseignants. Paper presented at 4th Annual Conference SALTISE, Montréal, Canada.

Michaut, C., & Roche, M. (2017). L'influence des usages numériques des étudiants sur la réussite universitaire [The influence of digital uses of students on academic success]. *Revue Internationale de Pédagogie de l'enseignement Supérieur, 33*(1).

Morissette, J., Guignon, S., & Demazière, D. (2011). De l'usage des perspectives interactionnistes en recherche [From the use of interactionist perspectives in research]. *Recherches Qualitatives*, *30*(1), 1–9.

Nguyen, L. T., & Ikeda, M. (2015). The effects of ePortfolio-based learning model on student self-regulated learning. *Active Learning in Higher Education*. doi:10.1177/1469787415589532

Patel, P., & Patel, N. (2017). ICT pedagogy for effective learning, education and quality evaluation. *International Journal of Computer & Mathematical Sciences*, *6*(5), 101–107.

Pavlovskaya, G., & Perkins, M. (2016). Taking a MOOC: Socio-cultural aspects of virtual interaction in a multicultural learning community. *Journal of Language and Education*, *2*(1), 16–21. doi:10.17323/2411-7390-2016-2-1-16-21

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Petit, M., Deaudelin, C., & Brouillette, L. (2016). *Recommandations à l'égard d'usages pédagogiques de dispositifs humains et numériques pour favoriser la présence en formation à distance: synthèse de trois recensions systématiques* [Recommendations for educational uses of human and digital devices to promote the presence of distance learning: synthesis of three systematic reviews]. Paper presented at Colloque international: Apprendre, Transmettre, Innover à et par l'Université, Montpelier, France.

Pew Research Center. (2018). *The future of wellbeing in a tech-saturated world*. Retrieved from http://www.elon.edu/docs/eweb/imagining/surveys/2018_survey/Elon_Pew_Digital_Life_and_Well_Being_Report_2018_Expanded_Version.pdf

Puentedura, R. R. (2009). As we may teach: educational technology, from theory into practice. Retrieved from http://www.hippasus.com/rrpweblog/archives/000025.html

St-Arnaud, Y. (2008). *Les petits groupes. Participation et animation*. Paris, France: Gaétan Morin.

Tricot, A., Plégat-Soutjis, F., Camps, J.-F., Amiel, A., Lutz, G., & Morcillo, A. (2003). Utilité, utilisabilité, acceptabilité: interpréter les relations entre dimensions de l'évaluation des EIAH. [Utility, usability, acceptability: interpreting the relationships between evaluation dimensions of the ITS] In C. Desmoulins, P. Marquet, & D. Bouhineau (Eds.), *Environnements informatiques pour l'apprentissage humain* [Computer environments for human learning]. (pp. 391–402). Paris, France: ATIEF/INRP.

KEY TERMS AND DEFINITIONS

Asynchronous: Communication not simultaneous but at the same place or with the same tools.

Authentic Learning Situations: Complex and significant situations presented as a context that is conducive to learning.

Collaboration: A form of work where students work together to achieve common objectives while valuing individual contribution in a spirit of shared responsibility.

Collaborative Work: Horizontal organization of tasks involving a mutual commitment and a division of responsibilities distributed evenly among team members in a coordinated effort.

Co-Modal: Training system where both face-to-face and distance learning modes coexist simultaneously.

Cooperation: Form of work where students work together to achieve common goals.

Distance Learning: Form of education using technologies and instructional systems design to students and/or teachers who are not physically "on site".

ICT: Information and communication technology.

Pedagodigital: Use of digital technology in a pedagogical context.

Social Constructivism: Learning through social interactions between learners intended by a modification of a previous learning or reorganizing a basic structure.

Synchronous: Instant communication mode allowing learners to communicate at the same time.

This research was previously published in the Handbook of Research on Operational Quality Assurance in Higher Education for Life-Long Learning; pages 243-263, copyright year 2020 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 54
Theorizing Virtuality in Enterprise Social Systems

James J. Lee
Seattle University, USA

Jessica L. Imanaka
Seattle University, USA

ABSTRACT

This chapter has built on research on today's modern organizations to lay the foundations for a comprehensive and systematic theorization of enterprise social systems. Theorizing virtuality marks a fundamental transformation in space-time parameters in communications. This is especially so in the context of rapid current advancements in IT such as cloud computing, as well as numerous other technological fronts. Current IT trends show that increased spatio-temporal plasticity heightens the effectiveness and the efficiency of modern enterprise social systems. In particular, subject-oriented asynchronous communications experience greater inferred plasticity and event-oriented synchronous communications experience greater referred plasticity. Finally, enterprise social systems vary in their degree of virtuality based on the perspective of the relevant stakeholder group considered.

INTRODUCTION

Due to fast evolving information techonologies (IT), organizations are always faced with a rapid chaning environment that requires flexible and dynamic responses to frequently changing business needs. Many organizations have responded by adopting decentralized, team-based, and distributed structures thanks to the communications through IT today. Advances in communication technologies have enabled organizations to acquire and retain such distributed structures by supporting coordination among people working from different locations (Ahuja, Carley 1998). Yet, IT implementations in cloud computing platform provide another dimension in enterprise social systems.

DOI: 10.4018/978-1-7998-7297-9.ch054

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Since the early 2000, Web 2.0 has emphasized relationships using the Web technologies. With this social restructuration, companies are reaping the benefits of Web 2.0 as Enterprise 2.0 (McAfee, 2006). Enterprise social systems will use the communication benefits from Web 2.0 by emphasizing relationship management in the Enterprise's internal social networking. As Web 2.0 and Enterprise 2.0 in this context are now absorbed by the advancement of cloud computing (Wided Guedria, 2014), it is imperative to investigate what drives this virtualized environment in the form of cloud computing platform.

Ontologically, Cloud Computing has been empowered by the advancements in networking, providing three service models; Software as a Service (SaaS), Platform as a service (PaaS), and Infrastructure as a Service (IaaS). With the implementations in organizations' IT, cloud computing can builds an "emptying of organization" by separating the content and process of organizations. Cloud Computing today has many predecessors. Heavy use of relational database management systems made Business Process Reengineering (BPR) practically possible in the early 1990s, indicating the separation of data from its organizational practice. In the late 1990s, use of many process integration tools, such as ERP and EAI, achieved the separation of process from business organizations. A major concern is how to manage human agents. The Internet creates e-business markets as well as the e-management of organizational resources remotely, emphasizing relationship management.

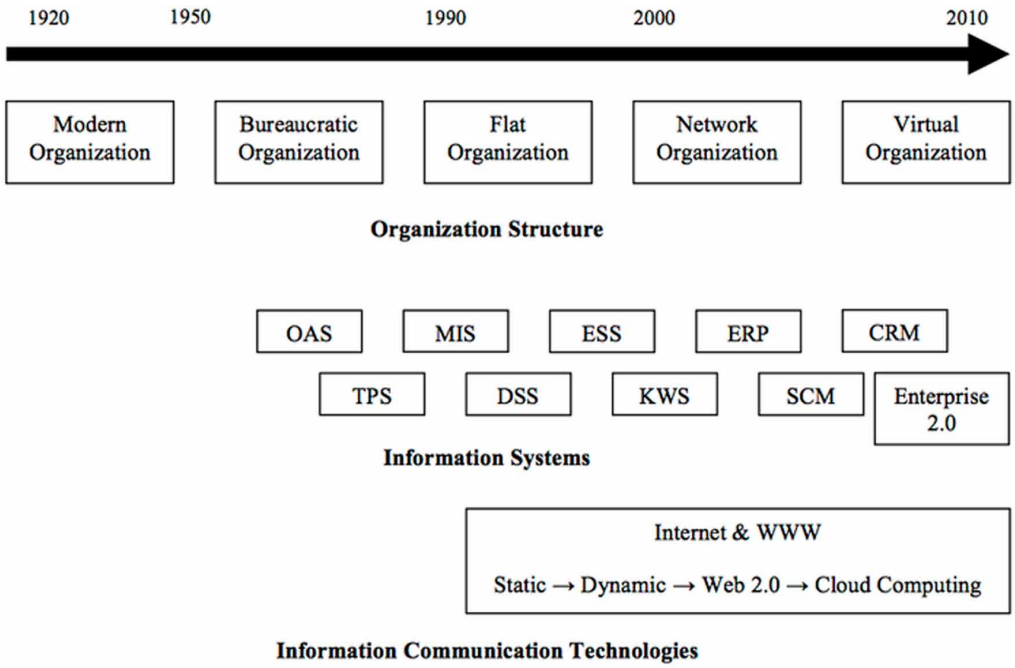
Back in the 1990's companies like SAP AG, Oracle, Baan, PeopleSoft and J. D. Edwards created multi-billion dollar businesses with ERP technology that automated and connected what had once been disparate parts of corporations – human resources, manufacturing processes, inventory supply and financial planning. These companies rode the wave of the corporate BPR (business process re-engineering) trend that gained steam in the middle of the decade. Along the way, the ERP industry began to be saturated and experience its growth struggle due to its focus on internalization. The main reasons for this were the Internet revolution and the surprising speed with which e-business began to change the way business was done, i.e., externalization of enterprise. Almost immediately, businesses had started to become Web centric. In the 90's ERP was too inward looking and not global centric (internalization of enterprise integration). However, this does not mean that the internal efficiencies that can be achieved by ERP systems are no longer crucial. Many practitioners claimed that a well-implemented ERP system is more critical today than it has ever been because it provides a solid start to an externalization of enterprise.

Enterprise integration has been a great focus in the 1990s with its internalization slogan. With the big boom of e-business, companies now have moved their directions to the Internet, thus focusing on externalization. E-business revolutionized the market both in customers and business partners. Naturally, it leads business organizations to a global focus and to manage their own resources, creating the concept of Enterprise Social Systems.

Figure 1 summarizes the history of organization structure with the development of information systems (IS) and information communication technologies (ICT). It is obvious that advanced information technologies these days drive the structure of organizations. Modern organization structure formed in the 1920s with the demolition of feudalism. Along with systematic management from the military, the bureaucratic organization structure dominated through the middle of the 1900s. With help from IS, business process reengineering was adopted, which revolutionized the traditional business concept, introducing flat organizations. With ICT and a global network (internet), almost every part of an organization is interconnected, regardless of its location and time, transforming into network organizations, and now Enterprise Social Systems these days. A major difference between network organizations and Enterprise Social Systems is the use of information technologies in terms of relationships among resources. Enterprise Social Systems, interestingly, create unique images of business, freeing limitations

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Chronicle of IS Organizations



on human activities, but maintaining the same or higher levels of relationship management. As Figure 1 shows, collaborative systems and current web technologies are the main justifications for Enterprise Social Systems today.

Managing Virtuality

A few decades ago, the concept of a virtual organization captivated the attention of researchers. Many companies hadn't realized the importance, processes or functionality of virtuality, and subsequently went bankrupt - .com bubble, Borders, etc. Today, as multifarious aspects of virtuality have come to prevail in many dimensions of social life, some of the buzz around virtual organizations has faded. Yet, this widespread acceptance of virtuality is precisely a reason to deepen studies of the phenomena that characterize it. More businesses than ever before have come to rely upon virtual communications, from email to teleconferencing to social media, so much so that the virtuality of organizations is taken for granted. Indeed, pioneers like Amazon.com have expanded virtuality into marketspace, expanding even further the scope of virtual processes in business and markets. Most of functionalities in organizations now are virtual. Yet, the meaning and parameters of the concept of virtuality remain insufficiently understood.

This research extends the theoretical scope of virtuality in organization studies (Schultze and Orlikowski, 2001) to Enterprise Social Systems, by analyzing the experience of individuals with collective memberships in virtual space. Because Enterprise Social Systems inherit the attributes of virtual space, they do not have the same physical properties as an organization tied exclusively to material reality. For this reason, metaphors of consciousness are more useful in understanding Enterprise Social Systems than metaphors of physicality. A key contrast between a virtual and a traditional organization lies in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the degree to which the former depends on mental construction whereas the latter depends on physical construction. The analysis of virtual organizations in this study applies to Enterprise Social Systems, although Enterprise Social Systems broaden the meaning of virtuality further than previous analyses of virtual organizations.

The main goal of Enterprise Social Systems remains the same as in a traditional organization, which is to serve the interests of its members. As a major component of any organization, human members historically have contributed the majority of the roles to prolong an organization (without the need for a virtual environment). However, the roles of members have now evolved as organizational practices come to depend upon advanced information technologies (IT) and forms of managed virtually, such as information systems (IS), information and communication technologies (ICT), networking, cloud computing, etc. (Lee, 2011). This phenomenon frees the traditional roles of members and the scope of actions they can perform. Along with this freedom, modern organizations now require knowledge workers who have the capabilities to utilize these new technologies responsibly. Ultimately, the rise of Enterprise Social Systems issue in new meanings in virtuality among their human members.

The prevalence of the trend toward virtuality in organizations can be most simply noted in the rise of 'Cloud Computing', a phenomenon lauded by the field of IT. Because of the separation of organizational processes from their previous physical bindings (such as office work practices in traditional organizational settings) and the advancement of IT (such as business processes in IS via networks), accessing and manipulating organizational activities can be achieved purely virtually. Indeed, virtualization is now happening all around us today. The term 'Cloud Computing' may be a buzz word for many academics, but it is not frequently known by the average person who makes use of it on a daily basis. The typical knowledge worker in a modern organization enjoys the world of cloud computing (Venters and Shitley, 2012) every day in the most basic business processes, such as free web mail services (Google email, Yahoo email, etc.). The trend toward 'Cloud Computing' turns a web browser into a new form of computing platform. The traditional meaning of a platform in computing implies operating system software such as Microsoft Windows or Mac OS. Now, most companies' websites run as web applications on web browsers (such as Firefox, Safari, Chrome, or Internet Explorer). Because we have achieved a technological state where any information system can be viewed as an interface on a website, web browsers play a key role in communications today and have become a new platform for the future of computing.

One of the values of cloud computing for organizations is the possibility of real-time communications between members and extended access to the organization's information systems. Members now have perpetual access as long as they possess computers with web browsers and an Internet connection. Cloud computing makes organizational management more cost effective. In addition to this efficiency implication and its financial ramifications, this trend toward virtuality impacts the experience of an organization's human members. As Enterprise Social Systems can be established in the clouds (via networks), the roles and work practices of their members have transformed. One of the most significant indications of this transformation can be identified in the nature of the dynamic, spatial, and temporal characteristics of a virtual organization. It is not just efficiency, but the mobility of work practices that has changed as workers can work with each other from different locations at the same time (synchronous collaboration) and at different times of the day (asynchronous collaboration). The spatio-temporal shift in human relations brought on by the liberation of the organization from traditional physical boundaries and extension into virtual reality is highly dynamic and continually evolving (Breu and Hemingway, 2004). Along with the evolved role of the knowledge worker due to the separation of practice from physical locations to virtual organizations (Giddens, 1990), human members can manage multiple memberships

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

effectively in the virtual organization settings. Without the limitations of face to face interaction between people in physical reality, workers can more easily control and manipulate the kinds of information they share about themselves and craft or even fabricate appearances online. Facebook and other forms of social media are notorious for the presentation of online persona that alter, amplify, and at times distort the identity of the person as they appear in physical reality (Venkataraman and Das, 2013). With an extension of spatio-temporal parameters, workers are freer to assume and manage diverse roles with different people and groups both within and outside of their organizations. In other words, a person can have virtual multiplicity of human identities and effectively manage multiple memberships in multiple groups, organizations, communities, and societies.

In the realm of business, we have experienced many of the 20th century's great discoveries through Google search engines and online stores like Amazon.com and eBay. These companies are almost pure e-businesses due to the introduction of the Internet, especially World Wide Web technology. Amazon.com started as a small e-store but the trend it helped spur became the *de facto* evolved form of business models in coming years of Internet technology. A major impetus for this research arises from this root planted and cultivated by Amazon.com. Regarding electronic communications as evolved business models enables us to envision the foundations of virtuality in human thinking and conceptualization. There has been extensive research in virtuality and virtual organizations (Maznevski, M. L. and Chudoba, K. M. (2000), Knights, D., Noble, F., Vurdubakis, T., and Willmott, H. (2001), Schultze, U., & Orlikowski, W. (2001), Orlikowski, W. and Yates, J. (2002), Verona, G., Prandelli, E., and Sawhney, M. (2006), McAfee, A. P. (2006), Linstead, S. and Thanem, T. (2007), Miller, R. (2007), Kolb, D. (2008), Lyytinen, & K., Newman, M. (2008), Wilson, J., O'Leary, M., Metiu, A., and Jett, Q. (2008), Overby, E. (2008), Kouyoumjian, V. (2010), Armbrust, M., *et. al.* (2010), Bailey, D., Leonardi, P., and Barley, S. (2012), Wilson, J., Crisp, C.B., and Mortensen, M. (2013), Child, J., Ihrig, M., and Merali, Y. (2014), Kamoche, K., Kannan, S., and Qixun Siebers, L. (2014). However, none of these studies has theorized these e-business models in terms of an encompassing conceptual framework, as we do in this paper with a theory of virtuality in organizations.

The purpose of this paper is to lay the foundations for a comprehensive and systematic theorization of Enterprise Social Systems by focusing on how virtuality figures in e-business companies. We explain the methodology generating this study, provide an overview of the virtuality phenomenon, detail communications evolutions in space and time, develop a new apply virtuality characteristics to Enterprise Social Systems, build a rubric for Enterprise Social System considering how virtuality is experienced across multiple stakeholder groups, discuss implications of this study, and conclude with recommendations for future directions in research and practice.

Methodology: Grounded Theory

Schultze and Orlikowski (2001) proposed the metaphors of virtuality with the stance of interpretive study. The study showed the insights of metaphors and identified how we treat virtuality. We adopted the approach of the above work and extended it with grounded theory methodology that would allow us to derive a generic set of metaphors that could explain the essence of the virtual organization.

There are six steps to analyze metaphors in their study based on Beer's method (Beer, 1984). Beer's scientific modeling (Beer 1984, Tsoukas 1991) explains the transformation of concepts when researchers conduct and build theories. Since this procedure discusses the role of metaphors, it is important to map Beer's method with the main strategy of this study, grounded theory (Glaser and Strauss, 1967). Grounded

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Methodological overview

Step	Beer's Method (1984)	Schultz and Orlikowski (2001) Activities	Grounded Theory
1	Insight	Find metaphoric content in the articles. Identify all of the metaphoric expressions contained in the articles, whether they appeared to be directly relevant to a virtual organization or not.	Data Collection
2		Each instance of a metaphoric expression was captured in a list together with the page number on which the trope was located, terms of source domain used for metaphorical expressions, and a short comment explaining the meaning or significance that the researcher had attributed to it at the time of reading.	Open Coding
3	Perception	From multiple analyses, eliminate from initial lists those metaphoric expressions that are unrelated to virtual organizations and refine the terms of metaphorical expressions.	Open Coding
4	Analogy	Review the terms of metaphorical expressions and create categories to put similar attributes together. Focus attention on the strategy in the texts – where authors contrast the "real" organization with the "virtual" one in order to construct a definition of virtual organizations.	Open Coding
5	Homomorphism	Analyze categories from the previous stage and discover the connections between each category using Meaning of Metaphors, Entailment, Affordance, and Challenge.	Axial Coding
6	Isomorphism	Establish a set of defining metaphors, using the concepts of Opposition, Meaning of Metaphors, Source, Entailment, Affordance, and Challenge.	Selective Coding

theory constitutes a series of theory building processes (Charmaz, 2000). Since both methods start from insights and end at scientific theory (grounded theory) and model (Beer's method), it is important to identify the gaps between the corresponding steps in each methodology due to different directions in their logics, induction vs. deduction. These gaps were further analyzed and used in metaphorical analysis as shown as 'Activities' in Table 1.

We also adopted the now of the data collection of Grounded Theory, *theoretical sampling* (Glaser, 1978; Glaser and Strauss, 1967). Authors decide which data will be analyzed and where they find interesting phenomenon. After initial data are collected, analyzing data is followed with iterative process of what additional data directed to be collected. The main focus is to collect selective data that are important for conducting research. In this way, researchers can enhance understanding and build theories. A data collection stage will be ended when researchers reach the point where no more new data is needed – theoretical saturation (Glaser, 1978).

By following the steps 1 – 3, we initially generated 555 terms from 59 articles in IS journals, spanning from the mid-1990s to mid-2000s. After a reevaluation of all the terms, we eliminated irrelevant terms. Final categorization resulted in 16 metaphors. Based on the above 16 metaphors derived from the aforementioned literature, seven groups emerged shown in the next section.

DATA DISCUSSION: VIRTUALITY PHENOMENON

IT- Information Technology is a crucial component of contemporary virtuality. Without advances in technology, many of the realities of today's virtual companies would be merely science fiction. These components include the Internet, LAN and WAN networks for business, email, online chat/bulletin

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

boards, video conferencing, instant messaging, etc. The rapid innovations with handheld devices such as smartphones, tablets, ultra-light laptops, and now Google glass and commercial drones cannot be underestimated for an understanding of contemporary virtuality. With advanced IT, we have access to a tremendous amount of information at the right time and the right place. Information systems we built on the basis of today's IT have become the backbone of our communications and activities. For example, information systems backed by cloud computing (IT) can virtualize an e-commerce site such as Amazon.com. By building such an information system, humans are experiencing the fastest progress in history by adding a most efficient and effective communication scheme (both manual and automatic) on top of the fastest and most accurate processing power (computer H/W and S/W). Contemporary virtuality may be characterized by the following seven features.

1. **Independence:** These technologies allow smaller workgroups as part of a larger company to operate independently of each other, across a room or the globe. This independence creates new forms of collaborative endeavor. The technologies also permit greater independence and convergence of interests for consumers, social and political groups.
2. **Flexibility:** Flexibility constitutes an essential characteristic of virtuality. Virtual organizations are, by their nature, flexible. Traditional organizational structures are rooted in the physical world and rely on structures, unalterable networks and specific locations to function properly. Consequently, when it becomes necessary to introduce change into a specific organization, a barrier is reached where further alteration requires costly, physical modifications. A virtual organization remains unhindered by these problems. These structures are designed so that they can operate regardless of time or place, independent of existing physical realities.
3. **Permeability:** Virtual worlds are defined by vague/fluid/permeable boundaries. As a continuation of flexibility, the virtual organization is characterized by vague boundaries as to the extent of its use and purpose. Since small tweaks can easily and largely affect the overall organization, it is quite possible to extend the boundaries of an organization so that they encompass new purposes, people or controls.
4. **Geographic Dispersion:** Geographical dispersion of individual workers/consumers/players/members characterizes virtual activities. The combination of a virtual organization with IT allows groups of employees to make progress on one project while working in tandem with another group in a distant physical location. The same geographic dispersion pertains to online stores, social events, and political action. Because information can be shared and meetings can be held with the use of high-speed networks and computers, tasks can be carried out in the location that is most appropriate and germane to that function. Hence, the geographic place where work occurs may change depending on the requirements of the job. Geographic dispersion is hence accompanied by malleability of geographic activity.
5. **Location Freedom:** Along with geographic dispersion, virtuality also enables us to overcome other spatial barriers. Since two members can theoretically connect to a virtual organization from any location around the globe (via network connections, the Internet or a private intranet), work can continue or be observed without regard to that location. If a business trip is necessary to meet with a supplier or provider, a virtual organization may establish virtual private networking (VPN) for its users so that they can log-on to the company's intranet as if they are work inside of company by checking emails, chatting with other members on the progress of the meetings and uploading work that has been completed in their absence.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

6. **Temporary Interactions:** Virtuality also engenders more temporary interactions. Virtual organizations are often formed to fill temporary needs, only extending to the end of the specific project that is charged to them. In a manufacturing project, a virtual organization may be formed between the engineers who design the project, suppliers who provide the raw materials and the factory that processes those into finished goods. At the end of that particular project, those alliances are dissolved, as they are no longer necessary to benefit the three independent groups. We see similar effects with consumers, social and political action groups.
7. **Time Freedom:** Just as virtuality enables us to overcome spatial barriers, so does it also enable us to overcome temporal barriers. Much like the limited barrier presented from spatial location, work in a virtual organization can theoretically take place twenty-four hours a day, regardless of time zone changes across the world. Members can constantly update their work at any time of day or night and have that information be instantly visible to a member who may be twelve hours apart.

In sum, independence, flexibility, permeability, geographic dispersion, temporary interactions, and the overcoming of spatial/temporal barriers (location and time freedom) make for greater plasticity in virtual domains. In what follows we engage in further concept clarification and build new rubrics for theorizing virtuality and Enterprise Social Systems.

FINDINGS: COMMUNICATION EVOLUTION IN SPACE AND TIME

Table 2 summarizes the characteristics of reality and virtuality. We differentiate the *place embedded reality* we use regularly and the *space embedded virtuality* from which we increasingly benefit.

Table 2. Place Embedded Reality vs. Space Embedded Virtuality

Reality	Virtuality
Body	Mind
Physical	Mental
Bounded	Permeable / Fluid
Rigid	Flexible
Fixed / Solid	Malleable / Plastic
Singular	Multiple

The benefits of the Internet revolution include the convergence of data and devices. This means we can use any device or media, and still communicate effectively. With today's networking, there are two important categories in computer-mediated communication modes: asynchronous and synchronous.

Asynchronous communications allow for *greater plasticity in time*. Asynchronous communications tend to be topic, material, or *subject oriented* and apply to interactions at different times between parties that may be at the same or distant places. It has been represented by the use of email, but with the revolution of the Internet and web technologies we now communicate not only through email, but through online postings, online shopping, online discussions, and even blogging, etc. These Internet communications

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

contrast greatly with letters, "snail mail", and the postal service in that there was a longer time delay for asynchronous communications in pre-computer eras. With networking today, asynchronous communications' travel time reaches virtually **zero** seconds. The major issue now involves the management of communications. For example, even in the same place of work, people do not have to respond right away to email they receive. They can wait for a time when it is more convenient to respond. Business communications across time zones have also become more convenient. All these changes in asynchronous communications reveal that time provides less of a restraint on connectivity. Time lags have grown shorter and people enjoy much more freedom in how to use time between correspondences. These effects lead to a perception of greater plasticity in time.

Perpendicularly, synchronous communications allow for *greater plasticity in space*. Synchronous communications have to be *event oriented* and apply to interactions that occur at the same time. Skype, teleconference, and the telephone are examples of this type of communication in different places. People across the globe can now enjoy near instantaneous communications, which is unprecedented in world history and another example of zero travel time. Contrast our present business practices to a time when merchants traveled for months or years at sea with often but a guess about what would be needed by the consumers of the goods to be acquired.

Greater plasticity in time and space has significant impacts on organizational performance in both efficiency and effectiveness. It is important to address that time and space are not two independent variables. Instead, time and space are woven together to create synergy effects. Efficiency is increased by sharing resources and core competences. The flexible and communicative nature of a virtual organization facilitates the sharing of resources amongst independent groups that are part of the same organizational structure. Each unit is expected to assist others by making their most important facilities and information easily available to others who may benefit from their use. The various technological components installed in the organization make this possible with ease.

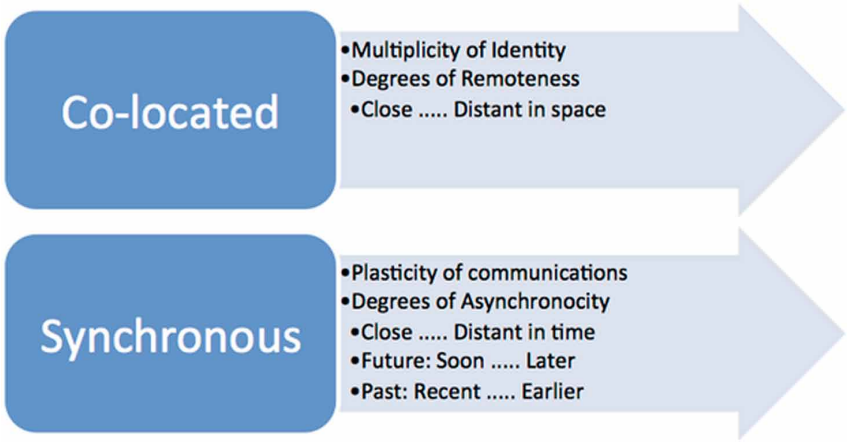
One way that effectiveness is increased by virtuality is through the ease of switching. The switching principle offers a fundamental advantage that a virtual organization has over a traditional one. Because the links between organizational functions are largely electronic and non-physical, it is easy to replace a weak component with a stronger one. Where this activity could be considerably expensive if the item in question was a physical supply chain, it may only be a change of suppliers for the virtual organization and can be made with a phone call and database edit, as opposed to a building project.

In sum, asynchronous communications provide greater plasticity in time in that they engender a perceived minimization in spatial parameters, so that people far away are much more accessible in the subject they work on, as synchronous communications have similar effects in terms of space. Virtual time speeds up processes and enables better management of communications, making work and activities more efficient. Virtual space ends up feeling closer than real space, making ones job more productive, *effective*. This plasticity leads to greater efficiencies and effectiveness.

To be sure, the development of mobile devices like the iPhone, Blackberry, and Android, tablets, along with the good "old-fashioned" computer provides platforms for myriad forms of synchronous and asynchronous communications, labeled as social computers (Wareham, Busquets, and Austin, 2009). Social media like Facebook also blur the lines between synchronous and asynchronous as posting, chats, and messages can occur simultaneously, and with variable differences in time. While social media is mostly communication oriented, the above devices provide other forms of virtual interface with the environment, such as through mapping and search tools that help the user identify their directionality in space and plan trips with greater immediacy. In a sense, the ease of photo and video-documentation also

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Place and Time Dimensions (co-located and synchronous)



provides an intriguing upgrade in the virtual relationship to one's surroundings. These media promote virtual connectivity with the environment that parallel the virtual communications discussed above. This is another indication of "communications convergence".

Together, the shifts in asynchronous and synchronous communications that constitute the virtual world mark a fundamental transformation in space-time parameters. Greater space plasticity reduces the time needed to accomplish tasks with both reference (co-located) and inference (remote) modes of communications. For example, if someone works two jobs virtually, they save time in not having to commute or physically move their body around to interact with people. Yet, time restraints do not entirely disappear. People are still tethered to physical bodies that must make the communications, i.e., type the inputs. In addition, there is only so much work and activity someone can do in a single day. Finally, pure virtual communications remain undesirable to many people. Even given these restraints, there is a net shift in the perception that distance across space is shrinking, which results in a reduction in the time needed to accomplish tasks (zero travel time, efficiency).

Virtual Organization Characteristics in Enterprise Social Systems

From an organizational perspective, we are now coming to see that there is a spectrum of possibilities between the two polar opposites of a virtual organization and a real organization. On one extreme you might have a location-less organization managed entirely through networks and online communication. On the other extreme, you might have an organization strictly defined by its physical premises. Yet, even structuration theory suggests that there is really no such thing as a purely non-virtual organization. Likewise, there may be no such thing as a completely virtual organization. It is interesting to note that previously the concept of a virtual organization was a hot topic. Now virtuality is so prevalent in organizations that the term has become defunct as nearly all organizations have virtual dimensions. The views on virtuality we have delineated and developed serve to problematize the meaning of virtuality and its use in modeling organizations.

From an employee perspective, a virtual organization often implied a great degree of freedom in where and how to work. They enjoy the benefits of a Virtual office, remote work, meaning they can work

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

from home, other locations, or on their own schedules. Therefore, it is clear that the difference between a virtual organization and structuration is where we work. In human history, many people worked at work sites, such as farmers' work in farms or fields. As we invented 'money' for exchange, trade, and commerce, people can manage better business, contracts, or relationships. These supporting activities (value chain, Michael Porter, 1998) can be analyzed for better competition. And this phenomenon is mainly classified as office work. This systemized concept of business with the introduction of military strategy philosophy has formulated modern business organizations as offices in buildings, and a physical organization. With advanced computing and networking, people can work from anywhere, like virtual offices, virtual teams, and now even Enterprise Social Systems. Obviously, the work site determines if your job is more physical or virtual. In addition, employees experience the possibilities of multiplicity in human identity, with the benefits of expanded choices and multiple memberships.

Below we articulate a set of characteristics of Enterprise Social Systems that derive from virtual organizations..

- **Boundary Crossing:** An Enterprise Social System transgresses different boundaries, both physical and virtual. Traditional corporations can be constrained by the traditional boundaries of countries and continents, while a virtual one can move beyond those. In addition, there are certain virtual boundaries that are crossed with computer networks and telecommunications.
- **Network of Independent Organizations:** Many Enterprise Social Systems are comprised of independent companies who ally themselves under one central name in order to provide a comprehensive schedule of services in points across the globe. Therefore, many Enterprise Social Systems, while appearing to be one large corporation, are really many single entities that derive part (or all) of their business from this alliance with a larger entity.
- **Reconfigurable Structures:** The transience of an Enterprise Social System allows for components to be regularly switched in and out of use, altering the overall structure of the organization. Because this can be done with relatively little impact, the frequency with which components are switched is high and allows each organization to quickly adapt itself to a changing environment.
- **Modularized:** Since the components and functions of an Enterprise Social System can be changed with such ease, Enterprise Social Systems are categorized by a high level of modularity. Frequent changes are easily implemented and commonplace among Enterprise Social Systems.
- **Separability:** While each member of an Enterprise Social System is indeed linked to a much larger corporate structure that oversees them all, they each remain a separate and often self-sustaining entity. They rely very little on outside help from the larger organization and work independently of the majority of other members.
- **Division of Labor:** Each member of the Enterprise Social System exists to fulfill a specific need of the larger organization. Since assignments are divided up specifically, there is little overlap in job function.
- **Explicit Goals:** Similar to meta-management, each member of the organization is charged with an explicit task to complete as it relates to the overall function of the organization. Often times, after this single goal is completed, the link between the organization and the entity is dissolved until a further need for it is realized. At that point, the link is re-established.
- **Complementary Core Competencies/the Pooling of Resources:** The ease with which two members of an Enterprise Social System can communicate allows them to pool their resources, even

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

with members not directly involved in a specific project. Separate entities can quickly be called upon to provide secondary service or consult on a project via virtual channels.

- **Sharing of Knowledge:** Members of an Enterprise Social System collaborate to share their knowledge gained from individual activities performed. Since collaboration is facilitated through the communications channels that are afforded through virtuality, it is common to find "knowledge bases" or other database systems that contain information and documents pertaining to past experience.
- **Geographical Dispersion:** The nature of an Enterprise Social System lends itself to being spread across the globe; this is its primary reason for functioning. Enterprise Social Systems allow for members to be located at a distance apart.
- **Changing Participants:** Members of an Enterprise Social System, no matter their level of commitment, can be easily switched with new or other existing members if the project lends itself to that change. Since temporary alliances can be formed merely through the addition of a network node or the reconfiguration of an external network, a project participant can be added as changing conditions necessitate.
- **Electronic Communication:** A vital concept to the Enterprise Social System is the ability to communicate through purely electronic means, eliminating the need for physical contact and allowing the geographical dispersion of organization members. Online collaboration via email, discussion boards, chat and other methods, as well as telephone and facsimile communications are primary contributors to the removal of time and space in this new organizational concept.

Table 3. Work Practices in Real and Enterprise Social Systems

Real Organization	Virtual Organization
Geographic concentration	Geographic dispersion Boundary crossing
Semi-permanent needs	Separable units Modularized Changing participants Reconfigurable structures
Less cross standards	Sharing of knowledge Electronic communication
Weak co-operability	Networked independence Pooling of resources
Ambiguous value proposition	Division of Labor Explicit goals

Stakeholder Virtuality in Enterprise Social Systems

A virtual organization is regarded as virtual on the basis of stakeholder perspective. Enterprise Social Systems have extended beyond employees to consumers, and arguably to all other stakeholders. The table below articulates this broader view of a virtual organization, by showing how its meaning and techniques change depending on which stakeholders assume the virtual role. Examples are given for each category. Of course, it is possible for an organization to be virtual across multiple stakeholder dimensions. In that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Types of Enterprise Social Systems

Stakeholders	Meaning	Techniques	Examples
Traditional Stakeholders			
Employees	Remote Work	Meta-managed	Expedia
Shareholders	Absentee Ownership	E-trading	All publicly traded co.
Managers	Remote Management	Meta-management	
Customers	Internet Retailing	Online shopping	Amazon, E-bay
Suppliers	Remote businesses	Remote transactions	All global supply chains
Community	Remote Users of Products / Services	Social media	FB, Linked-in, Skype, Ventrilio
Expanded Stakeholders			
Government	Absentee voting; Great distance between politicians and constituencies Security State; Intelligence community	Electronic polling; E-communications, sometimes media mediated Surveillance	Amazon.com-CIA
Competitors	Internet rivalry	e-espionage; social media and advertising wars on internet	Amazon: Book Publishers, Grocery Stores, Netflix, Apple itunes
Industry	Remote membership	E-conferences	IT, retail,
Society	Remote relationships	Media-mediated	Seattle-Bellevue, Silicon Valley
Technological Environment Natural Environment – Places constraints on all of The above.	Global scope; cross-sector partnerships (especially Academia)	Moore's Law impacts all of the above	Google Glass, commercial drones

case, the meaning and techniques may be more than mere aggregations of each category, as the virtualization of multiple groups creates manifold virtual relationships between them (Riemer and Klein, 2008).

IMPLICATIONS

Virtuality carries social idenities, imposing the social, ethical, and political dimensions of organizational life. Ultimately, it is human beings who constitute and are constituted by these structures. Furthermore the cloud computing platform today forms virtuality in these structures and as such experience benefits and harms. Further research should assess the value-laden import for human players in virtual spaces. Below we identify implications to be considered for such future work.

- **Customer Based/Customized Products:** An Enterprise Social System provides the unique opportunity to provide their customers with highly specialized products as per their specific needs. This can be accomplished through outsourcing work to a separate organization or through the use of a virtually connected inter-organizational node located closer to the customer. Either way, it

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

becomes simple to add a function based on the customer's request and seamlessly integrate that function into the existing framework.

- **Participant Equality:** Since the ideal and practically achievable situation in an Enterprise Social System is that all members have equal access to the overall network, it is assumed that each member is able to and will participate equally to the work in progress. Each individual facet of an Enterprise Social System is expected to contribute an equal amount of work towards a given goal, if appropriate. While the equality may not be measured best in quantity, it can be restated as effort and the successful completion of all tasks assigned to it, be they large or small. Since every task is considered to be essential as a part of the project, the equality comes in the addition of that piece to a larger puzzle.
- **Open Communication:** The foundation of an Enterprise Social System is its communications components that exist in the absence of face-to-face exchanges. An Enterprise Social System can only survive if its members communicate freely through the provided channels between them, be they based on the Internet or more traditional telephone technologies. The organization cannot continue to function unless it is aware of what all its members are currently completing and often times, when communication is more closed, work that is being completed in tandem by more than one member can be hindered or brought to a halt.
- **Semi-Stable Relations:** While a stable relationship between entities can be expected during the course of normal progress on a project, the relationship between them becomes less stable once that work is completed. With no reason to remain aligned virtually, the relationship is expected to dissolve and, obviously, become less stable.
- **Trust:** The lack of physical interaction places a higher regard to the trust that exists between each entity involved in the organization. Since fewer "checks and balances" can be placed on appropriate departments, management and other entities trust that they will complete the appropriate work on time or be straightforward about delays or problems. If two entities working on a project together separated by thousands of miles are unwilling to trust each other, the work slows and suffers to a critical point.
- **Functionally or Culturally Diverse:** The nature of global diversity and the ability to locate organizational functions across the globe creates a diverse environment for the entire organization. Since members are all in different locations and charged with different tasks, diversity exists that is only found in the very largest multi-national corporations.
- **Cohesion:** An extension of the independent network, this component represents the coming together of separate entities to form an organization on a large scale and to provide one service on a smaller one.
- **One Identity:** Though comprised of separate entities that may be in themselves independent corporations, an Enterprise Social System takes on a single identity. This identity if most often how the public refers to the company, unaware of the complexities that lie beyond.
- **Focus on the Individual:** Though not always accurate in every Enterprise Social System, members can operate completely independently of each other within the organization.
- **Laterally Connected:** This model of an Enterprise Social System involves a group of members working together to complete one project with each member contributing equally but not assigned to a specific duty.
- **Vertically Integrated:** While a group of members remain assigned to the same project, they do their work independently of each other yet the work is not performed simultaneously. Each mem-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ber has one task, which they complete before passing the sum of completed work to the member who is assigned to the next step.

- **Hierarchical Framework:** An Enterprise Social System that bases the completion of its work on vertically integrated members is said to have a hierarchical framework. The separation of members into a path puts them on different levels of the framework.
- **Collaborative Culture:** By their nature, Enterprise Social Systems foster camaraderie between members even in the absence of face-to-face communications. Since the built-in communications tools are so easy to access and use, relationships form between members who haven't even met. A corporate culture forms out of friendship that produces a highly collaborative nature unlike traditional organizations where such extensive communicating is not required.

CONCLUSION

This study has built on research on today's modern organizations with cloud computing platform to lay the foundations for a comprehensive and systematic theorization of Enterprise Social Systems. The trend toward virtuality marks a fundamental transformation in space-time parameters in communications. This is especially so in the context of rapid current advancements in IT from cloud computing service providers as they open their internal IT engines to business organizations as cloud computing service models (Boukhedouma et. al., 2017).

Current IT trends show that increased spatio-temporal plasticity heightens the effectiveness and the efficiency of predominantly Enterprise Social Systems in the cloud computing platform. In particular, subject oriented asynchronous communications experience *greater inferred plasticity* and event oriented synchronous communications experience *greater referred plasticity*.

Finally, Enterprise Social Systems vary in their degree of virtuality based on the perspective of the relevant stakeholder group considered. Future research should study these effects on the value-laden experience of human players in virtual space.

REFERENCES

Ahuja, M., & Carley, K. (1999). Network Structure in Virtual Organization. *Organization Science*, *10*(6), 741–757. doi:10.1287/orsc.10.6.741

Allcorn, S. (1997). Parallel Enterprise Social Systems: Managing and working in the virtual workplace. *Administration & Society*, *29*(4), 412–439. doi:10.1177/009539979702900402

Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., ... Zaharia, M. (2010). A View of Cloud Computing. *Communications of the ACM*, *53*(4), 50–58. doi:10.1145/1721654.1721672

Bailey, D. E., Barley, S. R., & Leonardi, P. M. (2012). The Lure of the Virtual. *Organization Science*, *23*(5), 1485–1504. doi:10.1287/orsc.1110.0703

Barley, S., & Tolbert, P. (1997). Institutionalization and Structuration: Studying the Links between Action and Institution. *Organization Studies*, 18.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Baron, R. A., & Nambisan, S. (2010). Different Roles, Different Strokes: Organizing Virtual Customer Environments to Promote Two Types of Customer Contributions. *Organization Science*, *21*(2), 554–572. doi:10.1287/orsc.1090.0460

Bartel, C. A., Wiesenfeld, B. M., & Wrzesniewski, A. (2012). Knowing Where You Stand: Physical Isolation, Perceived Respect, and Organizational Identification Among Virtual Employees. *Organization Science*, *23*(3), 743–757. doi:10.1287/orsc.1110.0661

Beer, S. (1984). The viable system model: Its prvenance, development, methodology and pathology. *The Journal of the Operational Research Society*, *35*(1), 7–25. doi:10.1057/jors.1984.2

Boukhedouma, S., Alimazighi, Z., & Oussalah, M. (2017). Adaptation and Evolution Frameworks for Service Based Inter-Organizational Workflows. *International Journal of E-Business Research*, *13*(2), 28–57. doi:10.4018/IJEBR.2017040103

Breu, K., & Hemingway, C. (2004). Making organisations virtual: The hidden cost of distributed teams. *Journal of Information Technology*, *19*(3), 191–202. doi:10.1057/palgrave.jit.2000018

Brown, J. S., & Duguid, P. (1991). Organizational Learning and Communities of Practice: Toward a Unified View of Working, Learning, and Innovation. *Organization Science*, *2*(1), 40-57.

Charmaz, K. (2000). Grounded Theory: Objectivist and Constructivist Methods. In *Handbook of qualitative research.* Sage Publications.

Child, J., Ihrig, M., & Merali, Y. (2014). Organization as Information – a Space Odyssey. *Organization Studies*, *35*(6), 801–824. doi:10.1177/0170840613515472

Chudoba, K. M., & Maznevski, M. L. (2000). Bridging Space Over Time: Global Virtual Team Dynamics And Effectiveness. *Organization Science*, *11*(5), 473–492. doi:10.1287/orsc.11.5.473.15200

Cohen, S. G., Gibbs, J. L., Gibson, C. B., Stanko, T. L., & Tesluk, P. (2011). Including the "I" in Virtuality and Modern Job Design: Extending the Job Characteristics Model to Include the Moderating Effect of Individual Experiences of Electronic Dependence and Copresence. *Organization Science*, *22*(6), 1481–1499. doi:10.1287/orsc.1100.0586

Crisp, C. B., Mortensen, M., & Wilson, J. (2013). Extending Construal-Level Theory to Distributed Groups: Understanding the Effects of Virtuality. *Organization Science*, *24*(2), 629–644. doi:10.1287/orsc.1120.0750

Dodgson, M., Gann, D. M., & Phillips, N. (2013). Organizational Learning and the Technology of Foolishness: The Case of Virtual Worlds at IBM. *Organization Science*, *24*(5), 1358–1376. doi:10.1287/orsc.1120.0807

Fiol, C. M., & O'Connor, E. J. (2005). Identification In Face-to-Face, Hybrid, And Pure Virtual Teams: Untangling The Contradictions. *Organization Science*, *16*(1), 19–32. doi:10.1287/orsc.1040.0101

Flake, G. W., Pennock, D. M., & Fain, D. C. (2003, July). *The self-organized web: the Yin to the semantic web's Yang. IEEE Intelligent Systems*, 72–86.

Giddens, A. (1984). *The Constitution of Society*. Berkeley, CA: University of California Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Giddens, A. (1990). *The Consequences of Modernity*. Stanford, CA: Stanford University Press.

Glaser, B. G. (1978). *Theoretic Sensitivity*. Mill Valley, CA: The Sociology Press.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: strategies for qualitative research*. New York, NY: Aldine Publishing Company.

Goodall, K., & Roberts, J. (2003). Repairing Managerial Knowledge-Ability Over Distance. *Organization Studies*, *24*(7), 1153–1175. doi:10.1177/01708406030247007

Guedria, W. (2014). A Conceptual Framework for Enterprise Interoperability. *International Journal of E-Business Research*, *10*(3), 54–64. doi:10.4018/ijebr.2014070104

Harrington, J. (1991). *Organizational structure and information technology*. Hertfordshire, UK: Prentice Hall International.

Hinchcliffe, D. (2007). The state of Enterprise 2.0. *ZDNet*. Retrieved from http://www.zdnet.com/blog/hinchcliffe/the-state-of-enterprise-2-0/143

IBM Smart Business. (2010). *Dispelling the vapor around cloud computing*. Thought Leadership White Paper. Retrieved from ftp://public.dhe.ibm.com/common/ssi/ecm/en/ciw03062usen/CIW03062USEN.PDF

Jett, Q. R., Metiu, A., O'Leary, M. B., & Wilson, J. M. (2008). Perceived Proximity in Virtual Work: Explaining the Paradox of Far-but-Close. *Organization Studies*, *29*(7), 979–1002. doi:10.1177/0170840607083105

Kamoche, K., Kannan, S., & Siebers, L. Q. (2014). Knowledge-Sharing, Control, Compliance and Symbolic Violence. *Organization Studies*, *35*(7), 989–1012. doi:10.1177/0170840614525325

Knights, D., Noble, F., Vurdubakis, T., & Willmott, H. (2001). Chasing Shadows: Control, Virtuality and the Production of Trust. *Organization Studies*, *22*(2), 311–336. doi:10.1177/0170840601222006

Kolb, D. G. (2008). Exploring the Metaphor of Connectivity: Attributes, Dimensions and Duality. *Organization Studies*, *29*(1), 127–144. doi:10.1177/0170840607084574

Kouyoumjian, V. (2010). The New Age of Cloud Computing and GIS, ArchWatch. *ESRI*. Retrieved from http://www.esri.com/news/arcwatch/0110/feature.html

Lai, L. S. L., & Turban, E. (2008). Groups Formation and Operations in the Web 2.0 Environment and Social Networks. *Group Decision and Negotiation*, *17*(5), 387–402. doi:10.100710726-008-9113-2

Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago, IL: University of Chicago Press.

Lee, I. (2011). Overview of emrging web 2.0-based business models and web 2.0 applications in business: An ecological perspective. *International Journal of E-Business Research*, *7*(4), 1–16. doi:10.4018/jebr.2011100101

Linstead, S., & Thanem, T. (2007). Multiplicity, Virtuality and Organization: The Contribution of Gilles Deleuze. *Organization Studies*, *28*(10), 1483–1501. doi:10.1177/0170840607075675

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lyytinen, K., & Newman, M. (2008). Explaining information systems change: a punctuated socio-technical change model. *European Journal of Information Systems*, *17*, 589-613. Retrieved from www.palgrave-journals.com/ejis/

Maznevski, M. L., & Chudoba, K. M. (2000). Bridging Space Over Time: Global Virtual Team Dynamics and Effectiveness. *Organization Science*, *11*(5), 473–492. doi:10.1287/orsc.11.5.473.15200

McAfee, A. P. (2006). Enterprise 2.0: The Dawn of Emergent Collaboration. *MIT Sloan Management Review*, *47*(3), 21–28.

McKinney, V. R., & Whiteside, M. M. (2006). Maintaining Distributed Relationships. *Communications of the ACM*, *49*(3), 82–86. doi:10.1145/1118178.1118180

Miller, R. (2007). Enterprise 2.0 Definition and Solutions. *CIO*. Retrieved from http://www.cio.com/article/print/123550

Morgan, G. (2006). *Images of organization*. Sage.

Nevo, S., Nevo, D., & Kim, H. (2012). From recreational applications to workplace technologies: An empirical study of cross-context IS continuance in the case of virtual worlds. *Journal of Information Technology*, *27*(1), 74–86. doi:10.1057/jit.2011.18

O'Reilly, T. (2005). *What is web 2.0: design patterns and business models for the next generation of software*. Retrieved from http://www.oreillynet.com/lpt/a/6228

O'Reilly, T. (2005). *What is Web 2.0*. Retrieved from http://oreilly.com/lpt/a/6228

Orlikowski, W. (1992). The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science*, *3*(3), 398–427. doi:10.1287/orsc.3.3.398

Orlikowski, W. (1996). Improvising organizational transformation over time: A situated change perspective. *Information Systems Research*, *7*(1), 63–92. doi:10.1287/isre.7.1.63

Orlikowski, W. (2002). Knowing in Practice: Enacting a Collective Capability in Distributed Organizing. *Organization Science*, *13*(3), 249–273. doi:10.1287/orsc.13.3.249.2776

Orlikowski, W., & Yates, J. (2002). It's About Time: Temporal Structuring in Organizations. *Organization Science*, *13*(6), 684–700. doi:10.1287/orsc.13.6.684.501

Orlikowski, W. J., & Robey, D. (1991). Information technology and the structuring of organizations. *Information Systems Research*, *2*(2), 143–169. doi:10.1287/isre.2.2.143

Overby, E. (2008). Process Virtualization Theory and the Impact of Information Technology. *Organization Science*, *19*(2), 277–291. doi:10.1287/orsc.1070.0316

Palmer, J. W., & Speier, C. (1997). *A Typology of Enterprise Social Systems: An Empirical Study*. Retrieved from http://hsb.baylor.edu/ramsower/ais.ac.97/papers/palm_spe.htm

Porter, M. (1998). *Competitive Advantage: Creating and Sustaining Superior Performance* (1st ed.). Free Press. doi:10.1007/978-1-349-14865-3

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Prandelli, E., Sawhney, M., & Verona, G. (2006). Innovation and Virtual Environments: Towards Virtual Knowledge Brokers. *Organization Studies*, *27*(6), 765–788. doi:10.1177/0170840606061073

Riemer, K., & Klein, S. (2008). Is the V-form the next generation organization? An analysis of challenges, pitfalls and remedies of ICT-enabled virtual organisations based on social capital theory. *Journal of Information Technology*, *23*(3), 147–162. doi:10.1057/palgrave.jit.2000120

Robey, D., & Orlikowski, W. (1991). *Information Technology and the Structuring of Organizations*. The Institute of Management Sciences.

Sachs, P. (1995). Transforming Work: Collaboration, Learning and Design. *Communications of the ACM*, *38*(9), 36–45. doi:10.1145/223248.223258

Salesforce.com. (2012). *Software as a Service*. Retrieved from http://www.salesforce.com/saas/

Schultze, U., & Orlikowski, W. (2001). Metaphors of Virtuality: Shaping and Emergent Reality. *Information and Organization*, *11*(1), 45–77. doi:10.1016/S1471-7727(00)00003-8

Tsoukas, H. (1991). The missing link: A transformational view of metaphors in organizational science. *Academy of Management Review*, *16*(3), 566–585.

Venkatarman, S., & Das, R. (2013). The influence of corporate social media on firm level strategic decision making: A preliminary exploration. *International Journal of E-Business Research*, *9*(1), 1–20. doi:10.4018/jebr.2013010101

Venters, W., & Whitley, E. (2012). A critical review of cloud computing: Researching desires and realities. *Journal of Information Technology*, *27*(3), 179–197. doi:10.1057/jit.2012.17

Wareham, J., Busquets, X., & Austin, R. (2009). Creative, convergent, and social: Prospects for mobile computing. *Journal of Information Technology*, *24*(2), 139–143. doi:10.1057/jit.2009.1

Zander, U., & Kogut, B. (1995). Knowledge and Speed of the Transfer and Imitation of Organizational Capabilities: An Empirical Test. *Organization Science*, *6*(1), 76–92. doi:10.1287/orsc.6.1.76

This research was previously published in Entrepreneurship, Collaboration, and Innovation in the Modern Business Era; pages 102-120, copyright year 2018 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 55
Coworking Spaces and the Transcendence of Social Innovation Knowledge in the Smart Territory

Guillermo J. Larios-Hernandez
https://orcid.org/0000-0002-8288-7981
Universidad Anahuac Mexico, Mexico

Alberto Borbolla-Albores
Universidad Anahuac Mexico, Mexico

ABSTRACT

Smart territories favor social entrepreneurship, which develops in a collaborative effort requiring networking and skilled facilitation. Coworking spaces (CWS) advance as mediating organizations that bring together entrepreneurial communities in smart territories. This chapter develops a practical framework for knowledge dissemination in CWS. It bases this framework on the analysis of three spatial characteristics that allow for the assessment of the knowledge transcendence originating in CWS, namely, physical, social, and informational spaces. To test this framework, the authors analyze the Roma-Norte corridor in Mexico City, whose results indicate the presence of two models: one constituted of private organizations that place collaboration as a secondary value, subject to their office rental services, and an umbrella model that clusters other social innovation facilitators that transcend their territorial strip. This latter meta-space model expresses positive effects in terms of knowledge spillover, suggesting the concentrated bottom-up construction process of a smart territory.

INTRODUCTION

Entrepreneurship has transformed the urban space, and this space has welcomed entrepreneurship as a cornerstone component of the not-long-accepted concept of smart territory (Parada, 2017), redefining the

DOI: 10.4018/978-1-7998-7297-9.ch055

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

scope of territorial governance to include entrepreneurial bottom-up applications in its most renowned challenges. In general, entrepreneurial ecosystems are part of the urban space, defining another intelligent element in the constitution of a functional smart territory.

In this respect, motivated social entrepreneurs make proposals intended to improve their territorial milieu, including typical post-modernist problems such as urban mobility, pollution, community building, and lack of public services, among others, gathering together in collaborative environments that aim to maximize knowledge spillover and experience transfer. These environments are usually known as coworking spaces (CWS), which have increased as a modern urban setting to develop social innovations; numerous urban concentrations worldwide have embraced this type of collaborative structure. However, how knowledge is disseminated in CWS and how it influences the social innovations that transcend is a work in progress (Crepeau, 2016; Prado, Pelegrini, & Chaves, 2017; Surman, 2013). Additionally, though recent academic research targets the phenomenon of entrepreneurial collaboration in CWS (Mitev, de Vaujany, Laniray, Bohas, & Fabbri, 2019) or aims to typify CWS in a given urban location (Fiorentino, 2019), most scholars have widely ignored the interplay that takes place between several CWS in the same territory. For instance, Capdevila (2015) presented a qualitative study on coworking spaces in Barcelona, which analyzes their intermediating functions among various social groups, but with no further investigation about the clusters' configuration.

In this chapter, we develop a practical framework for knowledge dissemination in the CWS that would help scholars and practitioners to visualize the role of these milieus in a smart territory. We base this framework on the analysis of three spatial characteristics that would allow for the assessment of the knowledge transcendence that originates in CWS. Additionally, we illustrate this framework applied to an ecosystem of self-proclaimed CWS to search for configurations that may or may not influence knowledge spillover, delineating an original approach to the subject matter. For this study, central Mexico City was chosen as a case study, specifically the Roma-Norte corridor. The selection of this land strip concerned evidence of the settlement of an important cluster of CWS (20). Results and policy suggestions are also provided.

BACKGROUND

Entrepreneurship and innovation are essentially dynamic spatial phenomena that change over time (Groys, 2005). The pursuit of profit or the realization of economic sustainability in a social venture can only take place in a specific location, whose characteristics are defined by a functional space comprising interactions, ideas, and social context (Giddens, 2011). Social innovation has to do with the advance of solutions that aim to remedy certain social needs (Saiz-Álvarez & Palma-Ruiz, 2019; Mulgan, 2006), and each territory expresses different social demands, involving the development of tailored social innovations (Bencardinoa & Greco, 2014).

François Perroux may have been the first scholar to relate Schumpeter's work on innovation with the spatial dimension (Rozga, 2007). From that moment, a variety of conceptual frameworks have been developed to explain territorial innovation, which became the dominant paradigm at certain periods: industrial district and growth pole in the late 60s; high technology areas, technology parks, innovation environments, informational cities, Technopolis (70s and 80s); industrial clusters, regional innovation systems, learning regions (90s); virtual communities, cities, and regions; smart communities, cities, and territories (from the beginning of the 21st century) (González & Rozga, 2005; Rozga, 2007). Though

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

clusters are typically defined as economic enclaves that are distinguished by their enterprise agglomeration (Capdevila, 2013), in the context of CWS, a cluster becomes a space of intermediation between different social groups (Capdevila, 2013b).

More recently, part of the scholarly literature about territorial development refers to "smart cities" and their capacity to become "sensitive cities," whose public policies associate economic competitiveness with social and environmental sustainability (Castelnovo, Misuraca, & Savoldelli, 2016). Other authors designate this type of city as "enabling spaces of entrepreneurship" (Richter, Kraus, & Syrjä, 2015), in that social innovation is empowered by the entrepreneurial ecosystem. In return, the practice of the social entrepreneur impacts the ecosystem, and eventually, the community. From this perspective, the smart city is a space that favors social entrepreneurship, building a new urban configuration that rationalizes innovation from citizen problems and needs (Castelnovo et al., 2016).

On the other hand, intra- and extraterritorial entrepreneurial activities and their corresponding spatial interrelations create an alternative territorial logic based on the clustering of its key participants (Harvey, 2001), leading to the development of a new structure composed of multiple small specializations: the mini-cluster, which reduces the cost of information search and transfer, facilitating entrepreneurial outcomes (Grabher, 1993). One of the fastest-growing mini-clusters in today's new smart space is coworking spaces (CWS). In general, social networking and collaboration, as well as aesthetic design, distinguish CWS from other office services (Waters-Lynch & Potts, 2017); that is, CWS are differentiated from other Small-office-Home-office (SoHo) concepts in that they are aimed at building a more flexible and interactive working community (Bouncken & Reuschl, 2016). Consequently, to facilitate social relations in a CWS, spatial imagination and usage are more important than planning (Assenza, 2015).

In general, the CWS offering involves both tangible and intangible assets, including services such as rental of infrastructure and access to a social cluster (Bouncken & Reuschl, 2016), which usually target the solo entrepreneur (Assenza, 2015), aimed at making this individual part of an effective collaborative environment. Typical CWS users include self-employed individuals, microenterprises, freelancers, entrepreneurs, or contractors, who participate in CWS to take advantage of its infrastructure, acquire knowledge, or seek recognition (Bouncken & Reuschl, 2016). These CWS value development processes that create conventions around how users seek to build capabilities and fulfill their entrepreneurial goals (Thompson, Purdy, & Ventresca, 2018), which can target both business and not-for-profit projects (Bouncken & Reuschl, 2016).

The origins of CWS go back to the year 2001 when like-minded people held informal meetings around specific productive activities, a model that evolved into a movement to encourage collaboration in shared facilities (Assenza, 2015). Since collaborative spaces become channels that facilitate the flow of unstructured information, they are a key element in understanding the innovation processes that occur in urban networks (Capdevila, 2013). Thus, collaboration is at the core of CWS, which unveils several spatial scenarios that represent laboratories for the exploration and exploitation of the entrepreneurial opportunity.

THE ROLE OF THE COWORKING SPACE IN THE SMART TERRITORY

CWS comprises a multipurpose spatial design that simplifies the complexity of entrepreneurial knowledge, absorbing and codifying useful expertise scattered around a collaborative environment (Eaton, 2015). In other words, CWS convert tacit knowledge value into explicit cognitive maps. CWS develop

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

as hinges of knowledge between citizens and their territorial structures of governance, considering that geographical proximity and the persistence of unsolved problems favor the creation of a sort of "noosphere" that strengthens social capital in the smart territory, confronting people's heuristics to the territory's institutional design (Giddens, 2011). In one regard, CWS provides a public good through a private service (Waters-Lynch & Potts, 2017) in that they develop a community (Bouncken & Reuschl, 2016) that builds together a culture of shared values (Bouncken, Aslam, & Reuschl, 2018).

These knowledge platforms help entrepreneurs to cultivate ideas and strategies to address social, environmental, cultural, and economic challenges in their territories (Surman, 2013). Based on the CWS-facilitated social capital, entrepreneurs are encouraged to initiate innovative proposals for their different localities, leveraging social innovation that builds on urban knowledge to create problem-solving capacity (Gandini, 2015). How this innovation capacity facilitated by CWS transcends in the form of effective social innovation knowledge is a question that requires further investigation. However, in spite of the fact that there have been around 7,800 CWS worldwide, according to 2015 estimates (Waters-Lynch & Potts, 2017), the study of CWS has been barely analyzed by academic scholars (Bouncken & Reuschl, 2016), and there is little empirical information on the operation of CWS (Assenza, 2015), rendering it difficult for researchers and practitioners to indicate whether the collaborative knowledge that originates in CWS leads to spillover effects for social innovation.

That is why CWS advance as promoters of social innovation, in that they emerge as mediators in the identification of and response to local problems, representing the platforms of social capital that are necessary for the intermingling of collective visions. Hence, from a social innovation approach, the role of CWS is to act as intermediary organizations that connect markets, communities, and governments (Avelino et al., 2019) in the smart territory. Thus, territorial development occurs through social innovation, which takes an approach that diverges from the traditional top-down regional development perspective, in that development or change originates in the social relations of an entrepreneurial community (MacCallum, 2009). As envisioned, the peer-to-peer proximity offered by CWS is expected to favor learning, teamwork, and collaboration, which would eventually lead to creative thinking and the realization of individual projects (Assenza, 2015; Bouncken & Reuschl, 2016), decreasing entrepreneurial uncertainty by sharing multiple knowledge (Waters-Lynch & Potts, 2017).

In this line of thought, it would be relevant to identify the enabling character of CWS as knowledge spillover generators, whose intermediating function (role) produces a public good that services individuals willing to discover novel solutions to territorial challenges. Identifying these enabling factors would permit better considerations in designing an effective CWS model.

Enablers of Knowledge Spillover in CWS

Taboada and García (2010) indicated that enterprises involve knowledge retention and knowledge spillover processes (called risks). The urban fringes of the city informally absorb the knowledge, previously retained by companies, which is disseminated and socialized in the figure of third places (connectors), such as clubs, bars, and coffee chains (Florida, 2002). According to Florida (2002), these places encourage the dispersion of knowledge, causing informal knowledge transfer, the socialization of images and symbols, and the use of physical and spatial objects that may lead to various patterns of action. The diffusion of knowledge will produce unexpected and peripheral cognitive organizations that would eventually facilitate information channels in the urban environment. To achieve the full transformation of collective knowledge into knowledge retained by organizations, it is necessary to count on another

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

connecting interface with the capacity to absorb scattered knowledge, formalize it and connect it with business players. This connecting interface is the coworking space.

Social interaction is the expected outcome of CWS, which ought to derive in learning and positive effects on innovation and new venture performance (Bouncken & Reuschl, 2016). However, users in CWS usually confront the challenge of identifying complementary knowledge to solve problems (Waters-Lynch & Potts, 2017), and they may require some level of guidance to profit effectively from this mutual interaction (Assenza, 2015). As seen before, this guidance is part of the CWS service portfolio, which facilitates trust creation and information exchange between participants as part of a social learning process leading to business matchmaking (Waters-Lynch & Potts, 2017).

Therefore, unpredictable encounters (serendipity) are a key component of the CWS dynamic (Waters-Lynch & Potts, 2017), and the value that users perceive in CWS would depend on the quality of these casual interactions or affordances that can be achieved as a result of being part of the CWS (Assenza, 2015). In this sense, the participants' behavior involves strong agency characteristics that may or may not contribute to the new networking environment, in that learning how to conduct effective networking requires a commitment to engage (Assenza, 2015). CWS can be ineffective when individuals end up in isolation as a result of their poor socialization skills (Bouncken et al., 2018). Additionally, some CWS participants may develop temporary links to peers, blocking any possibility of building a community of shared values (Bouncken & Reuschl, 2016).

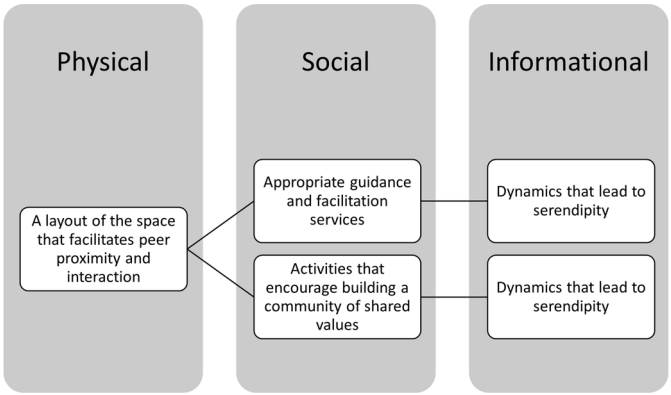
To be relevant, CWS should pay attention to factors that empower or disempower individuals (Avelino et al., 2019). Depending on the user's personality, the layout of the space can encourage collaboration or discourage it (Assenza, 2015). It remains uncertain which configurations result in effective knowledge spillover that originates in collaboration. However, successful collaboration and knowledge spillover require useful casual interactions, which stem from like-minded peer proximity, either virtual or physical (Assenza, 2015). These social interactions are responsible for the creation of effective entrepreneurial ecosystems (Thompson et al., 2018), and consequently, smart territories.

To some, effective collaboration in CWS depends on social similarity among participants (Assenza, 2015), though other scholars expect CWS to create trust and collaboration among persons with diverse profiles (Bouncken & Reuschl, 2016). In any case, trust creation and the subsequent upsurge of collaborative ties take time (Bouncken & Reuschl, 2016), and time is one of the entrepreneur's valuable resources. According to Bouncken and Reuschl (2016), the pursuit of collaboration in a CWS may become a distractor that delays entrepreneurs in the development of their business ventures. In other words, there is a tradeoff between collaboration with the existing network and new contact exploration, between investment in contact enhancement and value appropriation (Bouncken et al., 2018). Contrary to this perspective, Letaifa and Goglio Primard (2016) point out that collaborative entrepreneurship presents more significant evidence of success than individual entrepreneurship. The authors maintain that contexts that present the best conditions for the establishment of collaborative networks produce effective incentives to associate with interest or reference groups.

Based on the contributions of the previously mentioned authors, we identify key enablers in CWS that may lead to effective collaboration and, consequently, knowledge spillover within the CWS ecosystem. These enablers involve building a physical space that encourages social and informational processes within the CWS, namely, a layout of the space that facilitates peer proximity and interaction to achieve effectual affordances and knowledge discovery (serendipity). Additionally, the CWS should ensure, as part of its service portfolio, the appropriate guidance and facilitation to encourage a community of shared

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Knowledge spillover enablers of the CWS
Source: Own elaboration



values, leading to the anticipated informational outcome of opportunity discovery. These enablers are shown in Figure 1 below and are classified according to their character in assembling the CWS.

Identifying whether CWS comply with these characteristics to enable effective collaboration and subsequent knowledge spillover becomes instrumental. As expected, social entrepreneurs at CWS would operate locally though connected globally (Avelino et al., 2019), and international exposure provides incentives for entrepreneurs to engender new ideas that have the potential to flourish as long as the CWS informational processes effectively facilitate them. The extent to which CWS and guest projects produce this social innovation knowledge would determine whether these micro-spaces contribute to the development of the smart territory or are merely service islands in the local business landscape.

Network Effects That Favor Knowledge Spillover

At present, space acquires a new role within the context of global digital networks, including agile forms of interaction and governance (Perulli, 2000), which allow entrepreneurs to aspire to a quasi-planetary or multiregional scope. This level of reach is granted at high speed by the capabilities of digital technologies, building a complex system with network effects that influence CWS.

The formation of clusters is common in all networks whose individual members or nodes are not necessarily in the same "spatial neighborhood," constituting a space of flows (Castells, 1991). In this way, CWS act as nodes located in a specific territory but integrated into remote collaborative networks. These nodes can achieve significant effects on their geographical territory when they reach higher relative importance within the network: "hubs" or central nodes (nodes with many more links than others can). Thus, in a network of this type, the number of nodes with respect to the number of links of each does not follow (according to empirical experience) a bell curve (where there is a certain homogeneity), but a power law, where the vast majority of nodes have few links and a few, a huge amount of them (Barabási, 2002). A network has "hubs" when two basic conditions are met: the network is growing, and there are preferences toward the nodes with the largest number of links and that are the most robust ("fitness") (Barabási, 2002). Usually, the first nodes created have competitive advantages in the network (Velasco, 2003).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

There is, thus, a great variety of interconnection possibilities between nodes in the various CWS that locate in a smart territory, some more powerful or with better "fitness" than others, according to their capacity to form part of a global network of social innovation collaboration and value creation. Some nodes carry out activities that are structurally relevant to collaboration (influencers), others control and originate information flows (entrepreneurial ideas and projects), others are simply receivers of information with minimal control (peripheral or isolated CWS), and still others control access to the network (headquarters of global CWS) (Barney, 2004). Consequently, equality is a utopia in the face of the network effects of the CWS collaboration. While individuals can benefit from the information available on the network, this does not mean that more information leads to greater equity in terms of access and collaboration within the variety of CWS available in the territory.

Thus, CWS has enabled the creation of new levels of interaction among entrepreneurs within this network space, leading to different network architectural configurations that determine the transcendence of social innovation knowledge. These configurations allow for different forms of interaction that group collaboration characteristics among entrepreneurs who pursue specific objectives in their digital interrelations on the local and global scale.

Although the efficiency of the network requires the existence of central nodes, when groups with high local content and short links among them are achieved (small world pattern), productivity is enhanced more than any other hierarchical network (Van Alstyne & Bulkley, 2004). This means that it is possible to achieve greater efficiency within CWS when an interactive working community is built locally. The network architecture articulates nodes in a globalizing dynamic but forgets the segments of society that offer little interest from the perspective of value creation (Hilbert, 2001). That is why the study of network effects in CWS plays a fundamental role in the understanding of knowledge spillover at the territorial level: by explaining its structure, dominance, and relevant players.

In summary, collaboration networks through CWS develop as a complex system that adopts network effects with greater force. How CWS operates and interacts within the territory would determine success in terms of effective knowledge spillover, connecting individuals inside and outside of their spatial milieu.

Characterizing the Transcendence of Social Innovation Knowledge in CWS: A Framework Proposal

The smart territory informally absorbs the information spillover, previously enclosed in unconnected individualities. Interfaces built by CWS develop spaces that disseminate and socialize knowledge. Knowledge socialization produces unexpected and peripheral cognitive endeavors that may generate knowledge patterns or territorial trends, many of these fleeting and limited.

In other words, information spillover gives rise to tacit knowledge that had been scattered in the territorial space and without being used. For this reason, CWS becomes an interfacing solution that confers structure on this knowledge dispersion, transforming collective knowledge into retained knowledge for social innovation, which is absorbed, grouped, and formalized by the entrepreneur. During the entrepreneurial collaboration process, knowledge at the CWS and its surrounding territory is boundless, in that it remains safeguarded in the minds of its members. Hence, CWS are open spaces of social innovation possibilities whose members develop their vision collectively.

On the other hand, social entrepreneurship needs to confront an institutional context that favors profit maximization, short-term thinking, and business growth (Thompson et al., 2018), and CWS are physical spaces that generate the conversion of collective know-how into private knowledge value (Groys,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2005). Some CWS have clear regional economic development goals (Assenza, 2015), and others have been created with strong social or environment-oriented purposes (Avelino et al., 2019). It is this latter model that comprises the type of CWS that inspires social innovation knowledge spillover.

CWS encourages coordination between independent individuals, delivering an intermediating function between users (Capdevila, 2015) who, in the case of social innovation, seek to discover novel solutions to local or global problems, creating a social economy (social space) between them (Waters-Lynch & Potts, 2017). However, the transactional nature of this collaboration falls short if it cannot transcend to generate knowledge-based discoveries (informational space). The collection of dispersed knowledge from certain cognitive groups located in the smart territory is a process that originates in relationships where knowledge flows. CWS has the purpose of admitting this knowledge dispersion in order to explore new combinations and, finally, to grow codified knowledge in the form of cognitive maps (knowledge appropriation in the informational space).

Several frameworks have been proposed to examine change and social innovation dynamics in the smart territory that depart from a dimensional analysis of the territory's systemic functional aspects and their interrelationships. Avelino et al. (2019) conceive four shades of change and innovation, namely, social innovation, innovation system, game-changers, and narrative of change, which are systemic aspects that frame change and innovation from a social approach. Similarly, Assenza (2015) presents a proposal for the study of CWS that includes the organizational level (physical structure leading to production), the interactional level (where knowledge is disseminated), and the individual level (where innovation takes place). However, these proposals were not designed to express the process of knowledge spillover within CWS, but to distinguish functional characteristics.

As noted previously, knowledge spillover enablers can be classified according to their physical, social, and informational character. These characters can be taken to the spatial domain to develop an analytical framework for assessing knowledge spillover, which would provide a characterization of these coworking places and observe their territorial relationships. This framework is depicted in Figure 2.

In Figure 2, we base this framework on the analysis of the three spatial characteristics, i.e., physical, social, and informational, which represent processes of knowledge location, knowledge production, and knowledge appropriation, respectively. These three spaces of knowledge allow for the assessment of the transcendence of the social innovation knowledge that would have originated in CWS.

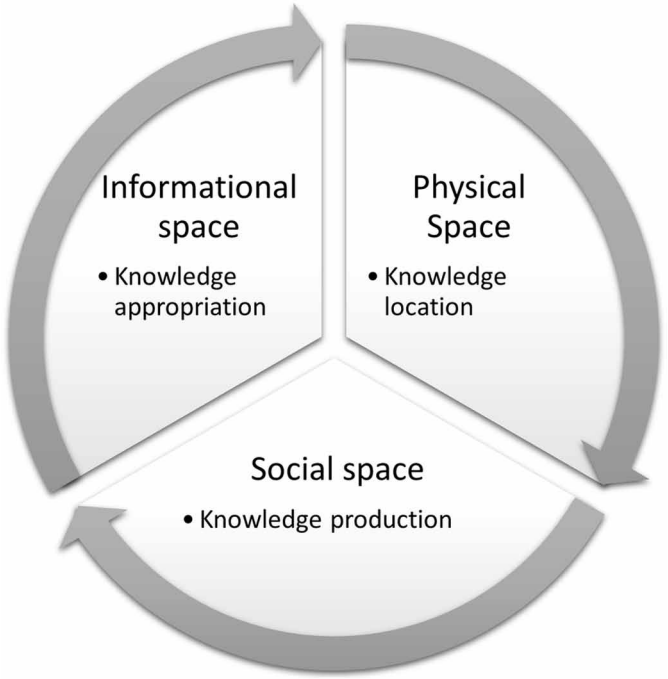
For our territorial analysis, we provide an alternative operational framework to accompany other models such as those proposed by Avelino et al. (2019) and Assenza (2015), which can be complemented by the viewpoint of physical space, social space, and informational space. We, therefore, think that constraining our research to these spatial features can help develop a better understanding of the predominant model of CWS in this land area.

METHODOLOGY

From a methodological approach, this chapter collects, organizes, and examines information that originates from a group of CWS to explore their character according to the analytical framework for knowledge spillover presented previously.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Spatial dimensions of the CWS
Source: Own elaboration



Territorial Description

The territorial target is the Roma-Norte corridor in Mexico City, which is the city area that has produced majority of knowledge clusters in that urban space: twenty Coworking spaces (CWS) are registered in that area of the thirty-two that exist in this metropolis, making this district a favorable space for the generation of social capital. This urban area is characterized by the presence of creative global and national companies and by the high density of diverse entrepreneurial activities that take place in its territory.

This business-cultural environment, clearly on the periphery, represents a territory of high spatial diversity and lifestyles. This is a corridor with a great diversity of groups, values, and ideas, assumed to be the type of innovative environment that permits the exchange of information and intermingling among different interests. The twenty collaborative spaces in the corridor share users with a wide range of third-party spaces, that is, environments that serve as connectors of the dispersed information flow on the periphery: restaurants, clubs, bookstores, theaters, public parks, coffee chains, among others.

Since CWS are functional in integrating dispersed information through these third-party spaces into packages of knowledge for entrepreneurship, the Roma-Norte corridor is known for its entrepreneurial lifestyle and global character, flexibility, and openness to outsiders, rendering this area decisive for the exchange of information and knowledge in Mexico City. As expected, coworking spaces in this corridor function as devices that simplify the complexity of this entrepreneurial environment.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Data Collection

After collecting Web and geographical data of the thirty-two CWS in the city (secondary sources), we analyzed and selected those CWS with readily available Webpage information and grouped within the Roma-Norte corridor. Twelve of these CWS were visited for site observation, and this investigation was complemented by phone calls and further web information searches, which were instrumental for exploring these coworking centers and recording their impacts on the territory. From a practical perspective, our investigation has undergone the following considerations:

1. **Data Sharing:** Most coworking spaces appeared reluctant to share data on and features of their communities
2. **Income Model:** We discounted CWS, whose model aimed mainly at the rental of office space. Hence, we directed our attention to five coworking spaces in this territory to carry out a focused, deeper exploration of these organizations and their relationship to territorial change and innovation dynamics
3. **Investigated CWS:** Selected CWS in the Roma-Norte corridor included COW Roma, UZone, 3er Espacio, Distrito Central Coworking, and Impact HUB

Method

We used the qualitative ethnographic research method. Qualitative research seeks to understand the action of the meanings inscribed in the discourses formed by diverse social groups, interpreting the contexts of social reality. Its scope is limited to the understanding that can be obtained from observation and communications. The symbolic world of individuals is understood through their contextual dialogues, which are decisive for the design of categories that allow for the generation of interpretative frameworks and the construction of social reality. The scope of the information search in this investigation included: secondary sources, telephone calls, and on-site visits, whose information supply tactics are shown in Table 1 below.

Table 1. Information supply tactics

Action	Information Supplies
Secondary sources	Websites
Phone calls	Registered numbers on the internet
On-site visits	Participating observation in coworking spaces

Source: Own elaboration

In this investigation, we essentially sought to specify the following aspects in each CWS:

- Purpose of the coworking space.
- Level of access to member affiliates.
- Impact that each of the coworking spaces had on their surroundings.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Challenges

Secondary analysis of qualitative data is a valid mode of research; however, limitations are always present. From a practical perspective, our research went through the following considerations:

- Some secondary sources did not provide enough information about coworking spaces.
- Regarding telephone calls, some coworking spaces did not provide quality information, or their attitude seemed reluctant to share data, including several characteristics of their communities.
- For some onsite visits to co-working spaces, access was restricted and could not obtain quality information.

Based on the analytical framework presented in Figure 2, we characterized the five CWS, whose features are summarized in Table 2 and Table 3.

RESULTS

As shown in Table 2, the physical space of four of the five coworking spaces is oriented toward offering office rental services, placing collaborative spaces as one more service, and not as the main value. These CWS are COW Roma, UZone, 3er Espacio, and Distrito Central Coworking. For this reason, we analyzed these four CWS separately. Despite being self-advertised as CWS, these spaces do not consider in their scope networking creation to facilitate information flows as a key component of their services portfolio (demonstrated by their lack of transparency), and only deal with restricted access groups that maintain few relationships among members.

Regarding the social space, we find that the four centers are hosts to for-profit organizations, which are offered office rental services. Networking arises mainly from the motivation of community members and not from the management's initiative, resulting in events, workshops, and competitions that originate essentially from the proactivity of the CWS guest participants. In this respect, education to support entrepreneurs in these centers is scarce and restricted to the community members' interests, resulting in limited or no-creation of startups within these spaces.

Concerning the knowledge space, the lack of open networking and participation beyond their own space instills barriers that impede the flow of knowledge with peers from other territories.

In summary, the services offered by these CWS target the rental of space (and offices), mainly for small companies, not entrepreneurs, resulting in a limited drive for the development of entrepreneurial groups. There is also a restricted offer of networking events, education for entrepreneurs, and invitations to competitions, whose organization is left to the members and their interests, considering that the role of management is confined to site administration. Consequently, few startups emerge from this type of coworking spaces. It is important to highlight that the few startups that have emerged from these spaces do not manifest themselves in the community as "game-changers," that is to say, their presence does not reveal an evident territorial impact. Additionally, interrelation among these centers and other players in the ecosystem is limited, resulting in diffuse, precarious, and dispersed inter-territoriality.

On the other hand, we were able to identify one coworking space that, despite possessing all of the characteristics mentioned previously, hosts organizations and startups that have strong social focus: Impact Hub. Created in 2014, Impact Hub's model combines CWS services with incubation services, building a

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Selected CWS-like organizations in the Roma-Norte corridor

CWS	MISSION	PHYSICAL SPACE Location of Knowledge	SOCIAL SPACE Production of Knowledge	INFORMATIONAL SPACE Appropriation of Knowledge
COW ROMA	To be agents of change and witnesses to the growth of companies and startups by helping them obtain their own space.	Office rental: Furniture, collaboration spaces (limited), virtual offices, and boardrooms.	Tech companies. Networking is not encouraged by the CWS. There is no collaboration. Few events or competitions, not open, restricted access community.	No workshops, only those from individuals No certifications (good practices) Does not become involved in local issues.
UZONE	To support entrepreneurs and independent professionals who seek to increase their income, through flexible space offering plans.	Office rental: Furniture, collaboration spaces (limited), virtual offices, and boardrooms.	Companies: Advertising, production company. Networking is not encouraged by the CWS. No events.	Education (individuals). No certifications (good practices). Does not become involved in local issues.
3er ESPACIO	To be an office alternative for independent professionals and entrepreneurs, offering multiple services and flexible schedules, with the possibility of developing creativity and expanding networks of contacts.	Office rental: Furniture, collaboration spaces (limited), virtual offices, and boardrooms.	Companies: software developers, public relations, architects. Networking is not encouraged by the CWS. Few events or competitions, not open, restricted access community.	There is education (topics to support entrepreneurs). No certifications (good practices). Does not become involved in local issues.
DISTRITO CENTRAL COWORKING	To be a shared environment in which entrepreneurs, startups, and freelancers are part of a community that connects them, creating business opportunities.	Office rental: Furniture, collaboration spaces (limited), virtual offices, and boardrooms.	Companies: advertising agencies, real estate, tech, architects, psychologists and, therapy Few events or competitions, not open, restricted access community. Networking is not encouraged by the CWS.	No workshops, only those organized directly by tenants. No certifications (good practices). Does not become involved in local issues.

Source: Own elaboration

community of social entrepreneurs who can access a worldwide network (Avelino et al., 2019). Impact Hub characteristics appear in Table 3.

Impact Hub leases its spaces to organizations with a social mission, including Ashoka, ANDES, and SistemaB, whose strategies are generally global in scope and not necessarily local. Despite the presence of these organizations, it should be noted that this coworking space does not have the creation of startups as a fundamental objective since all of its efforts are aimed at promoting the community settled in its space. In line with said community, it promotes proposals, competitions, and events that enhance the networking of its members. According to their "interests," the social-mission organizations in this space that promote social change and the empowerment of players, usually transcend their territorial strip.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Impact Hub characteristics in the Roma-Norte corridor

CWS	MISSION	PHYSICAL SPACE Location of Knowledge	SOCIAL SPACE Production of Knowledge	INFORMATIONAL SPACE Appropriation of Knowledge
IMPACT HUB	To be a global platform that supports entrepreneurs and innovators who seek to influence the world positively by offering services and the appropriate infrastructure for these to strengthen and scale their projects and level of impact.	Office rental: Furniture, collaboration spaces (limited), virtual offices, and boardrooms.	Social companies Networking is driven by management and by community members. Events and competitions are held.	Workshops to support entrepreneurs- Certifications (good practices driven by SistemaB). Does not become involved in local issues.

Source: Own elaboration

DISCUSSION

The analytical framework proposed in this chapter has proved to be a useful tool for characterizing the Roma-Norte corridor in terms of CWS knowledge spillover configuration. The key features of this characterization are listed and discussed below.

- **Feature 1:** The Roma-Norte is not a distributed structure, in that social innovation appears to take place around a single entity: Impact Hub.

Impact Hub not only hosts social entrepreneurs but also is the physical and social space that concentrates relevant organizational players in the social entrepreneurship ecosystem. Thus, Impact Hub becomes a sort of umbrella space in which other spaces, such as Ashoka, ANDES, and SistemaB, cluster. Hence, we can deduce that the Roma-Norte corridor of CWS is mainly a star structure around Impact Hub, surrounded by CWS-like islands with limited collaboration and, subsequently, few knowledge spillover effects. The clustering of social mission organizations in Impact Hub is a recent phenomenon in that they formerly had separate physical but socially interrelated locations, constituting a social innovation ecosystem. Today, this ecosystem opts not only to have social but also physical proximity, potentially increasing knowledge spillover within their territorial influence. This process is an example of the bottom-up construction of a smart territory, in which key social innovation players decide to increase synergies by proximity.

- **Feature 2:** The existence of a set of isolated coworking spaces in the same territory implies the absence of an integrated regional innovation cluster.

These islands focus mainly on the commercial and little on the development of startups in the majority of their coworking spaces. This isolated configuration of CWS is a counterexample to the ecosystem built around Impact Hub in the form of a social innovation superstructure.

- **Feature 3:** Change narratives possess a strong presence in all coworking spaces, unlike the innovation and social innovation systems or "game changers" that, although appearing in all of the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

examples studied, their actions do not suppose a radical transformation of the dominant institutions of their social context.

From feature 3, we can point out that the studied territorial strip does not demonstrate strong interaction among all dimensions (social innovation, innovation system, game changers, and change narratives), in that some of these aspects are more developed than others, according to the four "shades" of Avelino et al. (2019).

- **Feature 4:** The number of global organizations involved in the clustering process around Impact Hub implies the creation of a meta-space of social innovation, which is expected to transcend their spatial boundaries and scale to become proposals that solve problems in other territories as well.

From a knowledge spillover approach, Impact Hub constitutes a meta-space for social innovation knowledge, which transcends the territory in that it has created links on a global scale. Since there are many challenges faced by CWS to influence problem-solving in their local environment, the existence of a physical umbrella space that facilitated a stronger social space may result in positive actions to face these challenges, creating an informational space beyond the territorial boundaries of the Roma-Norte corridor.

As a final remark, CWS is a buzzword that has been mimicked by more traditional office spaces to gain market share, as has been demonstrated by the island CWS-like organizations, whose services portfolio would correspond only partially to what is expected from CWS. However, the existence of a star superstructure may motivate these CWS to evolve their business models and become closer to more collaborative CWS models, expanding the social ecosystem, considering that the presence of more expert peers that share knowledge may encourage entrepreneurial behavior among these CWS participants (Assenza, 2015).

POLICY RECOMMENDATIONS

From a policy perspective, the umbrella configuration that has been born in the Roma-Norte area can be incorporated into other local initiatives to build a smart city, creating stronger linkages that drive the generation of more sensible solutions to territorial problems.

Several unsolved problems are characterized by their complexity, uncertainty, and appraising dimensions, and scholars recognize that innovative solutions to these grand challenges require collective action, whose systemic linkages are yet to be understood (Ferraro, Etzion, & Gehman, 2015). Solving these challenges calls for an approach that understands innovation from a conceptual framework that appreciates social issues (broad meaning), in opposition to the Schumpeterian technology-push perspective of innovation. This approach has been known as the demand-pull model of innovation, which confers social meaning on the economic demand, including human and social needs, and articulated in programs driven by various mission-oriented organizations (Godin & Lane, 2013).

Unsolved challenges produce a type of demand-pull phenomenon, consisting of motivated people that decide to take action in an attempt to discover alternate solutions. Instances of this trend can be found in a variety of sectors, including education, security, health services, and finance, where organized entrepreneurial mindsets have launched bottom-up endeavors to tap into the opportunity to act as

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a substitute for traditional top-down activities. Great problems serve as a systemic demand-pull engine to generate entrepreneurial action and change, which can be encouraged or disincentivized by public support processes. Governments can partner with these entrepreneurs and be active in CWS to facilitate connections and networking. In this sense, CWS becomes the space to make alternative proposals to solve social problems, whose probability of success can be increased if relevant links exist between local authorities and CWS.

Nonetheless, it would be important to design the correct policies that provide the desired incentives, as it has been proven that CWS, supported by either government or private donors, may be tempted to prioritize short-term results according to their donors' requirements over user needs, confronting idealism with organizational realities as conventional norms prevail (Butcher, 2016). Additionally, since social entrepreneurs intend to target social or environmental problems that the public policy has been unable to solve, challenging dominant institutions (Avelino et al., 2019), public policy designers may see the social entrepreneurship that originate in CWS as a replacement for a public funding budget (Avelino et al., 2019), instead of a complement to solving local problems. CWS aid social innovators to determine entrepreneurial opportunities when participants receive this knowledge (spillover) or discover the opportunity to exploit it (Assenza, 2015). This is the challenge of this new umbrella structure that has been born in the Roma-Norte corridor in Mexico City, whose success needs to be tested to date.

On the other hand, as participants in a complex socio-economic system, organizations need to confront contradictory institutional signals, which would trigger distributed social involvement when top-down institutional and market-based mechanisms seem ineffective to members in a given society. A distributed and learning-focused entrepreneurial approach (robust action) has been proposed as an alternative to solving grand challenges (Ferraro et al., 2015).

Recent entrepreneurship methodologies such as Lean Startup or the Customer Development Model advocate for this robust action approach, which seeks to accomplish short-term goals that are constantly updated as part of a validated learning process (Ries, 2011), preserving long-term flexibility. Through distributed experimentation, intended solutions to challenges can be tested, posing new questions on their effectiveness at a large scale (growth engine).

CONCLUSION

In this chapter, we propose an analytical framework to assess the knowledge spillover that originates in coworking spaces as a key element for the development of a smart territory. This framework evolved from understanding the key enablers of social innovation within the coworking space. We used this framework to review the structure and transcendence of the Roma-Norte corridor in Mexico City from the perspective of its CWS-originated knowledge dissemination potential, whose configuration proved to be a tendency toward a clustering model. We also identified CWS-like models limited in their services scope and territorial impact.

The framework proposed in this chapter has implications for scholars, practitioners, and policymakers, including:

- A better understanding of how social ventures that emerge from these collaborative spaces affect the advance of smart territories.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- The identification of patterns in knowledge overflow beyond the territory's spatial limits, leading to more research questions and strategic role considerations surrounding the design of CWS in the smart territory.
- The recognition of demand-based spatial elements (physical, social, and informational) with the potential to trigger distributed social innovations and organizations around great challenges.

We suggest that if the smart territory includes in its design a spatial configuration that considers these three knowledge-transcendence enabling mechanisms, people would be more encouraged to self-organize (network effects) and create distributed organizations as an alternative proposal to addressing significant challenges. The limitations of this chapter invite scholars to address a variety of research questions, including comparatives studies between the Roma-Norte corridor and other urban territories in the world. Additionally, this chapter poses questions about the cluster configurations that result in more effective to encourage collaboration, including incentives and social innovation focus. Finally, this chapter comprises an original contribution to the CWS research discussion by including a perspective that suggests triggering elements of knowledge spillover into the smart territory to build a distributed social organization.

ACKNOWLEDGMENT

This research was supported by Universidad Anáhuac México and received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

Assenza, P. (2015). If you build it, will they come? The influence of spatial configuration on social and cognitive functioning and knowledge spillover in entrepreneurial co-working and hackerspaces. *Journal of Management Policy and Practice*, *16*(3), 35–48.

Avelino, F., Wittmayer, J. M., Pel, B., Weaver, P., Dumitru, A., Haxeltine, A., & O'Riordan, T. (2019). Transformative social innovation and (dis)empowerment. *Technological Forecasting and Social Change*, *145*, 195–206. doi:10.1016/j.techfore.2017.05.002

Barabási, A. L. (2002). *Linked. The New Science of Networks*. Cambridge, MA: Perseus Publishing.

Barney, D. (2004). *The Network Society*. Cambridge, UK: Polity Press.

Bencardino, M., & Greco, I. (2014). Smart communities. Social innovation at the Service of the Smart Cities. *Journal of Land Use, Mobility, and Environment*. doi:10.6092/1970-9870/2533

Bouncken, R. B., Aslam, M. M., & Reuschl, A. J. (2018). The Dark Side of Entrepreneurship in Coworking-Spaces. In A. T. Porcar & D. R. Soriano (Eds.), *Inside the Mind of the Entrepreneur, Contributions to Management Science* (pp. 135–147). Heidelberg, Germany: Springer International Publishing AG. doi:10.1007/978-3-319-62455-6_10

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bouncken, R. B., & Reuschl, A. J. (2016). Coworking-spaces: How a phenomenon of the sharing economy builds a novel trend for the workplace and entrepreneurship. *Review of Managerial Science*, *12*(1), 317–334. doi:10.100711846-016-0215-y

Butcher, T. (2016). Co-working communities: Sustainability citizenship at work. In R. Horne, J. Fien, B. B. Beza, & A. Nelson (Eds.), *Sustainability Citizenship in Cities: Theory and practice. Advances in Urban Sustainability* (pp. 93–103). Abingdon, Oxon: Routledge.

Capdevila, I. (2013). Knowledge dynamics in localized communities: Coworking spaces as microclusters. Retrieved from https://ssrn.com/abstract=2414121

Capdevila, I. (2013b). *Typologies of localized spaces of collaborative innovation*. Retrieved from https://ssrn.com/abstract=2414402

Capdevila, I. (2015). Co-Working Spaces and the Localised Dynamics of Innovation in Barcelona. *International Journal of Innovation Management*, *19*(3), 1–28. doi:10.1142/S1363919615400046

Castells, M. (1991). *The informational city: information technology, economic restructuring, and the urban-regional process*. Oxford: Basil Blackwell.

Castelnovo, W., Misuraca, G., & Savoldelli, A. (2016). Smart cities governance: The need for a holistic approach to assessing urban participatory policymaking. *Social Science Computer Review*, *34*(6), 724–739. doi:10.1177/0894439315611103

Crepeau, K. (2016). Rise of Coworking and its Influence on Social Innovation. *Public Journal*. Retrieved from http://publicjournal.online/rise-of-coworking-and-its-influence-of-social-innovation/

Eaton, S. (2015). Building community through coworking: a case study of spatial factors affecting member satisfaction with co-work spaces and collaborative activity [Thesis]. University Cornell.

Ferraro, F., Etzion, D., & Gehman, J. (2015). Tackling Grand Challenges Pragmatically: Robust Action Revisited. *Organization Studies*, *36*(3), 363–390. doi:10.1177/0170840614563742

Fiorentino, S. (2019). Different typologies of 'co-working spaces' and the contemporary dynamics of local economic development in Rome. *European Planning Studies*, *27*(9), 1768–1790. doi:10.1080/09654313.2019.1620697

Florida, R. (2010). *La clase creativa. La transformación de la cultura del trabajo y el ocio en el siglo XXI*. Barcelona: Paidós.

Gandini, A. (2015). The rise of coworking spaces: A literature review. *Ephemera*, *15*(1), 193.

Giddens, A. (2011). *La Constitucion de la Sociedad: Bases para la Teoria de la Estructuracion*. Madrid: Amorrortu.

Godin, B., & Lane, J. P. (2013). Pushes and Pulls The Hi(S)tory of the Demand-Pull Model of Innovation. *Science, Technology & Human Values*, *38*(5), 621–654. doi:10.1177/0162243912473163

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

González, S., & Rozga, R. (2005, November). Estado Actual de la Investigación sobre las Condiciones Territoriales de Innovación en México. *Paper presented at III Seminario Internacional "Territorio, Industria y Tecnología". Innovación ante la sociedad del conocimiento: Integración y estrategias regionales, Encuentro de investigadores entre México y España*. Academic Press.

Grabher, G. (1993). *The embedded firm on the socioeconomics of industrial networks*. London: Routledge.

Groys, B. (2005). *On the New: essay of a cultural economy*. Valencia: Pre-texts.

Harvey, D. (2001). *Spaces of capital: towards critical geography*. New York, NY: Routledge.

Hilbert, M. (2001). *From industrial economics to digital economics: an introduction to the transition*. Santiago de Chile: CEPAL.

Letaifa, S. B., & Goglio-Primard, K. (2016). How does institutional context shape entrepreneurship conceptualizations? *Journal of Business Research*, *69*(11), 5128–5134. doi:10.1016/j.jbusres.2016.04.092

MacCallum, D. (2009). *Social Innovation and Territorial Development*. Melbourne, Australia: Ashgate Publishing, Ltd.

Mitev, N., de Vaujany, F. X., Laniray, P., Bohas, A., & Fabbri, J. (2019). Co-working Spaces, Collaborative Practices, and Entrepreneurship. In K. Riemer, S. Schellhammer, & M. Meinert (Eds.), *Collaboration in the Digital Age* (pp. 15–43). Cham, Switzerland: Springer. doi:10.1007/978-3-319-94487-6_2

Mulgan, G. (2006). The process of social innovation. *Innovations: Technology, Governance, Globalization*, *1*(2), 145–162. doi:10.1162/itgg.2006.1.2.145

Parada, J. (2017). Innovaciones sociales para territorios "inteligentes":¿ficción o realidad? *Revista Problemas del Desarrollo*, *48*(190), 11–35.

Perulli, P. (2000). *La Citta delle Reti Forme di governo nel postfordismo*. Torino, Italia: Boringhieri.

Prado, G. C., Pelegrini, A., & Chaves, L. I. (2017, August). Coworking and design: a social innovation case study. *Paper presented at the International Symposium on Sustainable Design*. Academic Press. 10.5151bds-issd-2017-010

Richter, C., Kraus, S., & Syrjä, P. (2015). The Smart City as an opportunity for entrepreneurship. *International Journal of Entrepreneurial Venturing*, *7*(3), 211–226. doi:10.1504/IJEV.2015.071481

Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. New York, NY: Crown Business.

Rozga, R. (2007, September). Breve Historia de Discusión en torno a las relaciones Territorio-Innovación. *Paper presented at 12o Encuentro Nacional sobre Desarrollo Regional en México*. Academic Press.

Saiz-Álvarez, J. M., & Palma-Ruiz, J. M. (2019). Entrepreneurship in the Solidarity Economy: A Valuation of Models Based on the Quadruple Helix and Civil Society. In V. Ratten, P. Jones, V. Braga, & C. S. Marques (Eds.), *Subsistence Entrepreneurship* (pp. 33–50). Cham, Switzerland: Springer. doi:10.1007/978-3-030-11542-5_4

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Surman, T. (2013). Building social entrepreneurship through the power of coworking. *Innovations: Technology, Governance, Globalization*, *8*(3-4), 189–195. doi:10.1162/INOV_a_00195

Taboada I., & García G. (2010) Teoría cognitiva de la empresa. *Ide@s CONCYTEG, 5*(58), 337-358.

Thompson, T. A., Purdy, J. M., & Ventresca, M. J. (2018). How entrepreneurial ecosystems take the form: Evidence from social impact initiatives in Seattle. *Strategic Entrepreneurship Journal*, *12*(1), 96–116. doi:10.1002ej.1285

Van Alstyne, M., & Bulkley, N. (2004). Why information should influence productivity. In M. Castells (Ed.), *The Network Society A Cross-cultural Perspective*. London, UK: Edward Elgar Publishing Inc. doi:10.4337/9781845421663.00017

Velasco, R. (2003). *La Economía Digital. Del mito a la realidad*. Barcelona: Kriterios Tusquets Editores.

Waters-Lynch, J., & Potts, J. (2017). The social economy of coworking spaces: A focal point model of coordination. *Review of Social Economy*, *75*(4), 417–433. doi:10.1080/00346764.2016.1269938

KEY TERMS AND DEFINITIONS

Cluster: Agglomerate of several business organizations that share common objectives.

Coworking Space: A collaborative facility where the concepts of open and private areas are diluted, adopting an informal style to encourage the flow of information and ideas.

Entrepreneurial Ecosystem: A system of beliefs, values, ways of being, and doing that develops a particular social and economic environment with effects on local or regional entrepreneurship.

Knowledge Spillover: The process of tacit information dispersion in the territory, which is usually collected by business organizations in the form of systematized knowledge.

Mini-Cluster: Small spaces of social agglomeration in a fraction of a given territory, leading to information transfer processes and the construction of social capital.

Smart Territory: Geographical contexts that revolve around citizens, aimed at achieving efficiency and sustainable development in a given territory.

Social Innovation: Social practices that create alternative solutions to relevant societal problems, nurturing general well-being in a given community.

This research was previously published in the Handbook of Research on Smart Territories and Entrepreneurial Ecosystems for Social Innovation and Sustainable Growth; pages 287-305, copyright year 2020 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 56
Telework and People with Disabilities:
Perspectives of Managers and Employees from Australia

Rachelle Bosua
University of Melbourne, Australia

Marianne Gloet
University of Melbourne, Australia

ABSTRACT

People with disabilities face unique challenges to access work and participate in a work culture and environment. The increasing uptake of telework is promising from a digital inclusion perspective for people with disabilities. This qualitative study explored barriers and problems of including people with disabilities through telework in Australia. The study focused on management and worker perspectives and findings indicate that both parties face unique challenges to accommodate and include people with disabilities in telework arrangements. Worker barriers to access telework relate to management attitudes, physical and infrastructure problems, social isolation misconceptions, lack of management trust, insufficient telework opportunities and inadequate management knowledge of IT support and reasonable adjustment for people with disabilities. Management issues involve cultural intolerance towards diversity and disability in general, as well as a lack of policies and processes that create a supportive environment for people with disabilities who wish to telework.

INTRODUCTION

Over the last decade, there has been a major shift in thinking about 'work' regarding where and how work is conducted. New developments in Information Technology (IT) have greatly fostered a move towards more flexible modes of work commonly referred to as 'telework' or 'telecommuting' (Blok, Groenesteijn, Schelvis & Vink, 2012; Davison & Cotton, 2012; Maruyama & Tietze, 2012). Telework

DOI: 10.4018/978-1-7998-7297-9.ch056

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

allows workers to work flexible hours in any geographical location beyond the normal office, using IT or telecommunication technologies to communicate and collaborate (Olson & Primps, 1984; Maruyam & Tietze, 2012). Telework as a new way of work holds great promise as the *flexibility* of work provides multiple benefits to different types of workers. This includes saving commuting time, achieving work-family balance by extending work hours to accommodate family demands, or embracing flexible work hours to facilitate caring for elderly parents (Bailey & Kurland, 2002; Galvez, Martinez & Perez, 2012; Powell & Craig, 2015; Sullivan & Lewis, 2001). Also, prior studies indicate that access to telework increases employee wellbeing, which in turn increases productivity (Bosua, Gloet, Kurnia, Mendoza & Yong, 2012).

Once of the advantages of telework is the '*digital inclusion'* of workers who might otherwise be excluded from work, such as workers with disabilities. Disability can take many forms, be temporary, total or partial, lifelong, acquired, visible or invisible. In this study, 'disability' is the overarching term that covers impairments, activity limitations and participation restrictions resulting from problems with body function and structure (impairment), limitations to execute tasks/actions (activity restriction), and individual involvement in life situations (participation restriction) (World Health Organization, 2011). Disabled people's ability to engage in the workforce provides multiple benefits, including financial independence, a sense of self-satisfaction and improved physical and mental wellbeing (Randolph, 2004; Anderson & Douma, 2009; Stam, Sieben, Verbakel & De Graaf, 2015). Considering the benefits provided by telework, expectations are that this form of work opens up much more access to work for people with disabilities.

A recent report indicates that Australia has more than 4 million people (i.e. 1 in 5 people or 18.5% of the population) with disabilities (Australian Bureau of Statistics, 2013). Also, only 53% of people with disabilities participated in the Australian workforce in 2013, confirming that little change has occurred in this area over the last two decades. Recently, a World Health Organization report (World Health Organization, 2011) confirmed very little change in global workforce participation by people with disabilities over the last 20 years. Considering this gap and that telework may be a mechanism to include more people with disabilities in the workforce, this study poses the following research questions: *What are the issues and problems that both managers and people with disabilities face with respect to access to telework, and how can people with disabilities be included in the workforce through telework arrangements?*

In response to these questions, this study followed a qualitative research approach to explore the relationship between disability and telework from both a manager and worker perspective. This chapter is structured as follows: the next section provides background literature on telework and disability followed by a description of the research approach, participants, and data collection. Findings follow in the form of quotes, based on key themes that emerged from a deeper analysis of the data. The discussion highlights important elements that foster a more digitally and inclusive workforce for people with disabilities. The conclusion discusses limitations of the study and avenues for further research.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

BACKGROUND LITERATURE

Telework as a New Way of Work

Advances in ICT have brought about many changes in how individuals communicate and collaborate. Evidence of this includes new IT tools and technologies that facilitate the sharing of information, knowledge and the ability to conduct service-related work from any location at any time, using the Internet as a platform (Bayrak, 2012; Garret & Danziger, 2007; Pauleen, Campbell, Harmer & Intezari, 2015). Resulting from these changes, new flexible forms of work (defined as *telework* or *telecommuting*) have emerged, allowing individuals and teams to conduct their work from any location across time and space. Telework is defined as *the use of Information and Communication Technologies to conduct work at home or any other place that is removed from the physical infrastructure, colleagues, clients and the employer* (Haddon & Brynin, 2005; Nilles, 1975). Telework has shifted traditional views on work across the boundaries of the physical workplace, mode of interaction and collaboration, and hours of work.

Historically, telework has emerged into different forms resulting in a variety of discourses on problems, issues, and opportunities associated with each form. The most familiar elements cited in literature that shape forms of telework, involve technology, location (home-based versus a satellite office or smart workspace), contractual arrangements (occasional or routine telework) and time (duration and times of telework) (Haddon & Brynin, 2005). Forms of telework shaped by time include occasional telework days versus regular telework day agreements or full-time telework where workers work entirely from home a satellite office or other location. The latter includes call-centre and service-related work such as marketing, sales, and customer relationship management.

Recent studies identified three elements that influence successful telework arrangements:

1. IT support,
2. Management trust and
3. Hybrid telework i.e. a balance between time spent in the office and out of the office (Bosua et al., 2012).

The degree and extent of IT support greatly facilitate communication and collaboration between individuals and team members, managers and teleworkers i.e. telecommuting and networking tools that support awareness, online presence and the sharing of essential content such as electronic calendars, screen and virtual desktop sharing tools and audio/video conferencing tools.

Management trust in teleworkers is an essential ingredient in a successful management-teleworker relationship. Some studies report on the importance of trust as an incentive for positive teleworker attitudes and work outcomes (Baruch, 2000; Cascio, 2000; Kowalski & Swanson, 2005). Trust evolves depending on the degree and extent of control managers have on teleworkers. In addition to trust, telework arrangements allowing for a balance between working both in and out of the traditional office appear to deliver more positive outcomes from a management and teleworker perspective (Bosua et al., 2012; Halford, 2005; Peters, Den Dulk & de Ruitjer, 2010). Positive outcomes of hybrid arrangements relate to mentoring of younger employees, and the ability to learn from and socialize with workers that work full-time in the office.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Apart from eliminating traditional work boundaries related to the physical workplace, working hours and mode of communication, telework also brings about a shift in thinking on work-life-family balance, physical and emotional wellbeing and digital inclusion. A few studies report on the positive outcomes of telework arrangements that help parents balance work and family (Allen, Johnson, Kiburz & Shockley, 2013; Demeronti, Derks, Lieke & Bakker, 2014; Hilbrecht, Shaw, Johnson & Andrey, 2013), and the caring of dependents (Hartig, Kylin & Johansson, 2007; Hilbrecht, Shaw, Johnson & Andrey, 2008). From a wellbeing perspective, former studies have shown that the ability to work away from the office in a hybrid mode, contributes to individual wellbeing, which in turns increases productivity (Bosua et al., 2012; Maruyama & Tietze, 2012).

Regarding digital inclusion, there is the promise that flexible ways of work may help to integrate a large community of workers who may not otherwise be taken up into the workforce, such as people with disabilities. Even though flexible work may open up new employment opportunities for these workers, there may also be constraints related to telework, the workplace environment and interactions with other workers, as well as the social inclusion of disabled workers (Baker, Moon & Ward 2006).

Disability and Access to Work

Disability is

…a condition that may restrict a person's mental, sensory, or mobility functions to undertake or perform a task in the same way as a person who does not have a disability (Disability Works Australia, n.d.).

Disability varies in type, form, and severity, and is considered as a condition caused by accident, trauma, genetics or a disease. Australian Institute of Health and Welfare (AIHW, 2008) indicates that Australia has 4 million (or 18.5%) people that have some form of disability. 1.2 million of these have a profound or severe disability, with about 1,497,500 people with disabilities (about 8.8%) having difficulty in accessing employment and training which may also need workplace adjustments to enable employment. There is a lack of recent statistics that give a comprehensive indication of education and skill levels of people with disabilities, and there is almost no Australian literature that addresses the topic of telework for people with disabilities.

A study by Adams & Oldfield (2012) argues the need for disability equality in the workplace, suggesting that more effort should be made to provide better work and career opportunities for people with disabilities, as opposed to simply placing them in menial jobs with little or no opportunity for advancement. Research by Ali, Schur & Blanck (2011) suggests that the relatively low employment rates of people with disabilities are not related to a reluctance to work, but rather to the existence of a large range of barriers to employment. Their study indicates that people with disabilities could perform a large proportion of job roles, while they also make the case that access to employment for people with disabilities can result in many positive outcomes.

Technology is considered one means by which employment barriers for people with disabilities can be eradicated. Indeed, the proliferation of various forms of ICT has opened up a range of employment opportunities for people with disabilities, particularly telework, allowing people to work from any location without the need for commuting to work (Bilevičiūtė & Bilevičienė, 2010; Meshur & Ulusoy, 2013). There is certainly potential for technology and its application through telework to create more opportunities for people with disabilities to join the workforce (Breaugh & Farabee, 2012). In noting the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

high levels of unemployment facing people with disabilities, Barnes (2012) argues for a rethinking of the meaning of *disability and work* to create greater levels of awareness and work allowing the inclusion of people with disabilities who wish to access the job market.

While studies from the mid-2000s are full of promise of the potential of telework to eliminate employment barriers and integrate people with disabilities into the workplace, digital exclusion or a digital divide affects this group of workers (Atkinson, Black and Curtis, 2008). Bricout, Baker, Ward & Moon (2011) refer to this phenomenon as the '*disability divide,'* stating that the development and implementation of policies to address this situation is the most effective solution. Access to technology for the disabled is a significant issue, including affordability and general accessibility for blind, deaf and other forms of disability (Baker & Moon 2008; Davison & Cotton, 2010). However, significant recent growth in universal and exciting assistive tools and technologies (e.g. mobile applications), as well as a reduction in the cost of workplace accommodations for disabled workers can increase employment accessibility.

In summary, there is an acute shortage of accurate recent statistics and in-depth research in Australia that explores the uptake of telework, the challenges and barriers, as well as positive and negative aspects relating to telework for people with disabilities and their employers. Hence, this research seeks to fill this gap by exploring: 1) the issues that impact on the uptake of telework employment opportunities for people with disabilities, and 2) the relationship between telework and digital exclusion of people with disabilities from the workforce.

RESEARCH METHOD

Due to the exploratory nature of this study, a qualitative research methodology was undertaken. We were interested in the rich stories of both managers and people with disabilities in the field and therefore chose a narrative inquiry approach as the most appropriate method for this study (Connelly & Clandinin, 1990; Creswell, 2007). Narrative inquiry allows data collection in the form of participant stories based on personal experiences through semi-structured and structured interviews. Narrative inquiry therefore first allows a participant to narrate his/her story effectively through storytelling to the listener/researcher. The data collection phase is then followed by data analysis whereby the researcher aims to understand the lived storytelling experiences through content analysis and reflective accounts emerging from the data. The aim was to identify how people with disabilities can be included in the workforce through telework arrangements, and the issues and problems managers and people with disabilities face regarding access to telework. Once ethics approval was granted, senior HR, general and diversity managers and people with disabilities who have experience of telework were selected to participate in the study. Due to the sensitive nature of the study most participants preferred to stay anonymous, hence none of the participating organizations or participant details is revealed in this study.

Data Collection

The research unfolded in three stages, to gather rich insights, stories, and experiences from the participants over a period of six months, with each stage feeding into the next stage as outlined below:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Stage 1: Beginning the Story - Opinion Polls

This stage 'tested the ground' on general management perspectives of disability and telework by opening up the conversation about disability and digital inclusion. Seventeen managers in key HR/Managerial and Diversity Management positions were cold-called Australia-wide, and first briefed on the issue, then asked their opinions regarding the topic. Contact details were acquired through LinkedIn and personal networking. Five HR Managers, three 'HR/Diversity Managers,' seven Diversity Managers and two Managers of employment agencies for the disabled shared their stories. The aim was to hear initial stories that impact on disabled workers' access to telework considering changes in the workplace brought by various forms of technology. Responses were instrumental in shaping in-depth data collection of Stages 2 and 3.

Stage 2: Continuing Narrative Inquiry Through Stories of Working People with Disabilities

More data collection followed through the sharing of eight disabled workers' stories; six workers with physical disabilities and two with mental disabilities. Stages 2 and 3 were conducted either face-to-face or by telephone for some Stage 2 participants who preferred not to face the interviewee. In addition to Stage 2 interviews, to gain further insights and complement the study, seven case studies of disabled workers' experience in the workplace such as Australia Post and Government agencies were included.

Stage 3: Individual Stories from Senior HR/Diversity Managers

Finally, data was collected through stories and experiences shared by twelve senior HR/Diversity managers; eight from large- and four from medium-size organizations. Questions focused on telework and disability regarding diversity strategies, recruitment for telework, inclusion criteria, the technology used and provided, training given, and issues and problems associated with the management of disabled teleworkers.

Data Analysis

Opinion poll data was interpreted and summarized as notes, while all the stories were audio-recorded with consent and transcribed verbatim. Field notes taken while listening to the stories were merged with the transcripts followed by the use of NVivo 10 to support a thematic data analysis using principles of open, axial and selective coding (Corbin and Strauss, 1993; Neuman 2003). Both researchers first worked independently through the dataset and later combined views and interpretations. Findings presented are classified as a set of major themes that arose from a deeper analysis and interpretation of the data.

FINDINGS

Three key themes emerged from the data analysis: barriers impacting access to telework by people with disabilities, and management and technology issues hindering access to work for disabled workers as outlined below.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Theme 1: Barriers Impacting Access to Telework by People with Disabilities

Findings indicate that people with disabilities faced six key barriers regarding access to telework:

Barrier I: Attitudinal Barriers from Employers

One interviewee indicated that there were still stiff employer attitudinal barriers that hindered access to and uptake of telework for people with disabilities:

It's an attitudinal problem of employers - a prospective employer thinks here's a blind person who wants to work, how are they going to read? They don't think at all about options or possibilities. Other attitudes? They think there's a risk hiring someone who may not be able to read and write properly. Or risk associated with the possibility that a blind or visually impaired person might fall down in the office and get hurt – they might not want to take that risk. You know: I really like that person, but I don't want the liability. There is a range of different barriers, but that's just two examples.

This person also mentioned that managers were not prepared to build flexibility into work packages to facilitate telework uptake by people with disabilities:

We're even trying to build flexibility into enabled employment. For instance, an employer can choose how much work is in a job and how they want to pay. So you can pay by the day, and hire someone for five days of work. It doesn't matter how much he or she works in a day, but you are paying him or her for a block of work and you are expecting certain results from that. Then we also have hourly arrangements, and for those people who might not know how they are going to manage.

Barrier II: Physical and Infrastructure Barriers

People with disabilities faced physical and infrastructure barriers to access the physical workplace. Even though telework allowed working from home there were days that required workers to be present in the office:

Transport is an issue, because if you're blind or vision-impaired, you can't drive to the workplace, so you have to find another way to get there. That usually means public transport or a taxi. Taxis are prohibitive because they're costly. There is a government subsidy at state level to provide half-price taxi fares, but it's still a lot of money. So trying to get to work is complex, and you may have to take more than one form of public transport in your journey to work. So this helps to explain why 58% of blind and visually impaired people who want to work, can't get work.

Another participant confirmed this barrier by stating:

The biggest barrier to disability employment is potentially getting into the office (so accessibility), there are also attitudinal issues and capability issues. The biggest barrier is the employers themselves and how they think.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Barrier III: Lack of Management Awareness about Funding for Reasonable Adjustments

Participants noted managers' unawareness of government disability funding support for reasonable adjustments. One participant said:

Most [managers] think that it will cost thousands of dollars to make workplace modifications and adjustments, but that's not true.

The same participant noted:

I went to a conference recently, and they said that only 3% of employers know that there are funds out there to cover [reasonable] adjustments. In addition, they don't know that compensation and insurance are also covered by government funds. So we need to make employers more aware about all these resources. If they know about it, there are no more excuses for not hiring people with disabilities.

Barrier IV: Insufficient Telework Arrangements, Processes, and Access to Telework

Workers felt a need for more opportunities to work flexibly, particularly for recent university graduates, as two participants indicated:

There is a need for more flexibility around job arrangements – there are a lot of people [with disabilities] who cannot work full time.

The government disability employment services don't do anything for well-educated people with disabilities who lack work experience…. we aren't expecting them to be treating people like charity cases and we are dealing with people who already have skills.

The second participant further elaborated on the difficulty to hire people with disabilities:

And even employers - they want to hire people with a disability, but the process is so complex.

Barrier V: Social Isolation and Interaction Misconceptions

One potential risk of telework is social isolation, and many managers were fearful of isolating people with disabilities even more when giving them the opportunity to telework. Whereas this concern may be warranted, findings confirm that people with disabilities did not want to telework all the time, but also wanted to be present in the office some days. A vision-impaired worker commented that he enjoyed coming into the office despite the difficulty of moving around:

It actually turns out that going into the office every day, stopping at the coffee shop and getting a coffee, 'see' the people in the building, that sort of social interaction is extremely important. People get to know me around the building, and I think I would find it challenging if circumstances were different

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

at home and I had to miss out on that social interaction. So it's wonderful that I can come to work and have that social interaction.

Another participant felt the same and wanted to telework and be in the office:

I would prefer the hybrid telework approach because I am very social and I like coming to the office, but I would probably like to do 2 days.

Barrier VI: Managers Lacked Trust in Disabled Workers

Managers often lacked trust that people with disabilities are experienced and *can do* a specific job while some managers believe work is only conducted when physically at one's desk. One graduate participant described how he could handle 70-80% of IT problems in a non face-to-face role while another non-disabled worker attended to the other 20% of the problems face-to-face.

My new manager felt I wasn't being utilized enough and both of us should be attending to computer issues in person. And it didn't last long because all the jobs took much, much longer. They tried using wireless phones, which in the late 1990s didn't work very well; the whole thing just fell apart. The whole perception was that because I was sitting at my desk, I wasn't working. So jobs that would have taken a minute to solve over the phone were now taking half an hour by the time we had gone to the person and dealt with the problem. It is interesting that there is this perception about getting work done when it might not appear to some managers that work is actually being done.

The same worker described his current telework agreement and his ethical approach to his work:

I'm very fortunate to have a very strong working relationship with my manager, but having said that, I don't think that would have been the case if I had always been teleworking. I think the fact that I worked in Sydney for two and a half years, I built up that trust and that rapport - and he could see what my work was like. I also built up relationships with my colleagues, so I was not just a faceless person on the Internet or on the other end of the phone. Also I make a very active effort when I go to Sydney, to get to know new people, that sort of thing.

Theme 2: Management Issues Related to Telework and People with Disabilities

Four key thematic management issues related to culture and awareness arose from a deeper analysis of the manager interviews.

Issue I: Cultural Intolerance and Lack of Disability Awareness

A large organization's HR/Diversity Manager outlined the issue of management responsibility to create cultural awareness and tolerance associated with disability in their organizations by sharing his organization's story:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

A disabled athlete, a meningococcal victim with 80% burns on her body, 2 prosthetic legs, and an artificial arm joined our organization. She's is a very switched on, intelligent girl, has a degree and hasn't been able to get work. But being part of the [diversity] program I know what she has done, and she performs her job very well. We are trying to make it [diversity and disability awareness] a bit more universal across the organization, trying to break down the barriers a bit more. So I think you have to get people's awareness up in order for it [disability awareness] to be successful.

A second Diversity manager emphasized 'tolerance' as part of disability awareness:

Tolerance is one thing that workplaces need to develop further, and we also need to think more how to create a supportive work environment if we want to increase employment opportunities for the disabled generally and for everybody. So it's back to the universal design principle, that tools, equipment, and furnishings should be designed with everyone in mind. The same thing goes for awareness training; it should link more broadly to everyone and should include everyone in the organization. When you induct people, and you train people, this sort of stuff should be included.

Another Diversity Manager described her new disability awareness training program for managers:

We want to raise awareness in our workplace about what we felt was a pretty inclusive environment in a way. We also found there is a bit of a fear factor around disability in the workplace and when we thought about traditional methods of training, a lot of it is around discrimination, those sorts of things which scare people off. Many people think, oh I'm a bit uncomfortable about people with disabilities, so I'll just disengage and not talk to anyone.

Issue II: Lack of Awareness of the Need for Telework Arrangements for Diversity

Findings indicated the need for more access to telework regarding diversity:

Managers need to raise access [to telework] and awareness. They [managers] have all these unconscious biases that kick in, so my argument is: if you can shift the onus back to management - if I can do this, what do I need to get this done? People's working environments change from people with a disability to a mum who is just coming back in to the workforce and wants to come back differently. Managers face that on a day-to-day basis…I'm seeing more and more large organizations getting into awareness – making that first step.

Another manager supported this by stating:

I actually think that physical disability and telework could be quite successful - the fact is that if a person has the physical capability to work with a computer, work via Skype for instance if they need to attend meetings and the like. If they are capable of producing the work that's required, working via a consultancy role, that sort of thing, then I think there is a lot of scope for people with physical disabilities to access telework… However, there has to be a balance between working at home or in another location - just to keep a connection if workers are physically capable of doing that.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Issue III: Need for Diversity and Disability Policies and Processes

A senior manager spoke about the importance of policy for telework regarding diversity and people with disabilities:

I'm a huge fan of teleworking, of working remotely and working differently. People battle with that whole concept of working from home, but working differently could be from anywhere. It's about the language, the communication, the policy – I often talk about two things – policy and a process that enables people to work remotely, to allow the company to support that: the tools, technology, leadership, guidance – no longer is a single line of sight management required.

The same manager indicated how important it is for organizations to do the right thing with respect to disabled workers:

Organizations need to think what they do in their own organizational environment. Diversity, flexibility, mature age workers and disability are the major focus areas in most organizations. Managers should speak to people at the Australian Network on Disability. They help organizations think about and shape their views on diversity, and put systems in place to make sure that policy and vision is supported. Accessibility is an interesting policy, but sometimes it clashes with other policies, such as Occupational Health & Safety or heritage policies - I may not be able to dig up the front of an old bank building to make it accessible because it is heritage listed and therefore protected.

A senior manager of another large organization emphasized the importance of policy:

There has to be an inclusion policy - that is the first step. There are policies about equity and policies about positive discrimination, so people that say 'well I don't want to have a quota or a target,' which could be a policy. So in that case they would actively seek to fill positions through a disability employment agency.

Issue IV: The Need for a Changed Environment with Adjustments for Teleworkers

A senior diversity manager indicated the importance of change regarding management sensitivity towards thinking about disability and creating or adjusting a suitable work environment:

My argument is: how do we change the workforce, educating people by getting them to ask, how can I employ people differently? There is an organization I worked with that actually changed their interview and recruitment practices. So they ask questions like are you Aboriginal or Torres Strait Islander? But I cannot ask if you have a disability. What I can ask is 'Do you need any adjustments in order to perform this role'? I think telework should be available for all types of people, but if there is something that limits your ability to work at a certain level and standard, how do you adjust that work setting, be it the office or home? Management needs more communication skills, they need to set expectations, to adjust expectations.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Another senior manager indicated how her organization educates supervisors about adjustments for disabilities:

Supervisors get to work with me and learn how to interview someone with disability, how you see them in the workplace, how to talk about reasonable adjustments in the job. When that happens on an individual level, it actually makes change possible. I often see amazing changes…. the thought process has to change, we are still in that medical model where disability is a problem, how much do I hear disability and problem in the same sentence?

Theme 3: Technological Aspects to Consider for Digital Inclusion

Modern ICTs no longer restrict telework and can overcome barriers that previously prevented a disabled person from being employed. Two technology-related themes emerged as outlined below:

Issue I: Technology Should not be an Excuse to Exclude People with Disabilities

Technology has advanced sufficiently to allow for full digital inclusion as the Diversity Manager of a large organization stated:

We're in a better situation now than ten years ago [with technology support for mobile work] as cost has come down substantially. No longer can a company say it's too expensive for people to telework. You can work remotely with a laptop and phone these days. But it's more about labeling people who work differently. If they need special software, it's about asking the question, can I do that from home? Technology should not be a barrier these days, it should be an enabler.

Another senior manager indicated that technology has evolved to support disabled teleworkers, but felt there were some gaps:

With technology there are still gaps e.g., Skype is not suitable for deaf people using sign language, because of delays and drops outs the message gets muddled-up completely. We have got to address the universal design issues [of technology], because it often costs more to design things with everyone in mind. I think technology has improved the capacity for various disabled people to be more socially included

One of the managers who is disabled and also teleworks further commented:

I think technology is fantastic; I am as effective from home as when I'm here, because I've got access to everything. Obviously the technology gets better and better all the time.

Issue II: The Need to Provide Support for Assistive Technologies

Findings suggest that there was a need to provide support for introducing and using assistive technologies as one participant indicated:

Technology can help with adjustments, but management needs to empower the situation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Another participant indicated that there are exciting advances in technology that can enable work for people with disabilities:

More and more we're seeing issues around the actual technology. Logistics are being addressed around what needs to be set up in and around the office itself, which is an exciting step forward. Where the issues come in is that sometimes employers may not fully appreciate that the disabled can contribute fully to a job [through these technologies].

This participant was excited about IT support for workers with disabilities:

Exciting in the disability employment landscape is that many employers are moving to Cloud computing. One benefit of this is workplace flexibility [for disabled workers] - if you put your storage and infrastructure in the Cloud, people can use it anyplace, anytime. From a disability perspective its particularly exciting, because if you have particular needs; your employer doesn't have to worry about buying equipment and software. The disabled person might have a home-office set up perfectly well to meet their needs. So this flexibility of the Cloud offers future potential - it works in real time.

One disabled worker expressed his concern that managers and other employees don't understand what disabled workers 'can' do with technology:

There has to be mechanisms so managers [and other workers] can understand what we [disabled workers] can do with technology. There is a government subsidy, so you can buy hardware and software, and the government will cover workplace modifications, so businesses don't have to fork out money for this.

A disability employment agency manager mentioned that many different available technologies used creatively could enhance disabled worker productivity:

I think the advent of and increased uptake of technology is really assisting a lot of disabled workers especially those with sensory impairments. Suppose you're looking at someone who is hearing impaired rather than deaf - Bluetooth works really well to assist people like that so they get clear phone contact. A lot to think about - just because someone is hard of hearing doesn't necessarily mean s/he can't do a lot of phone work these days. Someone with low vision that doesn't mean that they can't do a lot of computer-based work, it's incredible what's out there - and given a bit of training, it just opens up so many opportunities for the disabled. Then I think about technology assisting those people who have learning or have memory issues as well because they're able to use various applications to set up reminders for things, and so forth.

Another disabled worker who occasionally teleworks added his opinion on IT and management involvement by saying:

But there are a lot more people now who are working from many different locations. Technology nowadays can support these different ways of work. From an employee [disability] point of view, we have the appropriate accommodation at home if we are working from home, but also need the trust from the employer and the right technology to do the job.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

DISCUSSION

This study posed two research questions: *What are the issues and problems that both managers and people with disabilities face with respect to access to telework, and how can people with disabilities be included in the workforce through telework arrangements?* In response to the second question, an interpretation of the empirical evidence identified three categories of issues that concern access to work for people with disabilities: disability worker issues, managerial issues and technology issues. Numerous studies on telework confirm multiple management and teleworker barriers that impact on telework arrangements for able-bodied workers i.e. manager trust and additional effort to manage teleworkers, technology support, synergy in teamwork, social isolation, creating a performance-oriented culture etc. (Bailey & Kurland, 2002; Baruch, 2000; Maruyama & Tietze, 2012). Our study confirms that people with disabilities face these challenges as well as many more unique challenges such as: access to telework arrangements, an accepting and welcoming cultural work environment, funding of reasonable adjustments to facilitate physical office access and IT support for work, unconscious bias, social isolation misconceptions and lack of management trust in capabilities to conduct work. It is clear that telework can facilitate the digital inclusion of workers with disabilities, thus leading to a range of positive outcomes.

One pertinent barrier that emerged from stories shared by disabled workers was limited access to telework roles/arrangements, and that they *would welcome an opportunity to prove themselves in the workplace*. Hence, people with disabilities are keen to gain management trust in their capabilities, contribute to the work in general and would embrace the opportunity to be part of any organization's workforce. Feeling a sense of exclusion as a natural consequence of disability, these workers are more than willing to overcome many of the obstacles associated with physical disability to contribute to the working environment, i.e. commuting to the workplace, being part of a work culture, team or workgroup, spending time in the office to build employer and collegial trust, and demonstrating individual accountability and loyalty. Once the necessary management trust has developed, and there are appropriate communication channels in place enabled by assistive technologies, managers can grant workers with disabilities some flexibility in the form of hybrid or occasional telework arrangements. This would foster work-life balance, in particular, for those who have families or are unable to work in more traditional, office-based environments. In fact, disabled workers were most willing to bear with the initial discomfort associated with physical access to the workplace to build collegial and manager trust as an antecedent to a more formal telework arrangement.

One other barrier evident from the findings involves task-related and non-task related workplace adjustments and assistive technologies to facilitate and support access to and the execution of work (Riches & Green, 2003). Findings indicate that managers were often uninformed about requirements, eligibility, and type of support provided by the Australian government in this regard. Moreover, most workers indicated they already had assistive technologies and devices they used in their everyday life activities that could be brought into the workplace to support and enable work. Considering recent advances in technology device usage by mobile workers, some reasonable adjustments may be necessary. These adjustments may not be the full responsibility of the organization as assistive tools and devices could be considered as additions to an organization's existing suite of bring-your-own-devices (BYOD) used by its non-disabled workers. Therefore, managers need to become more informed of categories of assistive technologies and type of adjustments required to accommodate workers with disabilities and government funding in this regard.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In response to the first research question, our findings suggest a clear *management responsibility,* particularly the need to treat disability as part of the larger *diversity* category as one of the diversity managers sensibly commented. Considering the limited change in workforce participation by people with disabilities over recent years in Australia, there is an imminent need for workplace reform in the area of social equity and balance for diversity in the workplace. Moreover, as Angeloni (2013) has suggested, more integrated and holistic approaches to disability management are required. Organizations need to review and adjust their cultural make-up to identify how and to what extent elements related to bias towards diversity could be eradicated. This calls for a number of changes at different levels. First, at the employee and employer level, tolerance and acceptance need to be cultivated, equity policies need to be reviewed and disseminated, and management needs to be open-minded regarding recruitment practices focused on diversity balance. Secondly, job and task structures need to be revisited or redesigned as part of a larger reasonable adjustment strategy to match specific and unique worker skills with tasks. This may impact on work allocation and corresponding remuneration associated with different tasks or categories of work. Finally, more comprehensive policies and Occupational Health & Safety arrangement should be required to cater for diversity and equity in the workplace.

This study clearly illustrates that flexible work brings about advantages for people with disabilities. While the study has not focused on specific disabilities, this study's results confirm that benefits of telework extend to people with various forms of physical, psychological and neurological problems, as well as those with chronic issues, fatigue, and pain. For those with chronic forms of illness or disability, flexibility of work allows a better balance between periods of illness and the capacity to work. Telework may also reduce social stigma associated with disability because people are judged more by the work they do, rather than their disability.

In conclusion, the study highlights that the worlds of managers and workers with disabilities are not yet adequately aligned nor transparent, i.e. managers do not yet fully understand the needs and potential that people with disabilities can contribute to the workplace. In addition, workers with disabilities have not yet expressed what they need and can deliver, to be part of the workforce. Hence, there is a need for these groups to open up discourse in this regard. Advocacy groups may play a more prominent role to support this discourse, while more networking activities are required to link different groups, role players, stakeholders, and agencies.

CONCLUSION

This study is the first exploratory research that investigates the relationship between telework and disability in Australia and identifies multiple barriers and issues associated with the uptake of telework for people with disabilities. The study has a number of limitations. First, the study was qualitative and relatively small considering the number of participants. Also, the study was largely focused on issues pertaining to workers with physical disabilities, as opposed to other forms of disability. In addition, the study did not consider specific aspects associated with workplace adjustments and equity from a policy and legal perspective. A larger, more in-depth quantitative study needs to be conducted that is more focused on different categories of disability and different attributes that relate to diversity and access to telework with respect to management and workers. Future work may, therefore, use the outcomes of this study as a basis for a quantitative study that involves a large-scale survey. Such a study may shed more light on best practices to accommodate diverse workers including people with disabilities. Best practices

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

regarding reasonable adjustments, specific IT use, task and job division and allocation aspects associated with diversity in the workplace in general, as well as issues relating more specifically to telework opportunities for people with disabilities would also be useful.

REFERENCES

Adams, L., & Oldfield, K. (2012). Opening up work: The views of disabled people and people with long-term health conditions. *IFF Research.* Retrieved from http://www.equalityhumanrights.com/uploaded_files/Employers/research_report_77_ opening_up_work. pdf

Ali, M., Schur, L., & Blanck, P. (2011). What types of jobs do people with disabilities want? *Journal of Occupational Rehabilitation, 21*(2), 199–210. PubMed doi:10.100710926-010-9266-0

Allen, T. D., Johnson, R. C., Kiburz, K. M., & Shockley, K. M. (2013). Work–family conflict and flexible work arrangements: Deconstructing flexibility. *Personnel Psychology*, *66*(2), 345–376. doi:10.1111/peps.12012

Anderson, J., & Douma, F. (2009). *Telework for Workers with Disabilities Pilot Projects Synthesis Report* (under sub-contract to CESSI for the Office of Disability Employment Policy, U.S. Department of Labor.). Retrieved from https://www.dol.gov/odep/research/TeleworkSynthesisReport.pdf

Angeloni, S. (2013). Integrated Disability Management: An interdisciplinary and holistic approach. *SAGE Open*, *3*(4), 1–15. doi:10.1177/2158244013510303

Atkinson, J., Black, R., & Curtis, A. (2008). Exploring the Digital Divide in an Australian regional city a case study of Albury. *The Australian Geographer*, *39*(4), 479–493. doi:10.1080/00049180802419203

Australian Bureau of Statistics 4430.0. (2013). *Disability, Ageing and Carers, Australia: Summary of Findings (Media Release)*. Retrieved August 3, 2015, from http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4430.0Chapter2002012

Australian Institute of Health and Welfare (AIHW). (2008). *Disability in Australia: trends in prevalence, education, employment and community living. Australian Institute of Health and Welfare Report, Bulletin 61*. Canberra, ACT: Government of Australia.

Bailey, D. E., & Kurland, N. B. (2002). A review of telework research: Findings, new directions, and lessons for the study of modern work. *Journal of Organizational Behavior*, *23*(4), 282–400. doi:10.1002/job.144

Baker, P., & Moon, N. (2008). Wireless Technologies and Accessibility for People With Disabilities: Findings from A Policy Research Instrument. *Journal of Assistive Technology, 20*(3). PubMed

Baker, P., Moon, N., & Ward, A. (2006). Virtual exclusion and telework: Barriers and opportunities of technocentric workplace accommodation policy. [PubMed]. *Work (Reading, Mass.)*, *27*, 421–430.

Barnes, C. (2012). Rethinking Disability, Work and Welfare. *Social Compass*, *6*(6), 472–484. doi:10.1111/j.1751-9020.2012.00464.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Baruch, Y. (2000). Teleworking: Benefits and pitfalls as perceived by professionals and managers. *New Technology, Work and Employment*, *15*(1), 34–39. doi:10.1111/1468-005X.00063

Bayrak, T. (2012). IT support for Telecommuting Workforce. *Telematics and Informatics*, *29*(3), 286–293. doi:10.1016/j.tele.2011.10.002

Bilevičiūtė, E., & Bilevičienė, T. (2010). Telework organization model as method of development of disabled persons' employment quality. *Perspectives of Innovations. Economics and Business*, *2*(5), 71–74.

Blok, M. M., Groenesteijn, L., Schelvis, R., & Vink, P. (2012). New ways of working: Does flexibility in time and location of work change work behavior and affect business outcomes? [PubMed]. *Work (Reading, Mass.)*, *41*, 5075–5080.

Bosua, R., Gloet, M., Kurnia, S., Mendoza, A. & Yong, J. (2012). Telework, Productivity and Wellbeing: an Australian Perspective. *Telecommunications Journal of Australia, 63*(1).

Breaugh, J., & Farabee, A. (2012). Telecommuting and Flexible Work Hours: Alternative Work Arrangements that Can Improve the Quality of Work Life. In Work and Quality of Life, (pp. 251-274). Springer Netherlands.

Bricout, J. C., Baker, P., Ward, A., & Moon, N. (2011). Teleworking and the 'Disability Divide. In *Global Business: Concepts, Methodologies, Tools and Applications* (pp. 2112–2134). Hershey, PA: Business Science Reference.

Cascio, W. F. (2000). Managing a Virtual Workplace. *The Academy of Management Executive*, *14*(3), 81–90.

Connelly, F. M., & Clandinin, D. J. (1990). Stories of experience and narrative inquiry. *Educational Researcher*, *19*(5), 2–14. doi:10.3102/0013189X019005002

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, *13*(1), 3–21. doi:10.1007/BF00988593

Creswell, J. W. (2007). *Qualitative inquiry and research design: choosing among five approaches*. Thousand Oaks, CA: SAGE.

Davison, E., & Cotton, S. (2010). Connection Disparities: The Importance of Broadband Connections in Understanding Today's Digital Divide. In *Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society*. Hershey, PA: IGI Global.

Demerouti, E., Derks, D., Lieke, L., & Bakker, A. B. (2014). New ways of working: Impact on working conditions, work–family balance, and well-being. In *The impact of ICT on quality of working life* (pp. 123–141). Springer Netherlands; Retrieved from http://www.dwa.org.au/whatisadisability.htm

Galvez, A., Martinez, M.J., & Perez, M. (2012). Telework and work-life balance: some dimensions for organisational change. *Journal of Workplace Rights, 16*(33-4), 273-297.

Garrett, R. K., & Danziger, J. N. (2007). Which telework? Defining and testing a taxonomy of technology-mediated work at a distance. *Social Science Computer Review*, *25*(1), 27–47. doi:10.1177/0894439306293819

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Haddon, L., & Brynin, M. (2005). The character of telework and the characteristics of teleworkers. *New Technology, Work and Employment*, *20*(1), 34–46. doi:10.1111/j.1468-005X.2005.00142.x

Halford, S. (2005). Hybrid Workspace: Re-Spatialisation of Work, Organisation and Management. *New Technology, Work and Employment*, *20*(1), 19–33. doi:10.1111/j.1468-005X.2005.00141.x

Hartig, T., Kylin, C., & Johansson, G. (2007). The telework tradeoff: Stress mitigation versus constrained restoration. *Applied Psychology*, *56*(2), 232–253. doi:10.1111/j.1464-0597.2006.00252.x

Hilbrecht, M., Shaw, S. M., Johnson, L. C., & Andrey, J. (2008). Im home for the kids: Contradictory implications for work–life balance of teleworking mothers. *Gender, Work and Organization*, *15*(5), 454–476. doi:10.1111/j.1468-0432.2008.00413.x

Hilbrecht, M., Shaw, S. M., Johnson, L. C., & Andrey, J. (2013). Remixing work, family and leisure: Teleworkers experiences of everyday life. *New Technology, Work and Employment*, *28*(2), 130–144. doi:10.1111/ntwe.12010

Kowalski, K. B., & Swanson, J. A. (2005). Critical success factors in developing teleworking programs. *Benchmarking: An International Journal*, *12*(3), 236–249. doi:10.1108/14635770510600357

Maruyama, T., & Tietze, S. (2012). From anxiety to assurance: Concerns and outcomes of telework. *Personnel Review*, *41*(4), 450–469. doi:10.1108/00483481211229375

Meshur, A., & Ulusoy, C. (2013). Attitudes of people with disabilities towards teleworking as an employment opportunity: IT modelling in terms of the Turkish case. *African Journal of Business Management*, *7*(4), 227–243.

Neuman, W. L. (2003). *Social Research Methods: Qualitative and Quantitative Approaches* (3rd ed.). Pearson Education.

Nilles, J. M. (1975). Telecommunications and organizational decentralization. *Transactions on Communications*, *23*(10), 1142–1147. doi:10.1109/TCOM.1975.1092687

Olson, M. H., & Primps, S. B. (1984). Working at home with computers: Work and non-work issues. *The Journal of Social Issues*, *40*(3), 97–112. doi:10.1111/j.1540-4560.1984.tb00194.x

Pauleen, D., Campbell, J., Harmer, B., & Intezari, A. (2015). Making Sense of Mobile Technology. *Sage Open*, *5*(2), 2158244015583859. doi:10.1177/2158244015583859

Peters, P., Den Dulk, L., & de Ruijter, J. (2010). May I work from home? View of the employment relationship reflected in line managers' telework attitudes in six financial-sector organizations. *Equality, Diversity and Inclusion. International Journal (Toronto, Ont.)*, *29*(5), 517–531.

Piaggesi, D., Castelnovo, W., & Battistella, R. (2013). ICT for Social Inclusion and Equal Opportunities. In *E-Government Implementation and Practice in Developing Countries*. Hershey, PA: IGI Global.

Powell, A., & Craig, L. (2015). Gender differences in working at home and time use *patterns*: Evidence from Australia. *Work, Employment and Society*, *29*(4), 571–589. doi:10.1177/0950017014568140

Randolph, D. S. (2004). Predicting the effect of disability on employment status and income. [PubMed]. *Work (Reading, Mass.)*, *23*(3), 257–266.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Riches, V. C., & Green, V. A. (2003). Social integration in the workplace for people with disabilities: An Australian perspective. *Journal of Vocational Rehabilitation*, *19*, 127–142.

Solovieva, T. I., & Walls, R. T. (2013). Implications of Workplace Accommodations for Persons with Disabilities. *Journal of Workplace Behavioral Health*, *28*(3), 192–211. doi:10.1080/15555240.2013.808079

Stam, K., Sieben, I., Verbakel, E., & De Graaf, P. M. (2015). Employment status and subjective well-being: The role of the social norm to work. *Work, Employment and Society*, *29*, 1–25.

World Health Organization (WHO). (2001). *International Classification of Functioning, Disability and Health*. Geneva: ICF.

KEY TERMS AND DEFINITIONS

Digital Inclusion: Digital inclusion is social inclusion in the 21st century that ensures individuals and disadvantaged groups have access to, and skills to use, Information and Communication Technologies (ICT) and are therefore able to participate in and benefit from today's growing knowledge and information society.

Disability: Disability can take many forms, be temporary, total or partial, lifelong, acquired, visible or invisible. In this study 'disability' is the overarching term that covers impairments, activity limitations and participation restrictions resulting from problems with body function and structure (impairment), limitations to execute tasks/actions (activity restriction), and individual involvement in life situations (participation restriction) (World Health Organization, 2011).

Diversity: Refers to an understanding that every individual is unique, and recognizing our individual differences. These can be along the dimensions of race, ethnicity, gender, sexual orientation, socio-economic status, age, physical abilities, religious beliefs, political beliefs, or other ideologies.

Telework: Telework is defined in this study as the use of Information and Communication Technologies to conduct work at home or any other place that is removed from the physical infrastructure, colleagues, clients and the employer (Haddon & Brynin, 2005; Nilles, 1975).

This research was previously published in Anywhere Working and the New Era of Telecommuting; pages 145-169, copyright year 2017 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 57
The Cross-Cultural Analysis of Australia and Russia: Cultures, Small Businesses, and Crossing the Barriers

Vardan Mkrttchian
https://orcid.org/0000-0003-4871-5956
HHH University, Australia

Svetlana Veretekhina
Russian State Social University, Russia

Olga Gavrilova
Petrozavodsk State University, Russia

Anastasiia Ioffe
Petrozavodsk State University, Russia

Svetlana Markosyan
HHH University, Australia

Serge V. Chernyshenko
https://orcid.org/0000-0002-2852-6878
Open University for the Humanities and Economics, Russia

ABSTRACT

The chapter examines the comparison of the cross-cultural analysis of the green country, Australia (NSW), and the northern country, Russia (Republic of Karelia). Based on the results of the analysis, it shows how a small business from Russia, Green Roofs, overcomes barriers in Australia through the application of blockchain technology. The authors hope that examples of development and thoughts about the driving sources of these transformations, chosen by taking into account the interests of the development of the Russian digital economy, can be interesting and useful for Russian enterprises, small businesses that have begun their digital transformations.

INTRODUCTION

As shown by Chernychenko (2009,2013), intercultural experience is considered a valuable contribution to personal and professional growth, especially in urban promote social growth & cohesion of HHH University (Australia, NSW), Russian State Social University, Open University for the Humanities and

DOI: 10.4018/978-1-7998-7297-9.ch057

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Economics (Russian Federation) and Petrozavodsk State University (Russian Federation, Republic of Karelia) in training teachers and social workers.

Nowadays literary review showed, in an urban environment, intercultural experience is useful in training teachers and social workers to training with students in multicultural classroom teaching. Our experience in the above mentioned team has shown that such work is especially important for the training of teachers and social workers in the city and urban environment at all levels, as Australia is recognized as a culturally diverse nation through its diverse immigration policies. Our experience in the Australian Federation has shown that Australian professional standards for graduate teachers and social workers require that teachers and graduates of social schools should have the knowledge and skills about learning strategies that meet the strengths and abilities of students in various linguistic, cultural, religious and socio-economic groups, especially in large, medium and small urban environment. In the course of our daily work, we became convinced that it is very important for teachers and social workers to be able to conduct a variety of professional experiences in different sociocultural settings and educate teachers prior to the start of training in order to understand teaching and learning in multicultural contexts and develop the student's ability to work with classes with multi-ethnic students from different cultures.

This chapter summarizes our reports on the intercultural pedagogical experience of pre-school teachers and social workers at HHH University (Australia, NSW) to three Russian Universities: Russian State Social University, Open University for the Humanities and Economics (Russian Federation) and Petrozavodsk State University (Russian Federation, Republic of Karelia). HHH University (Australia) was created in January 2001 by bringing together the resources All Armenian Internet University and Campus Armenian Catholic High School in Sydney. Our university offers higher education, social and vocational education and training on the Sydney campus. The University of HHH is an open access university, which is both regional and international. To provide teachers who have completed preliminary training, an international outlook and to enable graduates to effectively participate in studies in a multicultural class, HHH University has developed several foreign offices for teachers, which include the cities of Moscow, Petrozavodsk (Russian Federation). In accordance with the Memorandum of Understanding signed between the Petrozavodsk State University and the University of HHH, teachers and social workers of pre-school education in the third or fourth year of their undergraduate program were invited to the primary or secondary school in Petrozavodsk for three to four weeks prior to the beginning of the the main official program. During this training in the Russian Federation, we planned and implemented special, additional English lessons, attended regular training sessions for teachers and participated in joint preparatory activities for the lesson. They also had the opportunity to get acquainted with Russian culture and learn to understand the Russian education system, including strategies and approaches to teaching and teaching. Petrozavodsk is the capital of the Republic of Karelia in the northeast of the Russian Federation with a population of about one million people. Before the trip, none of the teachers before the start of the training did not have intercultural training in the classroom outside the Australian context. For four students, it was their first visit to Russia when they first saw the "big" class (with 50-60 students) taught by one teacher in the classroom, and their first experience was to start the work day before 7:00 am to prepare for the first the lesson of the day, which usually began at 8:00. For our students, these were new problems and experiences related to new opportunities in the learning and training process. The second author, a representative of the Russian-speaking university and the organizer of this placement in Russia, was in Karelia with four of his students. To study the broader picture of this international teaching practice, she interviewed four local instructors and interviewed 80 Russian students who were taught and trained by the University of HHH to find out their views and perspec-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tives on how they felt working with Australian teachers and what they perceived as the contribution of Australian teachers in their educational environment. The survey and survey data provided valuable information for this study, not only to inform the teaching experience in the Russian Federation, but also to better understand intercultural communication and teaching and learning, especially in the context urban promote social growth & cohesion. The third author represents the Moscow Open University (a HEI, providing distant education for the entire territory of Russia) and has wide international experience in higher education. He had professorship at universities of Russia, Ukraine, Germany and Poland, was a faculty dean, a national didactic committee member, manager of about thirty international projects in the field of higher education. His contribution to the new cross-cultural training programs will be based on his wide international experience.

BACKGROUND

The work carried out by the staff of the HHH university showed that the teacher-pupils will greatly benefit from the international experience of teaching, understanding more about children and opinions, beliefs and understandings and methods of teaching and learning in different contexts, urban conditions promote social growth and rallying (Mkrttchian, et al, 2011-2018). This section was considered by us on two positions: training and small business:

The Cross-Cultural Teaching Experience of Pre-Service Teachers and Social Workers

On a broader level, research literature suggests that the advantages of international teaching experience are professional and personal growth, including increased confidence, better evaluation and respect for differences in other and other cultures, and awareness of the importance of reflection in professional cultural development. Our research on similar pedagogical education programs in other regions and other countries shows that international experience can contribute to the development of students and teachers in various ways, such as: flexibility, tolerance, patience, self-confidence, self-criticism, courtesy, independence and the ability to adapt in another culture concluded that the international experience of teaching students can potentially change the beginning of the teacher's thoughts about himself, curriculum development and strategy training; increase the skills and abilities of effective teachers; resolve and encourage the study of personal beliefs, habits and values, and encourage a commitment to openness (Mkrttchian, et al, 2011-2018). All these factors should influence, finally, on quality of the teaching process (Gorbunova, et al, 2012) and should be directly taken into account during organization of education management (Chernyshenko, et al, 2012). We have seen that there is a convergence of views on the value of foreign professional experience and evidence of the use of such programs in numerous teacher training programs in Australia and internationally. Nevertheless, there is still a need for a new, focused study to determine the full effectiveness of such programs, including specific elements of pedagogical pedagogy and identity that they help to develop the system of international exchange and training (Mkrttchian, et al, 2011-2018). We noticed that the literature focuses on the perspectives and growth of the number of students - teachers and social workers during international pedagogical practice, our studies have shown that in very few studies reviews of local instructors-mentors and local students are considered, how they relate to approaches to learning, and also to what kind of harm they bring to local

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

schools and communities due to language barriers. Therefore, the answer to questions about the impact of the international experience of teaching students-teachers and social workers on the local context remains uncertain and needs further study. The main focus of this study was not only on how the teaching experience of the Russian Federation influenced the prospects for Australian teachers and social workers in teaching and learning, as well as their personal and professional development, but also to study that Australian student teachers and social workers bring in the local Russian context. This was achieved by studying the experience and voices of local instructors-mentors and students. (Mkrttchian, et al, 2011-2018) with using general approaches to development of international education standards (Chernyshenko, Okhrimenko, 2009).

The research proposed in this chapter was intended to answer the following questions:

1. How do Australian student teachers and social workers from the HHH university reflect their Russian experience and what is the impact of this intercultural placement on the personal and professional development of Australian student teachers and social workers?
2. How do the teachers and students of the Russian mentor perceive their experience with Australian student teachers and social workers, and how does this cross-cultural practice contribute to the local context from the point of view of teacher-mentors and students?

All the studies were organized around the study of these central issues. Based on these issues, more specific reflexive questions were developed to receive feedback from three different groups of participants. The study was approved prior to a trip to the Russian Federation by the Ethics Committee of the University of HHH, Australia.

The Small Business From Russia "Green Roofs" and Technology Green Roofs

Every year, green roofs are becoming an increasingly popular element of environmental construction. Now green roofs are covered by garages, shopping centers, they are used as playgrounds, restaurants and other recreational areas. Most green roofs are found in the southern climate, but there are also single projects in the northern conditions of Russia. The creation of green roofs in conditions with a high fluctuation of average annual temperatures is very effective.

The rapid pace of urbanization of the modern world leads to an inevitable deterioration of the ecological state of the environment. Thus, a high level of noise, dust, pollution of air emissions from road transport and industry, the reduction of optimal visual environment (a large number of homogeneous and aggressive visual fields) undermine people's health, violate the psychological balance and are generally characterized as unfavorable for living and working of the population.

The researches of the authors of the chapter, conducted in Faro (Portugal) and Petrozavodsk (Russia), showed a complicated ecological situation in the northern and southern European countries of different countries, which is connected with the lack of green spaces.

The territory of Petrozavodsk is 135 sq. M. km, including directly urban land -113 square meters. km, the rest - the city's forests. The green zone of Petrozavodsk covers an area of 48.2 thousand hectares, including 1.8 thousand hectares within the city limits. The forest park area of the green zone is 12.9 thousand hectares, the forestry part is 35.3 thousand ha. Parks, squares and street plantations occupy about 400 hectares, which is somewhat more than 14 square meters per one inhabitant.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

On the territory of the city of Petrozavodsk, the main indicators of the ecological situation in the area were investigated. We studied the noise level, the level of dust pollution, the degree of gardening of the city.

The noise level was measured in the summer and autumn (after the fall of the leaves), as well as in the absence of precipitation and strong wind. A route of measurements was compiled with the selection of certain points for the study. At each point, three replicates were measured at different time intervals: in the morning (7.00 - 9.00), in the afternoon (12.00 - 15.00) and in the evening (17.00 - 20.00). For the accuracy of each result, the computation duration was at least 5 minutes. The microphone of the sound level meter was directed towards the noise source at a distance of half a meter from the observer.

In summer, the minimum noise level of 25 dBA was observed in parks and squares. This is due to the presence of green spaces. The maximum value of 52 dBA was observed on Rovio Street. In the autumn (impersonal period), the minimum noise level was fixed at 30 dB on Lisa Chaikina Street. The maximum value of 59 dBA was observed on the Lososin Highway. The maximum values in most cases adjoin the places of delay of the traffic flow (pedestrian crossing, traffic light). Also, the noise level is increased in places where illiterate landscaping is created or not created at all.

The results of studies of the dustiness of the city's atmosphere show the level of dustiness in the central district of the city. The minimum amount of dust on the Topol Siberian leaves was recorded at a distance of 0.3 km from the lake - 0.0587 g / m2, maximum at a distance of 2.08 km 0.3108 g / m2. On the leaves of Lipa large leaf, the maximum value was found at a distance of 0.5 km - 0.2375 g / m2, the minimum - at a distance of 0.08 km -0.0406 g / m2. The distance from the water area of the lake has no effect on the dust content.

The results of the studies show the level of dustiness in the central district of the city. The minimum amount of dust on the leaves of the Topol Siberian was recorded at a distance of 0.3 km from the lake - 0.0587 g / m2, maximum at a distance of 2.08 km 0.3108 g / m2. On the leaves of Lipa large leaf (Figure 5) the maximum value was found at a distance of 0.5 km - 0.2375 g / m2, the minimum - at a distance of 0.08 km -0.0406 g / m2. The distance from the water area of the lake does not affect the content of dust in the air.

This numeral indicates the need to create additional green spaces. Regardless of climatic parameters and temperature conditions, cities experience an acute shortage of gardening.

Green plants are able to neutralize the harmful effects of many negative environmental factors. The problem of gardening is complicated in conditions of dense development, when in order to save space, similar houses are being built, leaving no space between them for parks and public gardens. One of the ways to solve the problem can be the creation of green roofs, when on the roofs of buildings, depending on the required functions, an exploited or unexploited construction, including green plantations, is created.

G. Petrozavodsk is a unique city. The range of fluctuations in average annual temperatures is from -40 to +30 degrees. The amplitude of the temperature fluctuation is 70 degrees. This number is typical for a few cities, some of which are located in the south near the equator (see cities). Therefore, in part, studies conducted in Petrozavodsk can be considered model for cities with wide amplitude of average annual temperatures.

The green roof allows you to reduce the air temperature in cities in summer (up to 10 ° C), thereby reducing the effect of the thermal island; Exclude the release of hazardous to human health volatile substances; Reduce air pollution (plants on the roof can catch up to 50% dust from the air streams); ensure the supply of oxygen; Reduce the total background noise from 2 to 10 dB; increase due to the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

slow evaporation of moisture from the soil humidity in the cities; regulate the number of storm drains; To exclude rapid spread of fire on the roof surface during fires.

Recent studies conducted in conditions with a wide range of fluctuations in mean annual temperatures have shown that the difference in temperature in the premises under the green roof and under the usual roof is 0.76 ° C. The difference in the room temperature under the green roof and the environment was 2.45 ° C. The difference in the room temperature under the usual roof and the environment was 1.69 ° C.

The Russian company "Green roofs" is a scientific and productive branch of Petrozavodsk State University. It was very interested to work in Australia, where there is no such technology for making roofs, but it did not have success in overcoming the existing barriers. The authors of the chapter before presenting their experience of overcoming these barriers below represent the company "Green roofs".

Green plants are capable of neutralizing the harmful effects of most negative environmental factors. The problem with planting of greenery is getting more challenging in the restrained urban conditions, namely when twin houses are built to save space, leaving no room for parks and public gardens. One of the solutions to this problem could be construction of green roofs, when on the surface of regular roofs a certain design with green plants is set which is either in or out of use, depending on its purpose.

A green roof is able to lower air temperatures in cities in summer (up to 10ºC), thus decreasing the heat island effect; to prevent emissions of volatile substances which are detrimental to people's health; to decrease air pollution (rooftop plants are capable of keeping up to 50% of dust from the air flow); to provide oxygen supply; to lower the general background noise by 2-10 dB; to increase air moisture in cities because of the slow water evaporation from soil; to adjust the number of storm drains; to prevent fire from spreading fast on the surface of the roof in case of emergency. Thanks to modern technologies and materials it is now possible to create rooftop gardens with lawns, flowerbeds, ponds and fountains.

An extensive downside of industrialization is waste management. If we take into consideration the cafe-coffee culture in Australia, it creates a colossal damage. According to sustainable campus of university of Melbourne it is estimated that Australians use one billion disposable coffee cups each year. Large amount of plastic and paper use goes towards the culture of industrialized societies however we have not yet reached a point where we can handle the waste created up to the present point. When considering a further industrialization of largely populated region such as Africa the factor of waste management cannot be ignored.

A green roof (ecological roof, accessible roof, living roof, and vegetation covered roof) is a roof that is partially or completely covered with vegetation located in the upper part of a roof panel on a waterproof membrane with a growing medium.

Researchers single out two types of green roofs: intensive and extensive. There are also some transitional options: half-intensive green roofs and half-extensive green roofs. All these types are mainly differentiated by thickness of a growing medium, mounting and running costs and by species of plants used in green roofs construction.

Extensive Green Roofs

An extensive way of roof greening is the easiest one. It is often used on roofs of industrial factories as well as in greening garage, gazebo and terrace roofs and roofs of different kinds of household buildings.

It is worth mentioning that extensive green roofs are not designed for walking or recreation and are mostly used for ecological or aesthetical purposes.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Such type of roofs has a very thin growing medium and besides that it does not require much maintenance. As far as economy goes, this type of roofs is considered the least resource-intensive.

Various species of moss, succulent plants, and herbs are often used in extensive roof construction. Such roofs are typically covered with sedum, and spurge, aye-green. These plants are officially approved for green roof construction in America and Singapore.

Features of extensive green roofs:

- Limited number of plants, few opportunities for creating a composition;
- Low running costs – normally not more than two checks a year;
- The roof is not thick;
- It does not weigh much;
- Cheap installation and technical maintenance are in Solution and recommendations.

Intensive Green Roofs

Such kind of roofs has a thicker growing medium that allows to grow trees and shrubs (except for species with a taproot system).

Permanent technical maintenance, irrigation and fertilizers are necessary for enabling intensive green roofs to function properly.

Intensive greening is characterized by:

- Thick layer of soil;
- Heavy weight;
- Higher capital costs;
- Increased diversity of plants.

An intensive green roof is a real garden that gives an opportunity to grow not only plants but also shrubs and trees. According to its performance characteristics, a green roof can hold from 100 to 700 kg for 1 m^2.

The technology of green roof construction includes several important stages.

1. Pre-design stage

This stage implies analyzing the given roof, how suitable it is to be turned into a green roof. Records of the building are looked into (the building's permissible load, roof coating materials), sizes of the planned roof are measured, the roof's susceptibility to winds is found out, and also a sunlight analysis is done (unless the data is provided in the records)

The building's permissible load must be no less than 200 kg for 1 m^2 (considering an average snow load to be 100 kg for 1 m^2). In this case it is possible to construct a roof of the extensive type. An intensive green roof requires the permissible load to be more than 200 kg for 1 m^2. It is crucial to be aware of the layers of the given roofing pie in order to specify the number of layers in a future green roof. So, if the given roof has liquid roofing, it means that a green roof can be created without any deconstruction.

It is necessary to measure the inclination of the given roof to determine the type of a green roof to be constructed. The inclination being less than 8 degrees allows constructing any type of roof. The inclina-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tion about 8 degrees is believed to be the most suitable for a green roof. With a bigger inclination only an extensive green roof could be constructed with the use of a volume georgic.

A sunlight analysis, the roof's susceptibility to winds as well as the wind diagram help to find proper plants that would naturalize best on this given roof.

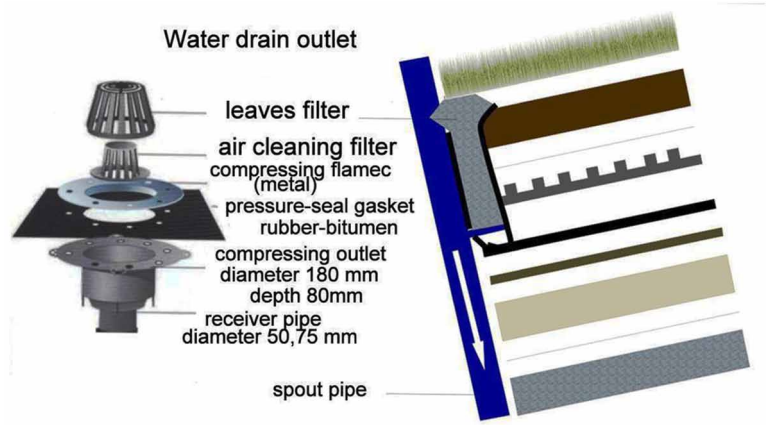
At this stage the green roof type is chosen (extensive, half-intensive, intensive). A landscape design project of the green roof is created depending on its type; the basic structure of the green roof is determined in accordance with the given roof. Choosing the type of the roof implies analyzing the data gathered during the previous stage. Such a comprehensive approach allows constructing the roof type that best fits the building. The construction of an extensive green roof does not differ much from the construction of an intensive green roof. In making a rooftop garden with large-sized trees it is possible to make use of extra water isolation and a blocking layer (landscape fabric) to create a better protection from root penetration. Construction of different types of roofs depends on how thick the layer of the soil is.

It is advisable to use the following construction materials:

- VA pour barrier – Izospan A, Izospan B;
- Thermal covering – glass wool;
- Surface cast - cement-sandy mixture;
- Water isolation – liquid rubber;
- Drain membrane – graded membrane PLANTER TechnoNicol;
- Landscape fabric – polymeric nonwoven material 200 gr/m^2.

The water drain installation scheme is shown in figure 1.

Figure 1. The water drain installation scheme



A water drain outlet is used for this purpose; it is also waterproofed with a layer of liquid rubber. The water drain outlet is attached to the spout pipe of the roof. The outlet is put between the layer of green plants and water isolation in the lowest part of the roof. To provide the best water drain the inclination of the green roof must be 8 degrees.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The design of a green roof depends on certain conditions (insolation, exposure to winds, and the wind diagram). A set of documents is prepared: a general layout, a dendrological plan, a layout drawing, a plants drawing, and a lighting and watering plan (if necessary)

At this stage the green roof construction is carried out, its landscape design is created and the whole green roof construction process is supervised.

Upon finishing the construction of a green roof it is important to take a range of measures to take care both of the roof and the plants that are growing on it. So that the green roof could function properly, the following requirements must be met:

1. Monitoring leaks 2 times a year (in autumn and in spring after pouring rains and snow melting).
2. Using supplementary fertilizers or bio compost in the ground coat in order to provide better nutrition for green plants and help them naturalize - at least once a year.
3. Monitoring the plants' condition regularly. As the first symptoms of freezing or different diseases appear it is necessary to provide good quality treatment and care.
4. Conducting technical maintenance of water drain outlets at least two times a year (in autumn and in spring).
5. If applicable, conducting technical maintenance of automatic irrigation and illumination systems before and after use.
6. Immediate removal of weeds and other undesirable plants.
7. During construction and use of intensive and half-intensive roofs it is necessary to protect them against pests.
8. During construction and use of intensive and half-intensive roofs such measures are necessary as timely lawn mowing, repairing lawns, decorative and anti-age trimming of trees and shrubs.

The proposed technology should be based on theoretical understanding of the processes from the point of view of population ecology and mathematical modeling. The authors have an approach to consider the green technology as a population development process (Belozyorov, Chernyshenko, 2014), forming a succession, which leads to sustainable ecosystems (Chernyshenko, Ruzich, (2013).

MAIN FOCUS OF THE CHAPTER

Issues, Controversies, Problems

The main focus of the research, the results of which are outlined in this chapter, is how to solve the problems, disagreements and problems of the experience of intercultural students / teachers, and the business of green roofs and how these decisions are related to urban policies and / or urban growth in Australia and Russia. Proceeding from the foregoing, it is necessary to combine the results obtained in the Russian Federation on the experience of intercultural students / teachers, and the business of green roofs. To do this, we need to develop new, special principles and create a practice of qualitative case study by all the numerous participants engaged in this research project. The need to develop and create such a qualitative approach was dictated by the fact that the research of case studies is focused on the development of large descriptions of specific phenomena (events, experiences and meanings that are attributed to them) in the epistemology of the concrete. Therefore, we used the traditions of case studies,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

as our research was intended to provide a detailed, holistic and descriptive description of how Australian student teachers interpreted their experience in the Russian Federation and how the teachers and pupils of the Russian mentor perceived their experience with Australian students teachers, and how the Russian green roof business integrated into the Australian reality, breaking all intercultural barriers, The created opportunity are related to urban policies and / or urban growth in Australia and Russia. The study was also based on the belief that a case study is the preferred strategy when:

1. The question "how" or "why" is asked about a modern set of events, according to which the researcher has practically no control;
2. Researchers are interested in insight, discovery and interpretation, not in testing hypotheses;
3. The type of data required is what people tell you and what they do, which allows the researcher to understand the meaning of what is happening;
4. Using this approach of qualitative case study, we organized this research project so that we could hear the voices of the participants.

Using this approach of qualitative case study, we organized a poll so that the participants could hear the voices of both the Russian Federation and the Australian Federation. To protect the anonymity of participants, aliases were used during the study. Four students of the fourth year undergraduate education voluntarily participated in the study. These pedagogical students and social workers have already successfully completed more than 70 days of vocational training in primary and secondary schools in Australia. The minimum requirement for registration by the Victorian Teachers Institute in Australia is 80 days of supervised training. At the beginning of the trip they did not have the skills of the Russian language. During a three-week international training in the Russian Federation, they were already able to work with local journals that contained statistical information and that included daily experience in the school and other details of cultural experiences and excursions. Students, educators and social workers described what they observed in the school, and how they felt about Russian educational concepts, student training activities, strategies and approaches to learning, and about the lessons they taught. They also included observations and reflections on weekend activities outside the school. At the end of the trip, the student teachers completed the final analytical work, which was the main source of data for this study. In addition, records of researchers of class observation in the Russian Federation and e-mail messages from the teachers and social workers' judges were also used as sources of data. As noted above, the Russian company "Green Roofs", this scientific and productive division of Petrozavodsk State University was very interested in working in Australia, where there is no such technology for making roofs, but was not successful in overcoming the existing barriers. The authors of the chapter have developed a new on Solutions and Recommendations overcoming this barrier, which is described below decisions, are related to urban policies and / or urban growth in Australia and Russia.

SOLUTIONS AND RECOMMENDATIONS

To present the results of the research, we organized data on three broad topics; first, a valuable cultural experience for all participants; secondly, differences in educational concepts and learning strategies, and thirdly, student-teachers and social workers reflect on their personal and professional development. We recognize that these individual topics can be interpreted in several ways and distributed in differ-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ent categories. Where possible, for the purposes of this document, we focus on the initial voices of the participants.

In general, Australian student teachers, local tutor teachers and local students appreciate this cross-cultural experience and consider it an unforgettable and meaningful life experience. Some of the basic values in traditional Russian culture, such as respect for teachers, hospitality and friendliness, impressed the Australians very much. The warm reception and friendly attitude of teachers and pupils of the school was repeatedly noted. Valuable cultural experiences and attitudes for Australian student teachers and social workers, as well as Russian teachers and students, along with the green roof business project, provided an interesting, new solution to the issues of urban and / or urban growth in Australia and Russia. In everything, everything was mentioned, how stimulating and exciting cultural experiences were for themselves and how they were warmly welcomed in schools and culture.

The goal is to link the barriers and style of management of intercultural communication (Gerald, 2000), the communication system and the behavior of employees of the Russian firm Green Roofs in Australia. Highlights define the basis of the conceptual model and hypothesis to achieve this goal (Huselid, et al, 1997; Becker et al, 1999; Wright, et al 1999). Therefore, we developed and tested six hypotheses, the verification of which served as a test for the purpose of the study, namely, is described below decisions, are related to urban policies and / or urban growth in Australia and Russia. These hypotheses are expressed as follows:

Hypotheses

- National culture does not influence the style of management of Russian companies
- National culture influences the style of management of Russian companies.
- The national culture does not affect the communication management system of Russian companies.
- National culture influences the communication system of management of Russian companies.
- National culture does not affect the behavior of Russian companies
- The national culture influences the behavior of Russian companies.
- National cultural values affect the productivity of the team in Russian companies.

Testing the Hypothesis

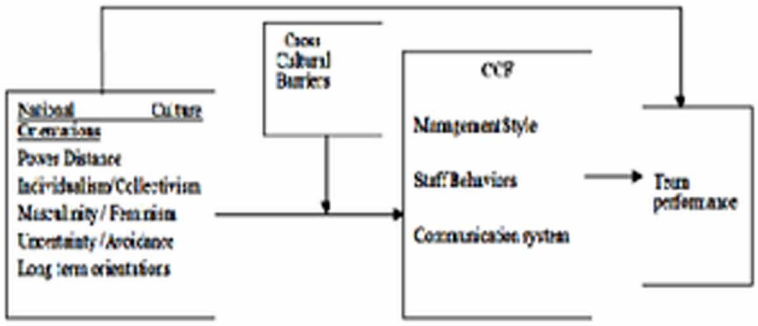
Based on the purpose of this study, three hypotheses were mainly proposed. Each hypothesis was tested using correlation analysis and multiple linear regression analysis and variance analysis. As for obtaining significant items related to the values of the national culture, intercultural communication barriers and efficiency, factor analysis was conducted. All variables, with the exception of communication systems, are positively and significantly correlated with Team Management. The style of behavior and management of personnel in terms of choosing hiring is up to 20% of the difference in the company's performance ($R2 = 0.2$). To test the mitigating effect of the communication barriers measured by the power distance on the relationship between the management style and personnel behavior, the coefficient of determination (R2) obtained when the cultural orientations were in the regression equation and when they were not compared. Communication barriers and national culture account for 30% of the total productivity of the group. We conducted a study in which we developed a conceptual model linking all variables by introducing intercultural communication barriers to mitigate the relationship between national culture

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and management style, communication system and staff behavior. Their joint influence on the work of the team earlier, before us was not considered in Russian firms operating in Australia.

The conceptual model of the small Russian company "Green Roof" to overcome existing barriers in Australia is shown in Figure 2.

Figure 2. A conceptual model of small Russian company "Green Roof" for overcoming the existing barriers in Australia



We found that the structure assumes that the relationship between the national orientation to culture, the style of management, the communication system and the behavior of personnel. It is proved that there is a direct link between the national culture and the teams. Our research put forward the hypothesis of a direct link between national culture and the work of the team. It was shown that existing intercultural barriers, a moderate relationship between national culture and managerial consequences in a multinational firm. It can be argued that the national cultural values do not directly lead to team productivity, but they affect the process, for example, motivate the work of employees, and these processes ultimately lead to the achievement of the team. As a result of our research, we emphasize a fundamental understanding of how the Russian company Green Roof is facing cultural barriers in communicating with the leadership of teams in Australia. Moreover, the result was influenced by the index of national cultural values (power distance, individualism / collectivism, masculinity / femininity and long-term orientation) to command management. From the analysis of the results, these communication barriers are associated with the influence of national culture on the workplace and the behavior of people with different identities (boss and subordinates). However, all the recommendations and decisions in today's conditions, namely, in the digital economy, require a digital transformation, only in this case it is possible that the results obtained were relevant for urban and / or urban growth in Australia and Russia. Therefore, based on the published works of Professor Mkrttchian (2018), technical solutions were summarized that are universal in nature and are given below.

Digital Economy and Digital Transformation

The analysis would be incomplete without mentioning the results of comparing the state of the digital economy and Green Roof in Australia and the Russian Federation, especially on digital transformation. As a result of the implementation of our project, it was established that Australia, developed by the level

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of the digital economy, can adopt the Russian experience of teaching the basics of digital transformation of participants in this process. We have established how the learning process takes place.

The two sides of digital transformation are centered on local hardware, software and infrastructure for a distributed virtual machine model, software as a service and cloud IT. This is the transition from the physically grounded world to the digital one. This is a digital transformation. This transformation consists of two parts: the technological side and the human side. Most business and IT leaders already have a technological side, but they do not pay attention to the human side: the understanding that effective digital transformation is related to how people adopt and use technology, at least as well as in technology itself. And this applies not only to people at the top of your organization, but to everyone who works for you, especially if they interact directly with customers.

The digital approach should help in forming a proper legal environment for the considering educational transformations including green roof, particularly, of international standards (Chernyshenko, Okhrimenko, 2009) and qualification frameworks (Mitrofanova, et al, 2105). According to the research (Mlrttchian, et al, 2018) the achievement of a complete and successful digital transformation depends not only on the right technology, but also on:

- From the leaders. People at the top of your organization must lead the way through digital transformations, for example, using the same tools that they expect everyone else will use;
- From managing an employee's trip, exactly the way you manage your customer's trip. Each user expects that the online experience will be as smooth as that of the world's leading digital companies.

These are small tasks, but they are much easier to accomplish with an integrated, seamless and secure solution. Just like cloud IT solutions can help you improve the quality of customer service, it will also help you provide the best experience with employees. This can become a real impact on the business when first-line employees feel able to help their clients in new and exciting directions.

Two Critical Business Effects

Collaboration uses the collective mental capacity of your employees. Two main components are basic for collaborative technologies: the ability to work from virtually anywhere and the ability to work with simple intuitive solutions on almost any device. Premium solutions offer integrated tools that help everyone to contribute. They are easier to adapt to your specific needs and culture, they are easily scaled, they have more life cycles, and their creators usually offer better long-term support. And since they are more common, new employees may already know how to use them, which reduces the time and cost of training.

Creativity depends on the ability to find innovative solutions to existing problems. From there, it expands the possibilities of finding these solutions, finding and fixing problems and testing them again. Creativity in business is not just a series of wild ideas, ideas must also work. Thus, the necessary tools for working together also help you stimulate creativity, simplifying the experiment and finding ideas that really work.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Security and Management

Digital transformation has opened up new opportunities, but it has also raised increased security concerns. Triple H-Avatar helps protect data that has been trusted with intelligent, permanent protection that protects data on many devices and scenarios. A simplified IT environment also allows your IT team to create and manage employees' devices and services, which reduces the burden on members of your IT team.

Business creativity depends on the ability to find innovative solutions to existing problems. Fortunately, there is a simple answer: Triple H-Avatar meets the needs of the enterprise. It integrates all existing technologies and equipment to help employees be more creative and work together safely, namely;

- Unlock creativity, helping its people to work with documents, voice and touch, all backed up by tools using AI and machine learning.
- Provides the widest and deepest applications and services, as well as a universal tool for collaboration, giving its people the flexibility and choice in how they connect exchange and communicate.
- Simplifies IT by integrating management of users, devices, applications and services.
- Helps protect customer data, company data and intellectual property with built-in intellectual protection.

Triple H-Avatar is designed for businesses with up to 50 users, but this is not limited, if necessary, the number of users can be increased to 3000. It combines all available resources with individual security and management functions. It also helps to expand the capabilities of employees, protect your business and simplify the management of IT. Namely;

- Helps your teams achieve more by better connecting employees, customers and suppliers.
- Helps your employees work anywhere on any device.
- Protects data on all devices with permanent protection.
- Simplifies the configuration and management of employees' devices and services using a single IT console.

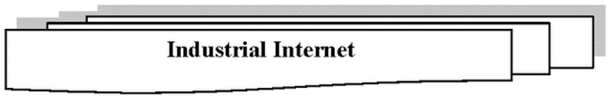
Example of Industrial Internet in sharing use Triple H-Avatar technology from Small Russian Company "Green Roof" for overcoming the existing barriers in Australia show in fig.3

FUTURE RESEARCH DIRECTIONS

Future research on our chapter are related to intercultural progress on the part of countries and their institutions, green roof policies and urban growth policies will be aimed at studying the interaction of people, sensors, composing Internet of things, Internet sing, analysis and storage of Big Data and cyber physical systems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Industrial internet in sharing use triple H-avatar technology from a small Russian company "green roof" for overcoming the existing barriers in Australia



WORLD MARKET	PILOT PROJECTS IN RUSSIA
IBM PTC GE Microsoft SAP Amazon Cisco	System integrators Foreign solution provider Software engineer
SCENARIOS OF USE	
User	**Goal**
Plants	Serviceability monitoring and optimization of equipment load
Logistic and transport companies	Transport optimization
Services and trade organizations	Analysis of clients' behavior, development of personal
Agricultural producers	Fields' monitoring, monitoring of cattle's health
Oil and gas companies	Percent increase in hydrocarbons' extraction

CONCLUSION

- As a result of our research, we underline a fundamental understanding of how the Russian firm "Green Roofs" faces cross cultural barriers to communication while managing teams in Australia. Moreover, the result was influenced by the index of national cultural values (power distance, individualism / collectivism, masculinity / femininity and long-term orientation) to command management. From the analysis of the results, these communication barriers are associated with the influence of national culture on the workplace and the behavior of people with different identities (bosses and subordinates).
- We have established that the structure assumes that the relationship between the national orientation to culture, the style of management, the communication system and the behavior of personnel. It is proven that there is a direct link between national culture and teams. Our research put forward the hypothesis of a direct link between national culture and the work of the team. It was shown that existing intercultural barriers, a moderate relationship between national culture and managerial consequences in a multinational firm. It can be argued that the national values of culture do not directly lead to team productivity, but they influence the process, for example, to motivate the work of employees, and it is these processes that ultimately lead to the achievement of the team.
- At the same time, a study of the problem of cyber-physics system for Digital Transformation showed that is section of information security, within the framework of which the processes of formation, functioning and evolution of cyber-physics objects are studied, to identify sources of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

cyber-danger formed while determining their characteristics, as well as their classification and formation of regulatory documents, implementation of Digital Transformation in future. This also is certainly true, and this truth has again never been questioned. However, working in the application of Machine Learning for Digital Transformation with the using the author's Avatars-Based Management techniques, we came to the conclusion that this is not so, and the built-in cyber-physics systems can be destroyed by the same artificial intelligence.

- Example of Industrial Internet in sharing use Triple H-Avatar technology from Small Russian Company "Green Roof" for overcoming the existing barriers in Australia

ACKNOWLEDGMENT

This research was supported by the Russian Foundation for Basic Research –

[Grant number 18-010-00204] entitled: Fundamental basis for the development of mechanisms for effective digital service-oriented interaction of participants in socio-economic systems and networks.

REFERENCES

Adler N J (1997). A typology of management studies involving culture. *Journal of International Business Studies*, 29-47.

AFDB Policy Brief. (2010). *Chinese trade and investment activities in Africa*. African Development Bank Group, Chief Economist Complex.

Asheghian, P., & Ebrahimi, B. (1990). *International business: economics, environment and strategies*. New York: Harper Collins Publishers.

Baregu, M. (2008). The three faces of the dragon: Tanzania-China relation in historical perspective. In *Crouching tiger, hidden dragon? Africa and China*. University of KwaZulu-Natal Press.

Barney, J. B., & Wright, P. M. (1998). On become a strategic partner: The role of Human resource in gaining competitive advantage. *Human Resource Management*, *37*(1), 31–46. doi:10.1002/(SICI)1099-050X(199821)37:1<31::AID-HRM4>3.0.CO;2-W

Becker, B. E., & Huselid, M. A. (1999). Overview: Strategic human resource management in five leading firms. *Human Resource Management*, *38*(4), 287–301. doi:10.1002/(SICI)1099-050X(199924)38:4<287::AID-HRM2>3.0.CO;2-L

Belozyorov, V. Ye., & Chernyshenko, S. (2014). Quadratic model of inter-population interaction: Investigation of stability areas. *Applied Mathematics and Computation*, *230*, 43–56. doi:10.1016/j.amc.2013.12.095

Benet, M. J. (1988). Intercultural communication: A current perspective. In M. J. Bennet (Ed.), Basic Concepts of intercultural communication: selected readings. Yarmouth, ME: Intercultural Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bennet, M. J. (1998). Intercultural communication: A current perspective. In M. J. Bennet (Ed.), *Basic concepts of intercultural communication: Selected readings* (pp. 1–34). Yarmouth, ME: Intercultural Press.

Bershadsky, A., Berezin, A., & Mkrttchian, V. (2018). Theoretical and Technological Perspectives on Development of Information Monitoring System for Solving Complex Problems. In U. G. Benna (Ed.), Optimizing Regional Development Through Transformative Urbanization. Hershey, PA: IGI Global. DOI: doi:10.4018/978-1-5225-5448-6.ch006

Burke, C., & Corkin, L. (2006). *China's interest and activity in Africa's Construction and infrastructure sectors*. Centre for Chinese Studies, Stellenbosch University.

Chaponniere, J. R. (2009). Chinese aid to Africa, origins, forms and issues. In The New Presence of China in Africa. Amsterdam University Press.

Chernyshenko, S. V., Demchyk, O. I., & Chernyshenko, V. S. (2012). Regional system of higher education management: Information support of interaction with stakeholders. *J. of Pedagogical Informatics*, *18*(1-2), 134–146.

Chernyshenko, S. V., & Okhrimenko, O. A. (2009). Formalisation of international education standards: Design of information models with use of computer technologies. *Proceedings of International Conference "Actual Problems of International Cooperation in the Field of Science and Education",* 257-264.

Chernyshenko, S. V., & Ruzich, R. V. (2013). Bifurcation Model of Successions in Ecosystems. *Proceedings of 27th European Conference on Modelling and Simulation. ECMS-2013*, 169-174.

Foster, V., Butterfield, W., Chuan, C., & Pushak, N. (2008). *Building bridges; China's growing roles as infrastructure financier for sub-Saharan Africa*. Washington, DC: World Bank.

Fua, Y., & Kamenou, N. (2011). The Impact of Chinese values on Human resource policies and practices within transnational corporations in China. *The International Journal of Human Resource Management, 22*(16), 3270-3289.

Gamidullaeva, L., Potapova, I., Shatokhin, M., & Mkrttchian, V. (2018). Increasing Territorial Economic Growth through Cost Optimization in the Digital Economy. In U. G. Benna (Ed.), Optimizing Regional Development Through Transformative Urbanization. Hershey, PA: IGI Global. DOI: doi:10.4018/978-1-5225-5448-6.ch009

Gamidullaeva, L., Vasin, S., & Mkrttchian, V. (2018). *Regional Economic Growth and Open Innovation Platforms: Emerging Trends and New Opportunities*. Academic Press.

Gerald, M. J. (2000). Cross-cultural Industrial and Organizational psychology: introduction to the special issue. *Journal of Applied Psychology: An International Review*, 191-123.

Gorbunova, Yu. N., Bykova, A. V., & Chernyshenko, S. V. (2012) Social and psychological aspects of education process quality as a factor of forming competitiveness of a manager in labour market. *Human Resources Management in the Russian Innovation Economy. Conference Proceedings*, 106-112.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hitt, M. A., Keats, B. W., & DeMarie, S. M. (1998). Navifating in the new competitive landscape:Building competitive advantage flexibility in the 21st century. *The Academy of Management Executive*, *12*, 22–42.

Hofsetde, G. (2001). Culture Consequences: Comparing values, Behaviors, Institutions and Organizations across Nations, Thousand Oaks California. *Sage (Atlanta, Ga.)*, *2001*, 25–40.

House, R. J., Wright, N. S., & Aditya, R. N. (1997). Cross-Cultural research on organizational leaderhip: a critical analysis and a proposed theory. In New Perspectives in international industrial Organizational Psychology. New Lexington Press.

Kwani, Y.A., & Ofori, G. (2001). Chinese Culture and Successful Implementation of partnering in Singapore's Construction Industry. *Construction Management and Economics, 19*, 619–632.

Merkin, R. S. (2006). Uncertainty avoidance and face work: A test of the Hofstede Model. *International Journal of Intercultural Relations*, *30*(2), 213–228. doi:10.1016/j.ijintrel.2005.08.001

Mitrofanova, E.A., Afanasyev, V.Y., & Chernyshenko, S.V. (2015). *Development of sectoral qualification framework: methodology and practice*. Moscow: Publishing House of State University of Management.

Mkrttchian, V. (2011). Use 'hhh" technology in transformative models of online education. In G. Kurubacak & T. Vokan Yuzer (Eds.), *Handbook of research on transformative online education and liberation: Models for social equality* (pp. 340–351). Hershey, PA: IGI Global. doi:10.4018/978-1-60960-046-4.ch018

Mkrttchian, V. (2012). Avatar manager and student reflective conversations as the base for describing meta-communication model. In G. Kurubacak, T. Vokan Yuzer, & U. Demiray (Eds.), *Meta-communication for reflective online conversations: Models for distance education* (pp. 340–351). Hershey, PA: IGI Global. doi:10.4018/978-1-61350-071-2.ch005

Mkrttchian, V. (2015). Modeling using of Triple H-Avatar Technology in online Multi-Cloud Platform Lab. In M. Khosrow-Pour (Ed.), Encyclopedia of Information Science and Technology (3rd ed.; pp. 4162-4170). Hershey, PA: IGI Global. DOI: doi:10.4018/978-1-4666-5888-2.ch409

Mkrttchian, V., & Aleshina, E. (2017). *Sliding Mode in Intellectual Control and Communication: Emerging Research and Opportunities*. Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2292-8

Mkrttchian, V., & Aleshina, E. (2017). Sliding Mode in Real Communication. In *Sliding Mode in Intellectual Control and Communication: Emerging Research and Opportunities* (pp. 22–29). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2292-8.ch003

Mkrttchian, V., Amirov, D., & Belyanina, L. (2017). Optimizing an Online Learning Course Using Automatic Curating in Sliding Mode. In N. Ostashewski, J. Howell, & M. Cleveland-Innes (Eds.), *Optimizing K-12 Education through Online and Blended Learning* (pp. 213–224). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-0507-5.ch011

Mkrttchian, V., Aysmontas, B., Uddin, M., Andreev, A., & Vorovchenko, N. (2015). The Academic views from Moscow Universities of the Cyber U-Learning on the Future of Distance Education at Russia and Ukraine. In G. Eby & T. Vokan Yuzer (Eds.), *Identification, Evaluation, and Perceptions of Distance Education Experts* (pp. 32–45). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-8119-4.ch003

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mkrttchian, V., & Belyanina, L. (Eds.). (2018). *Handbook of Research on Students' Research Competence in Modern Educational Contexts*. Hershey, PA: IGI Global. doi:10.4018/978-1-5225-3485-3

Mkrttchian, V., Berezin, An., Berezin, A., Veretikhina, S., Bershadsky, A., & Potapova, I. (2018). Model of Benchmarking for Development of Firm's Competitive Advantage to Improve Economic Growth in Cities. In U. G. Benna (Ed.), *Optimizing Regional Development Through Transformative Urbanization*. Hershey, PA: IGI Global. doi:10.4018/978-1-5225-5448-6.ch008

Mkrttchian, V., Bershadsky, A., Bozhday, A., & Fionova, L. (2015). Model in SM of DEE Based on Service Oriented Interactions at Dynamic Software Product Lines. In G. Eby & T. Vokan Yuzer (Eds.), *Identification, Evaluation, and Perceptions of Distance Education Experts* (pp. 230–247). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-8119-4.ch014

Mkrttchian, V., Bershadsky, A., Bozhday, A., Kataev, M., & Kataev, S. (Eds.). (2016). *Handbook of Research on Estimation and Control Techniques in E-Learning systems*. Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9489-7

Mkrttchian, V., Bershadsky, A., Finogeev, A., Berezin, A., & Potapova, I. (2017). Digital Model of Bench-Marking for Development of Competitive Advantage. In P. Isaias & L. Carvalho (Eds.), *User Innovation and the Entrepreneurship Phenomenon in the Digital Economy* (pp. 288–303). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2826-5.ch014

Mkrttchian, V., Kataev, M., Hwang, W., Bedi, S., & Fedotova, A. (2014). Using Plug-Avatars "hhh" Technology Education as Service-Oriented Virtual Learning Environment in Sliding Mode. In G. Eby & T. Vokan Yuzer (Eds.), *Emerging Priorities and Trends in Distance Education: Communication, Pedagogy, and Technology*. Hershey, PA: IGI Global. doi:10.4018/978-1-4666-5162-3.ch004

Mkrttchian, V., Kataev, M., Hwang, W., Bedi, S., & Fedotova, A. (2016). Using Plug-Avatars "hhh" Technology Education as Service-Oriented Virtual Learning Environment in Sliding Mode. In Leadership and Personnel Management: Concepts, Methodologies, Tools, and Applications (pp. 890-902). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9624-2.ch039

Mkrttchian, V., & Stephanova, G. (2013). Training of Avatar Moderator in Sliding Mode Control. In G. Eby & T. Vokan Yuzer (Eds.), *Project Management Approaches for Online Learning Design* (pp. 175–203). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-2830-4.ch009

Mkrttchian, V., & Stephanova, G. (2013). Training of Avatar Moderator in Sliding Mode Control Environment for Virtual Project Management. In Enterprise Resource Planning: Concepts, Methodologies, Tools, and Applications (pp. 1376-1405). Hershey, PA: IGI Global. DOI: doi:10.4018/978-1-4666-4153-2.ch074

Potapova, I., Vasin, S., Gamidullasrva, L., Tolstykh, T., Belyanin, L., & Mkrttchian, V. (2018). Drivers of Urban Development in Terms of Education Based on Digital Technologies. In U. G. Benna (Ed.), Optimizing Regional Development Through Transformative Urbanization. Hershey, PA: IGI Global. DOI: doi:10.4018/978-1-5225-5448-6.ch003

Roberstson, C. J. (2000). The global dispersion of Chinese values: A three-country study of Confucian dynamism. *Management International Review*, *40*(3).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Rozkwitalska, M. (2010). Barriers of Cross-cultural Interactions According to Research Findings. *Journal of Intercultural Management*, *2*(2), 37–52.

Schuler, R. S., Dowling, P. J., & De Cieri, H. (1993). An intergrative framework of strategic international human resource management. *International Journal of Human Resource Management*, *4*(4), 717–764. doi:10.1080/09585199300000056

Shree, S. (2011). Challenges Before Management with Reference to Cross Cultural Issues and Communication. *The IUP Journal of Soft Skills*, *V*(3), 7–11.

Sonja, A. S., & Philips, M. E. (2004). Contextual influence on Culture Research Shifting: Assumptions for New Workplace Realities. *Applied Psychology*, *49*(1), 192–221.

Tanzania Investment Centre. (2008). *Chinese trade and Investment in Tanzania*. Author.

Tolstykh, T., Vasin, S., Gamidullaeva, L., & Mkrttchian, V. (2017). The Control of Continuing Education Based on the Digital Economy. In P. Isaias & L. Carvalho (Eds.), *User Innovation and the Entrepreneurship Phenomenon in the Digital Economy* (pp. 153–171). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2826-5.ch008

Tolstykh, T., Vertakova, J., & Shkarupeta, E. (2018). Professional Training for Structural Economic Transformations Based on Competence approach in the Digital Age. In Handbook of Research on Students' Research Competence in Modern Educational Contexts (pp. 209-229). Hershey, PA: IGI Global. DOI: doi:10.4018/978-1-5225-3485-3.ch011

Triandis, H. (1988). Collectivism vs individualism: a reconceptualization of a basic concept in cross-cultural psychology. In G. Verma & C. Beyley (Eds.), *Cross-cultural studies of Personality Attitudes and Cognition. Macmillan*. doi:10.1007/978-1-349-08120-2_3

Tsui, J., & Windsor, C. (2001). Some cross-cultural evidence on ethical reasoning. *Journal of Business Ethics*, *31*(2), 143–150. doi:10.1023/A:1010727320265

Vasin, S., & Gamidullaeva, L. (2017). About Russian Regional Users' Innovation Based on Digital Information. In P. Isaias & L. Carvalho (Eds.), *User Innovation and the Entrepreneurship Phenomenon in the Digital Economy* (pp. 304–319). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2826-5.ch015

Vasin, S. M., & Gamidullaeva, L. A. (2015). Methodical Approach and Tools to Improve the Efficiency of Managing of the Innovation Potential in the Context of Economic Globalization. *Review of European Studies*, *3*, 124–139.

Wright, P. M., & Snell, S. A. (1991). Toward an integrative view of strategic human resource management. *Human Resource Management Review*, *1*(3), 203–335. doi:10.1016/1053-4822(91)90015-5

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

KEY TERMS AND DEFINITIONS

Comparison: Special tools for cross-cultural analysis.

Cross-Cultural Analysis: Discussing some aspects of cross-cultural experiences, touching the rapidly changing small business in Australia and Russia, its cultural connection.

Cross-Cultural Communication Barriers: Understanding differences in communication systems, management practices, and decision making.

Digital Transformation: Application of multifunctional and multilevel information technology designed to reliably record various assets in the digital economy to help with technological challenges and created tools.

Green Country (Australia): Traditional international identification name of Australian Federation.

North Country (Russia): Traditional international identification name of Russian Federation.

This research was previously published in Industrial and Urban Growth Policies at the Sub-National, National, and Global Levels; pages 229-249, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 58
The Flexibility of the Workplace and Working Time:
Analysis of Employees' Preferences in Poland

Beata Skowron-Mielnik
Poznan University of Economics and Business, Poland

Grzegorz Wojtkowiak
Poznan University of Economics and Business, Poland

ABSTRACT

Organisations are more and more interested in ensuring flexibility of working time and space for their employees. This approach is enforced both by labour market volatility and company strategic plans, e.g. relocation. However, employers begin to realise that employees' flexibility is limited. While the reasons behind it might be objective (lack of legal regulations, commuting expenses), in some cases it is the employees' personal views that stand in the way. In such situation the company is much more limited in its attempts to offer a greater flexibility to its workforce. The research problem that arises here is as follows: is it possible to define the characteristics and situations in which employees are willing to accept flexible conditions of working time and space? Therefore, the aim of the study is to indicate how to increase work flexibility on the side of employees. The study focuses on four areas, i.e. changing the place of residence due to work, frequent business trips, long commuting and flexible work arrangements.

INTRODUCTION

"For employers, workforce flexibility refers to the ability to use labour in a more adaptable and variable way. For employees, flexibility refers particularly to the degree of choice available in their work arrangements" (Blyton & Jenkins, 2007, p. 74). While work flexibility can bring tangible benefits to the both parties, the diversity of available solutions and interests has put employers in a rather less comfortable situation. They are forced to adjust their working patterns not only to their business needs (e.g.

DOI: 10.4018/978-1-7998-7297-9.ch058

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

flexibility of production processes or customer requirements), but also to the needs of their workforce. In turn, employees analyse the available work arrangements from their own perspective, typically in terms of work-life balance (Bailyn, Drago, & Kochan, 2001). It is considered to be one of the key EVP (Employee Value Proposition) elements in building up employees' commitment to their organisation, so welcomed by employers (Aon, 2015; Aon, 2016; Gallup, 2013).

Companies cannot afford not to take into account employees' preferences, particularly in the so-called employee's labour market, as the Polish market has been known to be called these days. As cyclical labour market research in Poland shows, the employment rate has continued to grow while the working age population has been dropping (NBP, 2016). The unemployment rate has fallen below its historical low in 2008 and currently amounts to 6.3%, reflecting both a high demand for labour and a decreasing labour supply. This drop is partially compensated by increased market participation among the youngest and oldest populations of employees; however, the rising participation cannot offset the demographic decline in the number of working people (ageing society). Employers are aware of this change – 77% of the studied entities believe that the Polish labour market is shifting towards employee's domination (HRM Partners, 2015). Consequently, it is more and more difficult to recruit candidates, whose expectations are rising also in terms of work organisation. This refers particularly to talents and those representing younger generations of employees, who pay more and more attention to working conditions, including working time and place of work (Gibson, Greenwood, & Murphy, 2009; Weyland, 2011). At the same time, studies conducted in Poland reveal that the Generation Y employees value work stability and job security, which makes them less keen on having as high a degree of flexibility as their peers in other European countries and the US (Kmiotek, 2015).

In view of the above, a question arises: is it possible to draw conclusions about preferences of job applicants or employees regarding work flexibility, based on demographic characteristics and competence? With these features in mind, is it possible to select people whose preferences are consistent with the employer's needs or to offer them a solution acceptable to them? Can a workforce be recruited whose flexibility profile complies with that of the company, as enforced by the character of its business operations? The article tries to define the characteristics and situations in which employees agree to flexible conditions in terms of working time and space.

The authors deliberately did not consider legal aspects of flexibility in their analysis due to the variety of legislations of different countries around the world.

BACKGROUND

Organisational flexibility is a concept which has been defined and discussed by management science and in managerial practice for many years, with H.I. Ansoff (1965), H.W. Volberd (1997), Sushil (2001) and R.C. Pathak (2005) as its researchers (in: Osbert-Pociecha, 2011, pp. 136-137). It is a multifaceted term which refers to a variety of issues and solutions, differently approached by entrepreneurs, employees and governmental institutions, often used ideologically to reflect the views and understanding of the value of flexibility (Zeytinoglu, Cooke, & Mann, 2009). The diversity of the concept of flexibility makes it difficult to operationalise actions aimed at its promotion and determine the management methods and tools used in practice to achieve flexibility; its development is, however, one of the basic dimensions of the newly emerging paradigm of organisational management (Volberda, 1998, p. 13), next to securing effectiveness and quality. Due to the duality of its nature, flexibility is an equivocal term – it is associ-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ated both with changes and with stability that comes afterwards, only to be disturbed again and modified even further. As a feature of the organisation, flexibility is to ensure a smooth and the quickest possible transition through changes in between the consecutive periods of stability. The organisation may therefore be recognised as flexible not because of its ability to bring about changes but its ability to incorporate changes, which should occur spontaneously, by itself, without the need for major organisational operations. Approach to change is crucial here (is it provoked or managed), together with the source of resources (external or internal) which are necessary to ensure adequate flexibility, as discussed by H.I. Ansoff, D.J. Eppink or H.W. Volberd and others, in their concepts of flexibility.

Definition dilemmas arise in connection with labour flexibility recognised as flexible resources and as the basis for the flexibility of the organisation as a whole (Karuppan, 2004). As a feature of the organisation it takes into account the variability of external conditions and needs of the organisation and its employees, and describes labour development which is as much innovative, non-standard and deregulated, as it is adaptable and unstable (Thomas, 2009, p.13). The object it refers to is also diversified, as the category of flexibility is applied to work, labour market, employment, human capital and human resources. Out of various classifications of labour flexibility (Beardwell & Holden, 2001; Garsten, 2008; Grudney & Sarvutyte, 2007; Krol, 2014; Martinez-Sanchez, Vela-Jimenez, Perez-Perez, & de-Luis-Carnicer, 2008; Schief, 2010), two seem to be essential, i.e. that of space and type. The former denotes external flexibility which covers developments occurring in the labour market and between the organisation and the labour market, including recruitment of new employees and dismissal of those whose services are no longer required, and internal flexibility focused on changes of working conditions within the organisation. These two dimensions of flexibility are also respectively called macro- and microeconomic flexibility, with the first one interpreted as a way of ensuring the balance in the external labour market, and the second as the organisation's adaptability in labour resources management. The both types of flexibility cannot be separated, as they depend on and influence each other, i.e. a rise in the micro-scale flexibility will result in an increased macro-scale flexibility; similarly, it would be difficult to develop internal flexibility without taking external flexibility into account.

In terms of macro- and microeconomic flexibility, another classification may be proposed which focuses on what is to be made more flexible: number of employees, forms of employment and working time (numerical or quantitative); tasks/responsibilities, competence, working place, occupational and spatial mobility (functional or qualitative); or remuneration and labour costs (financial or payroll flexibility). Some authors (Grudney & Sarvutyte, 2007; Eamets & Masso, 2004) indicate that some of these flexibilities exist only in the macro, while others only in the micro terms. In fact, all of them may be found in the internal and external dimension, and all of them have a different effect on each other. For example, flexitime may be applied as a specific solution in a company, but it is at the same time regulated by the labour law as a macroeconomic phenomenon; on the other hand, the introduction of flexible forms of employment, e.g. contracts of mandate, is reflected in the flexibility of labour costs. Macroeconomic flexibility may be described as institutional, represented in formal regulations (labour regulations on working time, telework, pay). Microeconomic flexibility is organisational in its nature, as exemplified by the respective solutions implemented by organisations (flexible working hours, remote, part-time or temporary work, self-employment). The diversity of solutions proposed by organisations is reflected in numerous studies conducted in the recent years (Brown, Wong, & McNamara, 2009; Eurofound, 2016; Houseman, 2001; WorldatWork, 2015). Specific proposals depend on a number of exogenous (phenomena at the level of the economy) and endogenous (phenomena at the level of the organisation) conditions (Anxo & O'Reilly, 2000; Krol, 2014), which to a bigger or smaller extent force or encourage

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

companies to make changes in their models of work. The conditions result from the organisation's internal and external environment, and are generated by a number of legal, economic, technological and social factors. The last group of factors encompasses employees' individual characteristics and preferences that have an increasing impact on work organisation and which determine benefits for the both parties to the employment relationship (Eurofound, 2015; Zeytinoglu, 2005).

Zeytinoglu, Cooke, and Mann (2009) point to two most recent streams of literature devoted to flexibility. One discusses flexibility as demand-driven, i.e. a strategic initiative of employers to enhance business requirements of the firm. The other analyses flexibility as supply-driven, where employees have the ability to influence decisions about the nature of their work and where they, particularly women, can demand flexible work schedules to ensure a greater work-life balance. "Flexibility is about an employee and an employer making changes to when, where and how a person will work to better meet individual and business needs. Flexibility enables both individual and business needs to be met through making changes to the time (when), location (where) and manner (how) in which an employee works. Flexibility should be mutually beneficial to both the employer and employee and result in superior outcomes" (Aequus Partners, 2010). "A meta-analysis by Baltes, Briggs, Huff, Wright, and Neuman (1999) found that flexible work schedules had positive effects on both job satisfaction and satisfaction with work schedule. In a study of the 'virtual office', Callentine's (1995) participants attributed an increase in job satisfaction to increased flexibility in the location and timing of their work. Teleworkers in Quaid and Lagerberg's 1992 study (cited in Standen, Daniels, & Lamond, 1999) also reported higher levels of job satisfaction. In their 2007 meta-analysis, Gajendran and Harrison found that telework was associated with increased job satisfaction and reduced intentions to turnover, with these relationships partially mediated by lower levels of work-life conflict" (Beauregard & Henry, 2009).

In view of the above, the following research problem may be formed: when deciding about work organisation, to what extent is the organisation limited by its employees' needs? If flexible work arrangements are to motivate employees, they cannot be imposed purely for business reasons. However, if flexibility is necessary in order to ensure competitiveness, meet hard technological conditions or customer requirements, the company has to find employees willing to accept the solutions it offers. Organisations may find it easier if they know which characteristics to look for and objectively verify either in a recruitment process or workforce analysis. Given the development prospects for the Polish labour market (deepening labour shortages), key groups of employees include women, young people entering the labour market, people over 50, and, regardless of age and sex, people with higher education and a high potential for personal growth (NBP, 2016). Increased participation of women and people over 50 may result in an employment growth in organisations, while young people and those with higher education can have a positive effect on the amount and quality of work, thus compensating for quantitative shortages. Each of these groups is associated with a positive attitude towards work flexibility (Kmiotek 2015; Zeytinoglu, 2005; Zeytinoglu, 2009): women due to family responsibilities, older people may no longer have those but they are limited by health issues, young people are on the pursuit of diverse and constantly changing interests and seek professional development, while the well-educated and talented perceive flexibility as a privilege and compensation for their competence. However, as studies from the UK and Greece show, employees' attitude to flexible work arrangements is not always so positive and it depends on sex, place of work and previous opportunity to work in a flexible environment (with seniority and age as important factors) (Giannikis & Miahail, 2011; Sullivan & Smithson, 2007).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Based on the study results presented below, an attempt was made to evaluate the attitude of the Polish labour market to selected forms of working time and space flexibility, with respect to demographic characteristics and competence of the respondents.

FLEXIBILITY OF WORKING TIME AND SPACE IN THE LIGHT OF AN EMPIRICAL STUDY IN POLAND

Methodology

The data was collected by the means of the Paper and Pencil Interviews (PAPI) carried out in the period of July-August 2015 on a sample of 160 people – the structure of the sample is presented in Table 1.

Table 1. Structure of the Sample

Category		Persons in the sample (%)
Sex	Male	34.38%
	Female	65.00%
Age (years)	20-29	45.63%
	30-40	23.75%
	40-55	20.63%
	>55	10.00%
Years of work experience/ seniority	<3	23.75%
	4-9	25.63%
	10-20	17.50%
	>20	29.38%
Education	Primary and vocational	1.88%
	Secondary	23.75%
	Higher: BA degree	33.75%
	Higher: MA degree	40.63%

With such structure the sample is not representative. The main selection criterion was the respondents' availability and consent to providing information. Consequently, the analysis of the responses cannot be used for forming general conclusions about the whole population. Obtained in a sample survey, the responses allow for some observations to be made only as an example which may be subject to a further in-depth research. For this reason, what was carried out was in fact an analysis of the structure of the responses without an in-depth statistical analysis.

The study focused on spatial mobility and flexibility of working time, based on the assumption that the both are strongly interconnected. Spatial mobility affects the time devoted to work, typically by extending it without any temporal or financial compensation offered in return (working overtime).The

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

time available to the employee to organise their life outside work is limited, which affects their level of commitment and satisfaction.

The following were adopted as potentially different for the respondents and thus relevant to the subject of the study: demographic characteristics (sex and age) and competence (education and seniority, i.e. years of work experience). In terms of education it was assumed that higher education offers more opportunities to decide about working conditions; organisational talents are also mainly people with a solid formal education. For this reason, only the respondents with at least secondary education were included in the analysis. Those who described their education as primary (graduates of primary school or lower secondary school, in Polish: *gimnazjum*) and vocational (graduates of vocational school) constituted a small percentage of the sample and were therefore not taken into consideration.

All the respondents were professionally active before and/or at the time of filling out the questionnaire and had work experience allowing them to realistically assess the options offered in questions (verified against their seniority). The questionnaire included projection questions in which the respondents had to refer to hypothetical situations reflecting four aspects of labour flexibility: changing the place of residence due to work, business trips, commuting to work and organisation of working time. The first three are related to spatial and the last one to temporal flexibility. The results of the study are presented in these four categories.

Changing the Place of Residence Due to Work

In its most radical version, spatial flexibility or mobility, involves changing the place of residence due to the change of employer or job relocation. The survey outlines a situation which may occur both when the employer is changed and when the employer remains the same while the place of work changes. The respondents had to answer the following question:

If my employer offers me a relocation package (equivalent of the 6-month salary), will I be willing to move 300 km away from the current place of residence?

The amount of the relocation package was estimated as an offset between an attractive offer and potential removal expenses. The distance between the previous and new place of work was calculated to exclude daily commuting from the current place of residence (given the average transport conditions in Poland), with the option of weekend returns.

In total, the answer of 34% of the respondents was positive. Surprisingly, this percentage was slightly higher among women (36% compared to 33% of men; Figure 1). The difference in responses was negligible; however, the optional mobility was rather expected to be higher among men, as men are traditionally less obliged to perform house work and family duties which require daily presence at home.

The analysis of responses by age revealed that the older the respondents, the less willing they were to relocate; although those aged over 55 were already slightly more open to this idea.

The analysis of the structure of seniority in the group which responded positively showed clearly that people with the shortest professional experience were the most willing to accept the change (Figure 2). In the other seniority groups the situation was almost identical, with most respondents rejecting the offer. Professional experience seems therefore to contribute to a negative opinion about changing the place of residence due to work or results in significantly bigger demands in this respect.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Decision about relocation with respect to demographic characteristics

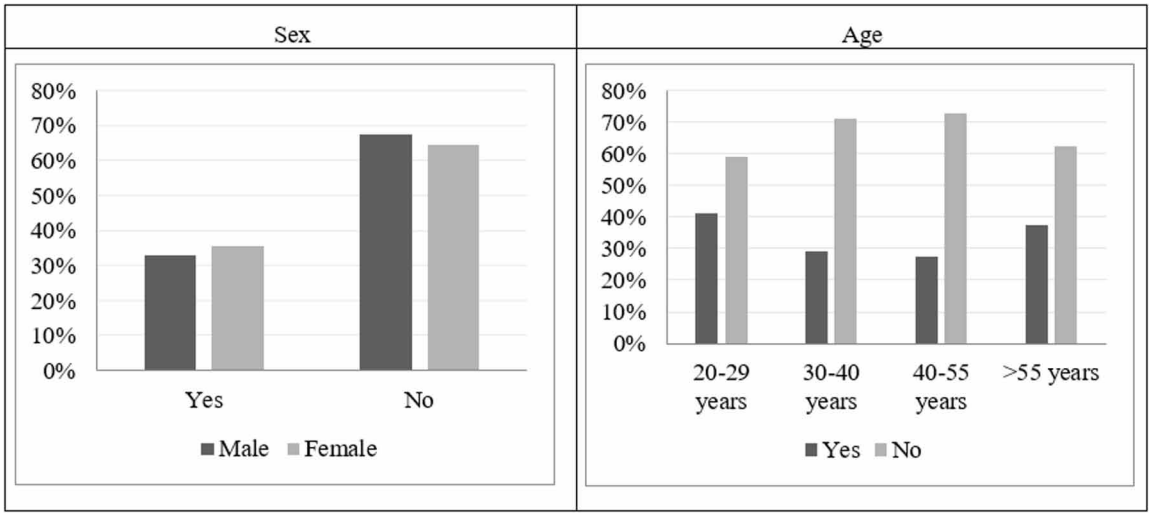
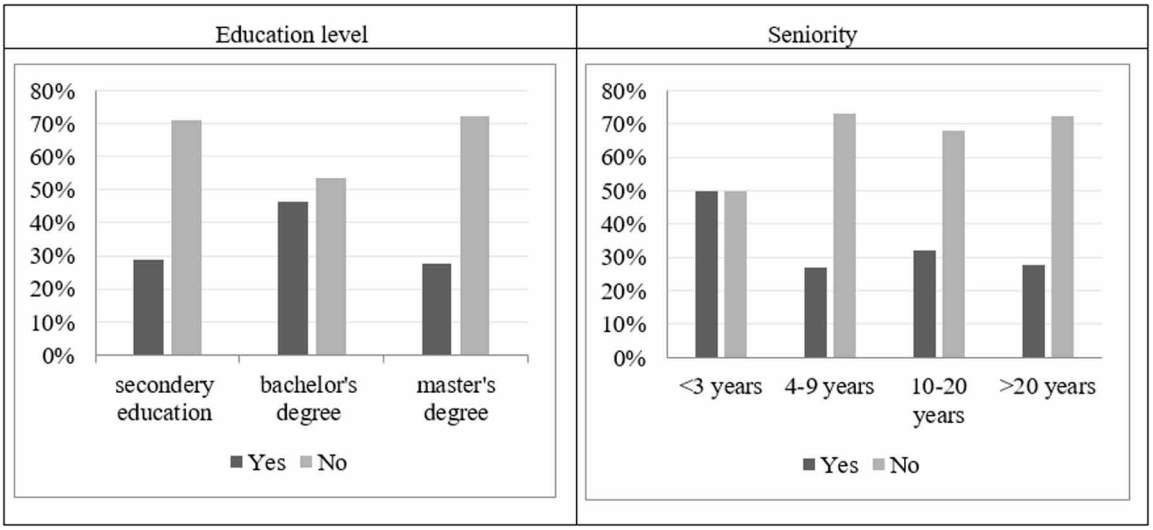


Figure 2. Decision about relocation with respect to competence



The analysis carried out with respect to education reveals significant differences. Those with the BA degree were most keen on consenting to moving (approx. 46%). This is mainly due to transition period in their professional life: people at this stage are typically still in the process of learning (which they later continue as MA studies), have a shorter work experience, are younger, and consequently, their family or life situation is different. Given the current generational changes in the approach to work, this group is most open to change and most mobile in its search for an optimal place of work. In most cases people with the MA degree have already completed their formal education and, sometimes even straight after graduation, they seek stability, want a dream/target job, have a greater sense of the significance of their competence, and are thus more ready to reject the proposal of moving, perceiving it rather as

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

destabilising their life, even if it means professional development for them. Similarly, those with secondary education will also see themselves as people with completed formal education (based on the respondents' declared seniority) and already formed competence and skills, and will rather expect their work to be stable and predictable.

Business Trips

Another question was about business trips which involve staying away from home. While it might be typical for certain jobs, such as salespeople, technicians, construction workers or consultants, it does not have to be a rule limited to specific sectors. For example, a construction company may operate exclusively in the local market and thus require no travelling on business; on the other hand, some jobs, although traditionally perceived as stationary, may require frequent business trips due to the specificity of the company operations. When choosing a profession, a career path and eventually a particular job, every employee considers their own preferences and acknowledges the fact that sometimes they will have to go away from home (e.g. to attend a training). Meanwhile, their job description, market demands or employer's expectations might change, in which case the ability to accept new conditions may be critical to boost their motivation and keep the job.

The following statement was presented to the respondents who had to choose one of the options:

As part of my job, I accept being away from home (as % of nights spent at work between working days per year): none at all, up to 10%, up to 25%, up to 50%, up to 70%.

The analysis of the distribution of the responses confirms what was assumed, i.e. a low mobility of the studied employees. Respectively, 31% and 34% of the respondents were not willing or agreed to spending approx. 10% of nights away from home as part of their job, 23% accepted spending every fourth night away from home, while less than 10% agreed to half of nights and less than 2% approved being away from home almost permanently (70% of nights per year).

The distribution by sex also reflects the general assumption (Figure 3). Among women, 41% would not accept staying away from home at all (compared to 13% of men), while 30% would agree to 10% of nights (compared to 40% of men). Extending the number of multi-day business trips was accepted by far fewer women than men; the longer the trips, the fewer respondents agreed to them.

The structure of the responses by the respondents' age was relatively stable in all the groups: there was generally no consent to the longest business trips, while staying away from home for up to 10% of nights per year was approved. The older the respondents, the less willing they were to accept longer trips, with the longest option marked only in the first two age groups (up to 40 years of age). Compared to other age groups, the first one (20-29 years of age) declared a greater acceptance of shorter trips and a smaller one (10% of the respondents) of travels for over 25% of nights; in this group, however, work takes a different place among life priorities. The responses of those aged over 55 are the most interesting and homogenous; these respondents did not agree to the longest business trips at all and accepted trips for 10% of nights only to a small extent, while their approval for staying away from home for 25% of nights was the biggest.

Similar characteristics are revealed in the analysis of the responses with respect to seniority (Figure 4). The first two seniority groups (in total, up to 9 years of work experience) were most willing to spend up to 10% of nights away from home, with a similar percentage in each group objecting to making such

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

sacrifice for work (approx. ¼ of the respondents). In the third seniority group (10-20 years of work experience), the percentage of those against such solution was the highest (46%). The group of 4-9 years of working experience was the only one in which the longest trip option (up to 70% of nights away from home) was at all accepted. The last group with the longest seniority turned out to be the most polarised; the percentage of the respondents who did not accept any overnight trips and those who agreed to trips of up to 10% and 25% of nights was similar. At the level of 9%, the acceptance of trips taking up to 50% of nights per year was also similar to the other groups.

Figure 3. Approval for business trips with respect to demographic characteristics

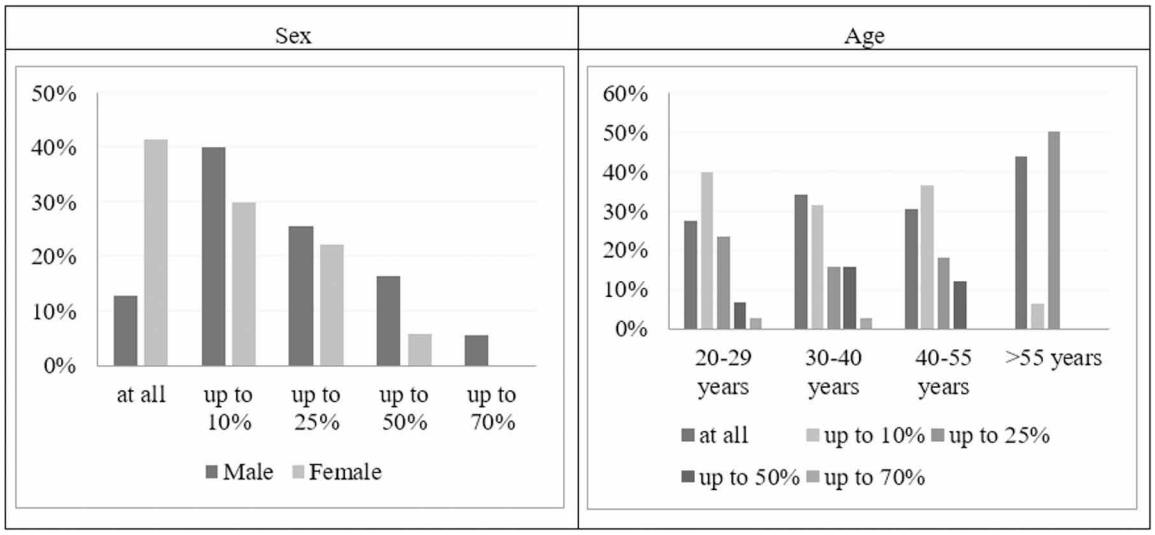
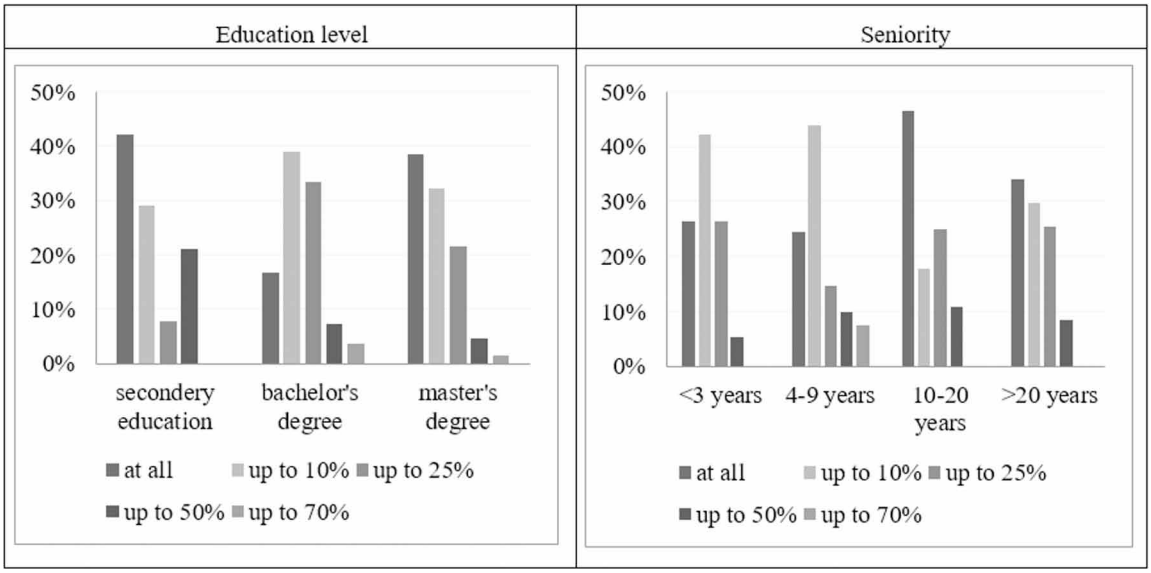


Figure 4. Approval for business trips with respect to competence



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The analysis of the results with respect to education suggests that people with the BA degree were the most open group to the idea of working away from home; in this group the percentage of those who did not accept this option at all was the smallest, while that of those who agreed to trips of up to 10% and 25% of nights was the biggest. The groups with secondary and higher education seem to be the least flexible or the most demanding in this respect, i.e. they were characterised by a high refusal to be away from home at night and a low acceptance of working away from home for more than 10% of nights (except for the respondents with secondary education whose acceptance of working for up to 50% of nights was relatively high, while they were totally against the option of 70% of nights).

Commuting to Work

One of the responsibilities carried out directly at the expense of the employee's private life is regular commuting to work. Travel expenses depend on the means of transport and travel allowance offered (or not) by the employer (e.g. transport organised by the employer free of charge). However, time spent on commuting can truly affect the level of satisfaction with the workplace. Not everyone has the possibility to choose such work in which the commuting time would not exceed 30 minutes (one way), i.e. the time adopted by the authors as a standard value accepted by most employees under the Polish conditions. In many cases a change of the employer's seat may significantly affect the organisation of employees' private life; the distance of a few kilometres can add extra 30 minutes to the regular commuting time.

The organisation of private life connected with leisure time activities, children's education and/or spouse's work may be crucial to the logistics of commuting; unattractive commuting options or changes in this area may affect the employee's decision about their work. It is worth adding that the standard maximum time of 1 hour per day already represents as much as 12.5% of the working time.

In view of that, the respondents were asked the following:

As part of my job, I accept commuting to work which takes up to 30 minutes, up to 60 minutes or up to 90 minutes one way.

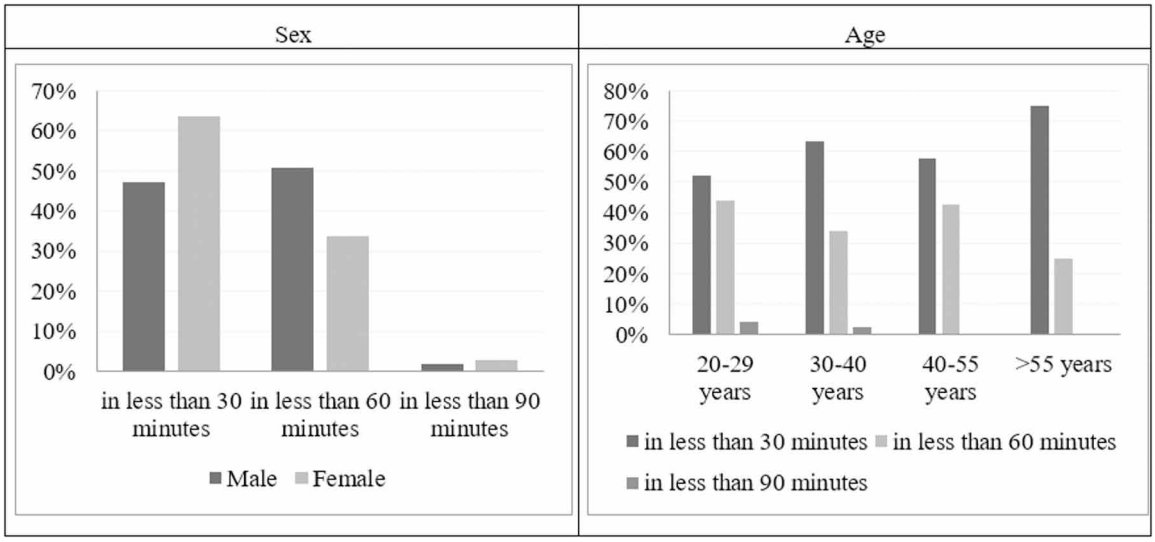
The analysis of the responses reveals that in general 30 minutes turned out to be the upper limit for 58% of the respondents, 60 minutes for 40% of the respondents, while only 3% accepted commuting for up to 90 minutes. Consequently, no further analysis of this question was necessary, whereas any future studies might consider adding the intermediate category of 45 minutes. The analysis of distribution by sex is consistent with the previous assumptions: 63% of women accepted commuting for only up to 30 minutes, compared to 47% of men (Figure 5).

In terms of age, the distribution of preferences is similar in all the groups up to 55 years of age, with small differences for the generally prevalent time of up to 30 minutes. The age groups of 40-55 and over 55 did not mark the longest commuting time of up to 90 minutes, probably for family (the former) and biological (the latter) reasons, such as health and physical condition. The group of the oldest respondents was strongly in favour of the shortest time of commuting (over 70%), with just over 20% of them accepting the commuting time of up to 60 minutes.

The analysis of the responses with respect to the seniority (Figure 6) also shows a fairly similar distribution of preferences in every seniority group: 50-60% chose the shortest time of commuting, 30-40% opted for 1 hour, while approx. 5% of the respondents (except for those with the longest work experience who did not mark this option at all) –1.5 hours. The group with the shortest work experience

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

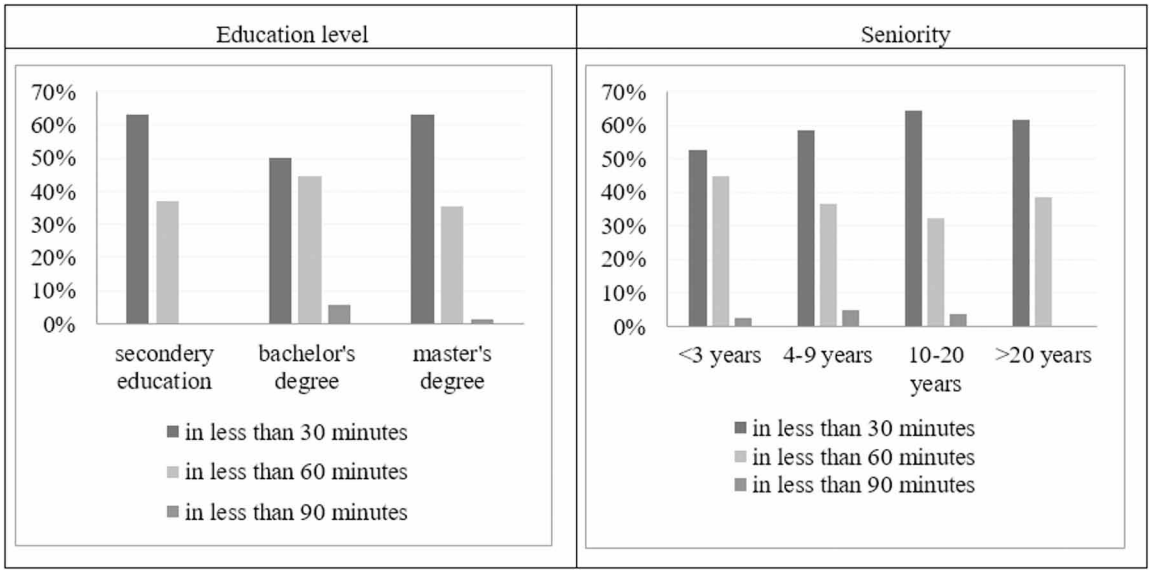
Figure 5. Approval for commuting to work with respect to demographic characteristics



was also the most balanced in terms of its preferences, i.e. commuting for 30 minutes was as good as commuting for 60 minutes.

It is more difficult to explain the discrepancy between the responses with respect to the respondents' education. The results for the groups with secondary and higher education are nearly identical; the only difference being that those with secondary education did not mark the longest time of commuting at all, while this option was accepted by 2% of the people with higher education. The respondents with the BA degree more willingly agreed to longer commuting (60 and 90 minutes), which can be linked to

Figure 6. Approval for commuting to work with respect to competence



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the respondents' age and the, already mentioned, transition period in their professional life (education still in progress).

Organisation of Working Time

Undoubtedly, flexibility of working time has the largest effect on the organisation of private life. The range of solutions available to employers is truly significant. They primarily include different working time arrangements and calculation, but also business phone calls and e-mails outside of the working hours, being at the employer's disposal even during holidays, overtime (not always correctly settled), or business trips interfering with private life (as discussed above). Naturally, flexitime is a solution that can be beneficial for the both parties. It allows the employer to reduce payments for overtime and adjust working hours to the actual requirements, while the employee may enjoy a longer weekend without taking a day off, start late or leave work early, or take brakes at work. Of course, for these solutions to be well-organised and to ensure mutual benefits for both the employee and the employer, clear rules have to be agreed in terms of planning and adjusting working hours, whereby the both parties need to respect each other's interests. This cannot be guaranteed with rules and regulations, and can only be verified in practice. Therefore, when interpreting the responses it is necessary to pay attention to the respondents' individual experience with managers representing their employers.

The study focused on the formal aspects of working time, i.e. those that determine how it is paid for and which in practice have the biggest effect on employees' private time, making it difficult for them to plan their life outside work.

The respondents had to consider the following situation:

Choose one of the two following work arrangements:

1. *Work starts at 8 am and ends at 4 pm, you need to take a day off to deal with any personal matters at this time, overtime paid in full.*
2. *Flexible working hours, overtime compensated only by taking time off on other days, unpredictability of working time (hours and days changing depending on the needs of customers and business partners).*

The distribution analysis of the preference of the fixed (option 1) or flexible (option 2) working time revealed that as many as 60% of the respondents opted for the traditional organisation of working time, with 68% of them being female (Figure 7). In the group of men, only 44% selected the fixed working hours. The traditional perception of male and female roles seems to be reflected in the decisions regarding the preferred working time arrangements.

The analysis of the responses with respect to age produced interesting results: among those up to 55 years of age, preferences for the both working time arrangements were rather balanced, with the acceptance of flexitime growing slowly but steadily. In contrast, a radical change was observed in the group over 55 years of age, in which only 6% marked option 2, compared to 94% of those in favour of option 1.

The analysis with respect to the respondents' seniority reveals a very balanced distribution of the responses, with the preference for the traditional, fixed work arrangements (approx. 60%) and a slightly higher than in the other groups level of acceptance of flexitime among those with the working experience of 4-9 years.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 7. Approval for working time arrangements with respect to demographic characteristics

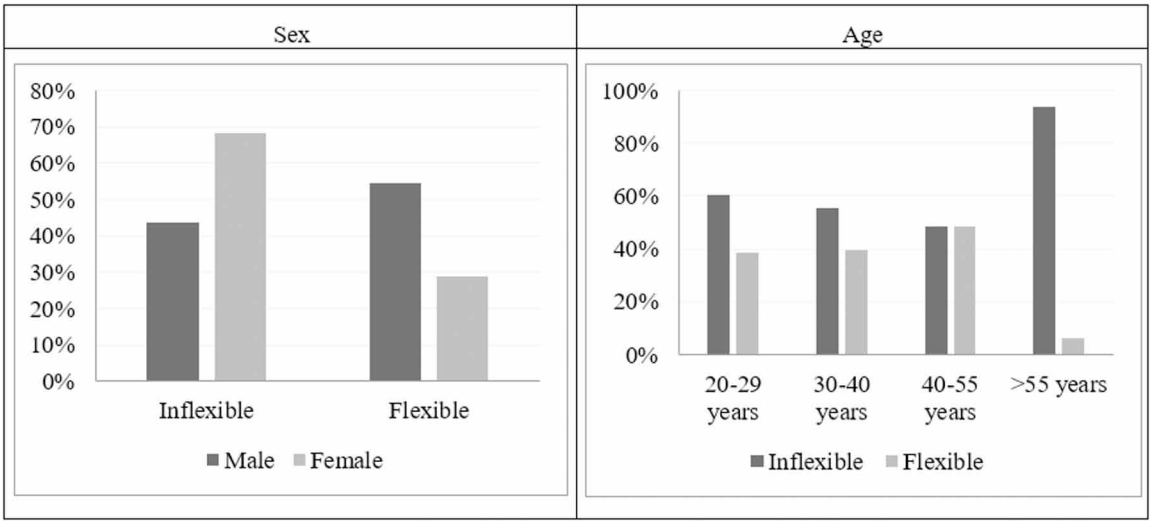
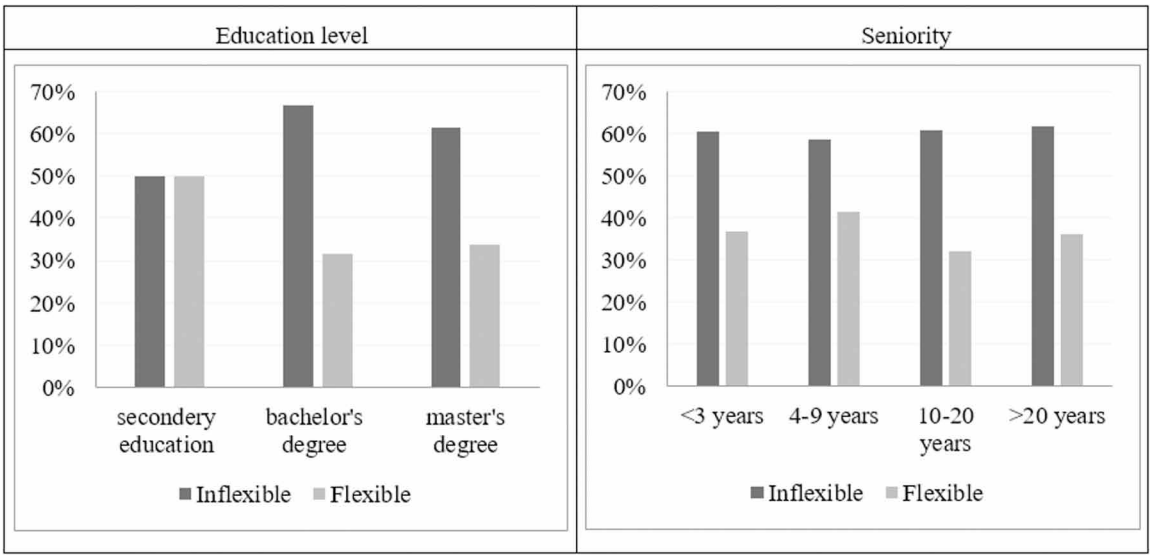


Figure 8. Approval for commuting to work with respect to competence



With regard to education, respondents with higher education (both with the BA and MA degrees) had similar preferences, with 60% of them in favour of fixed working time. Those with secondary education accepted the both options to the same extent. This may be the result of their previous experience with different work arrangements and acceptance of different solutions due to the situation in the labour market. People with the BA degree may require a greater stability, as they need to continue their education, while those with the MA may be more interested in being able to combine their professional and private life in a more predictable way.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

SOLUTIONS AND RECOMMENDATIONS

The results presented in the article come from a pilot study. Naturally, it is impossible to develop a universal profile of a flexible employee using only this data. However, based on the analysis of the respondents' social characteristics, a general hypothesis may be formed that contemporary Polish employees are rather reluctant to relocate because of their job. Similarly, they will not be very keen on too long business trips and commuting to work, which may generally point to the importance of work-life balance in their assessment of work arrangements.

In terms of sex, a similar proportion of women and men accept or do not accept (majority) changing the place of residence due to work. The same applies to business trips; the longer the stay away from home, the fewer respondents, particularly women, agreed to it. Not much changes in commuting to work, either. Most women accept the travel time of up to 30 minutes, men are equally fine with commuting for up to 60 minutes, while none of the sexes approved of longer commuting. In terms of work arrangements, women definitely opted for fixed working hours, in contrast to men. In the light of these analyses, a flexible employee would therefore be male.

In terms of age, young employees and those who are about to finish their professional career were more flexible about moving. The approval for business trips was also the biggest in the youngest group. On the other hand, the oldest respondents were more willing to agree to multi-day business trips rather than longer commuting time. This group, however, did not accept flexible working time at all. The results may be linked to the family and life situation of the respondents. People under 30 and over 55 years of age tend to have fewer non-negotiable family responsibilities, as they typically do not yet have a family of their own or their children are adult and do not require constant care anymore. Moreover, a greater mobility among younger employees may be explained by their search for an optimal model of work and professional development, and under Polish conditions, also fear of unemployment. In Poland, unemployment affects primarily young people. In Q1 of 2016, the unemployment rate among people aged 15-24 was 19.6%, compared to 16.1% in Q3 of 2008 (the lowest) and 46.5% in Q1 of 2003 (the highest). At the end of the quarter in which the study was carried out, i.e. Q3 of 2015, people aged 25-34 constituted the largest group among the unemployed (449,200), accounting for 28.1% of the total number of the unemployed. People aged 24 and younger accounted for 14.6% of the total unemployment rate. The percentage of the registered unemployed aged 35-44 was 21.6%, 45-54 – 18.1%, and over 55 – 17.6% (Central Statistical Office of Poland, 2016). It is therefore difficult to clearly identify the preferences based on age; every age group is flexible in certain categories, while it is not in others.

The analysis of the results with respect to education points to people with the BA degree as the most likely to take up work which involves moving, business trips and commuting. However, this group is the least willing to work flexitime, which makes it similar to the preferences of people with the MA degree. The latter group seems to be the least keen on flexible work arrangements, possibly because of their competence, which allows them to demand stable working conditions, and life outside work which is becoming more stable too. In the light of these analyses, the most flexible employee would therefore have the BA degree and, under Polish conditions, would typically be a young person, preferably still a student.

Seniority, understood as years of work experience, was the last category considered in the study. Approval for changing the place of residence was the biggest among those with the shortest work experience, while business trips were not accepted primarily by the employees with 10-20 years of experience, which could be the effect of their family situation. Seniority turned out to be practically irrelevant in case of commuting and working time arrangements – in the respective groups the responses were almost the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

same, with the approval for the shortest commuting time and fixed working hours. A flexible employee would therefore rather have a short work experience.

Based on these conclusions, it may be noticed that the career stage, focus on professional development and family situation have a significant effect on preferences regarding the organisation of work. This means that relatively competent people who develop their career and have families are not very willing to work under spatially and temporally unstable conditions. They see flexibility as something rather negative because it disrupts the predictability of their professional activity and private life, and may additionally have a negative impact on how their career path is perceived in the future (flexible solutions as offered to "worse" employees).

FUTURE RESEARCH DIRECTIONS

The analysis leads to the conclusion that according to Polish employees there is a category of "good" and "bad" work flexibility. Unfortunately, no clear criteria exist for what is considered to be a good or bad proposal in this respect. However, this should be an important recommendation for employers to implement such flexibility solutions which do not interfere too much with employees' private life, e.g. teleworking, home office or remote communication between branches. As many as 60% of the respondents preferred fixed solutions in terms of time directly spent at work, with a significant diversification of the responses with respect to age, sex and education, which – if interpreted as a solid and fixed conclusion – would require the implementation of extremely individualised work arrangements. While definitely welcomed by employees, such approach would not be possible in many organisations due to objective limitations (technological regime, contractors' requirements, and need for supervision). However, the diversity of preferences shows that sticking rigidly to one uniform type of work arrangement, regardless if flexible or fixed, is also not beneficial for the organisation, primarily due to the poor effect it may have on the employer's image and reputation.

A number of conclusions is difficult to interpret – particularly those regarding the analysis of the impact of seniority or education on flexibility. The interpretation of the results should be complemented with a wider social research including generational differences, with the primary focus on the position of work on young people's priority list and on the question whether the value of work changes with age or is characteristic of the given generation. Next to its scientific significance, this information may be crucial for employers in the future organisational planning and human resources management. The future studies should also address the topic of job security depending on the employee's position in the labour market, also to explore how it affects the employee's agreement to working conditions and flexibility, both formal and informal. Another interesting aspect is the question of work flexibility limits, i.e. to what extent and how the organisation can make work more flexible without it having a negative social impact (e.g. refusal to work under such conditions).

The difficulty with the interpretation of the conclusions also points to the need for collecting more extensive information on the social aspects of the respondents' life (e.g. their professional function, current form of employment, financial status or family situation).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

In the chapter, a microeconomic point of view was adopted, with the study focused mainly on employees' spatial mobility and flexibility of working time perceived as a social factor affecting the organisation of work. The observations presented in the chapter may be applied in companies – in operational management of human resources in terms of selecting and retaining employees, and in strategic management of human resources in terms of demographic changes and competence shift in the workforce. They point to the need to analyse the preferences of employees and job applicants in order to have the work organisation adjusted also to them. Even though it deals with the topic already explored for some time, the study shows that further in-depth research is needed in this respect, addressing also new aspects of work flexibility.

REFERENCES

Aequus Partners. (2010). *Workplace flexibility: Advice, training, research*. Retrieved on October 6, from http://www.workplaceflexibility.com.au/index.htm

Anxo, D., & O'Reilly, J. (2000). Working time regimes and transitions in comparative perspective. In J. O'Reilly, I. Cebrién, & M. Lallement (Eds.), *Working time changes: Social integration through transitional labour markets*. Cheltenham, UK: Edward Elgar Publishing. doi:10.4337/9781781952788.00013

Aon Hewitt. (2015). *Trends in Global Employee Engagement*. Retrieved from http://www.aon.com/attachments/human-capital-consulting/2015-Trends-in-Global-Employee-Engagement-Report.pdf

Aon Hewitt. (2016). *Trends in Global Employee Engagement*. Retrieved from http://www.aon.com/poland/attachments/hr/meh/2016-Trends-in-Global-Employee-Engagement.pdf

Bailyn, L., Drago, R., & Kochan, T. (2001). *Integrating Work and Family Life: A Holistic Approach.* Report for Alfread P. Sloan Foundation Work-Family Policy Network.

Beardwell, I., & Holden, L. (2001). *Human Resource Management*. Edinburgh, UK: Pearson Education.

Beauregard, T. A., & Henry, L. C. (2009). Making the link between work-life balance practices and organizational performance. *Human Resource Management Review*, *19*(1), 9–22. doi:10.1016/j.hrmr.2008.09.001

Blyton, P., & Jenkins, J. (2007). *Key Concepts in Work*. Los Angeles, CA: SAGE Publications Ltd. doi:10.4135/9781446215814

Brown, M., Wong, M., & McNamara, T. (2009). *Flexible work options in state agencies. State Issue Brief No. 01*. Chestnut Hill, MA: The Sloan Center on Aging and Work at Boston College. Retrieved from http://www.bc.edu/content/dam/files/research_sites/agingandwork/pdf/publications/SIB01_ Flex.pdf

Eamets, R., & Masso, J. (2004*). Labour Market Flexibility and Employment Protection Regulation in the Baltic States.* IZA Discussion Paper Series, 1147.

Eurofound. (2015). *First findings: Sixth European Working Conditions Survey*. Retrieved from https://www.eurofound.europa.eu/publications/resume/2015/working-conditions/first-findings-sixth-european-working-conditions-survey-resume

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Eurofound. (2016). *Working time developments in the 21st century: Work duration and its regulation in the EU*. Publications Office of the European Union.

Gallup. (2013). *State of global workplace. Employee engagement insights for business leaders worldwide*. Retrieved from http://www.gallup.com/services/178517/state-global-workplace.aspx

Garsten, C. (2008). *Workplace Vagabonds. Carter and Community in Changing Worlds of Work*. Palgrave Macmillan. doi:10.1057/9780230227460

Giannikis, S. K., & Miahail, D. M. (2011). Flexible work arrangements in Greece: A study of employment perceptions. *International Journal of Human Resource Management*, *22*(2), 417–432. doi:10.1080/09585192.2011.540163

Gibson, J. W., Greenwood, R. A., & Murphy, E. F. Jr. (2009). Generational differences in the workplace: Personal values, behaviors, and popular beliefs. *Journal of Diversity Management*, *4*(3), 1–7. doi:10.19030/jdm.v4i3.4959

Grudney, D., & Sarvutyte, M. (2007). Conceptualizing the Determinants of Labour Market Flexibility: the UE Perspective. In D. Kopycińska (Ed.), *Flexibility of Labour Market. Monograph No 7" in the series Economics and Competition Policy*. Szczecin: Wydawnictwo Uniwersytetu Szczecinskiego.

GUS. (2016). Bezrobocie rejestrowane. I kwartał 2016 r. Warsaw: GUS.

Houseman, S. N. (2001). Why Employers Use Flexible Staffing Arrangements: Evidence from an Establishment Survey. *Industrial & Labor Relations Review*, *55*(1), 149–170. doi:10.1177/001979390105500109

HRM Partners. (2015). *Prognoza HR 2016: Koniec rynku pracodawcy?* Retrieved from http://www.hrmpartners.pl/docs/raporty/raport-z-badania-prognoza-hr-2016-hrm-partners.pdf

Karuppan, C. M. (2004). Strategies to foster labor flexibility. *International Journal of Productivity and Performance Management*, *53*(6), 532–547. doi:10.1108/17410400410556192

Kmiotek, K. (2015). The Generation Y approach to flexibility of employment. *The Journal of American Academy of Business*, *20*(2), 72–80.

Krol, M. (2014). *Elastyczność zatrudnienia w organizacji*. Warsaw: CeDeWu.

Martinez-Sanchez, A., Vela-Jimenez, M.J., Perez-Perez, M., & de-Luis-Carnicer, P. (2008). Workplace flexibility and innovation. The moderator effect of intra-organizational cooperation. *Personal Review, 37*(6).

NBP. (2016). *Kwartalny raport o rynku pracy w I kw. 2016 r.* Retrieved from http://www.nbp.pl/publikacje/rynek_pracy/rynek_pracy_2016_1kw.pdf

Osbert-Pociecha, G. (2011). *Zdolnosc do zmian jako sila sprawcza elastycznosci organizacji*. Wroclaw: Wydawnictwo Uniwersytetu Ekonomicznego we Wroclawiu.

Schief, S. (2010). Does location master? An empirical investigation of flexibility patterns in foreign and domestic companies in five European countries. *International Journal of Human Resource Management*, *21*(1-3).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sullivan, C., & Smithson, J. (2007). Perspectives of homeworkers and their partners on working flexibility and gender equity. *Journal of Human Resources Management*, *3*(3), 448–461. doi:10.1080/09585190601167797

Thomas, M. P. (2009). *Regulating Felxibility. The Political Economy of Employment Standards*. Montreal: McGill-Queen's University Press.

Volberda, H. W. (1998). *Building the Flexibility Firm. How to Remain Competitive*. New York: Oxford University Press.

Weyland, A. (2011). Engagement and talent management of Gen Y. *Industrial and Commercial Training*, *43*(7), 439–445. doi:10.1108/00197851111171863

WorldatWork. (2015). *Trends in Workplace Flexibility. A report by WorldatWork, underwritten by FlexJobs*. Retrieved from https://www.worldatwork.org/waw/adimLink?id=79123

Zeytinoglu, I. U. (Ed.). (2005). Flexibility in Workplaces: Effects on Workers, Work Environment and the Unions. Geneva: IIRA/ILO.

Zeytinoglu, I. U., Cooke, G. B., & Mann, S. L. (2009). Flexibility: Whose Choice Is It Anyway? *Relations Industrielles*. *Industrial Relations*, *64*(3), 555–574. doi:10.7202/038873ar

KEY TERMS AND DEFINITIONS

Commuting: To regularly travel from home to work and back, with all its implications (travel time, financial and organisational implications).

Flexible Working Time: Ability of both the employer and employee to modify working hours (e.g. flexitime, part-time, job sharing, compressed workweek).

Formal Flexibility: A policy officially approved by human resources or any other official policy which implements and regulates flexible work arrangements.

Informal Flexibility: A policy or practice that is not official or specified in writing but which in fact allows flexibility at work.

Mobile Working: To perform work remotely, in different locations, e.g. in the office, at home, at the customer's seat, also during commuting and business trips.

Organisation of Working Time: To regulate the length and schedule of the employee's working time (number of hours and work schedule).

Relocation: A permanent change of the location of the place of work.

Work-Life Balance: Ability to combine the professional and private life in a smooth, conflict-free way.

Workplace Flexibility: To modify and adjust the working conditions to the needs of the employer and employee.

This research was previously published in Exploring the Influence of Personal Values and Cultures in the Workplace; pages 287-304, copyright year 2017 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 59
Strategic Leadership, Readiness for Change, and Innovative Work Behavior: A Field Study From Turkey

Meltem Akca
https://orcid.org/0000-0001-5544-5929
Istanbul University, Turkey

ABSTRACT

At the present time, business work environments are becoming more volatile and competitive. The development of information technologies, rapid changes of organizational structures, changeable customer attitudes are more important for today's organizations. These features of the marketplace direct organizations to be in search of new methods to achieve and maintain sustainable performance. Leadership, employee favorable work behavior, technological investments are some methods to provide continuity of an organization's existence. This chapter aims to obtain influence of strategic leadership on the employees' innovative work behavior. Furthermore, it is expected to obtain the mediator role of readiness for change in this relation. In the study, the sample is composed of four-star hotel employees in Antalya, Turkey. This evidence-based field study proves new implementation's impact on the employees.

INTRODUCTION

At the present time, the business work environment is becoming more volatile and competitive. The development of information technologies, rapid changes in organizational structures, changeable customer attitudes are more important for today's organizations. These features of the marketplace direct organizations to be in search of new methods to achieve and maintain sustainable performance. Leadership, employee's favorable work behaviours, technological investments are some of the interesting methods to provide continuity of the organization's existence.

DOI: 10.4018/978-1-7998-7297-9.ch059

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sustainability of an organization is related with leaders, employees and the market structure of the organizations. If leaders manage the organization with the orientation of the environmental requirements, the impact of the structural volatilities will be limited. In addition to that, employees' behaviours will be determinative on the sustainability of the organization. Particularly, employee's attitudes have a significant value when a change is planned or realized in the organization. If the logic of the environmental changes is perceived as favorable by the employees, it means that they are ready for a change. Besides, employees who expect a change is necessary for the organization generally demonstrate innovative work behaviours in the basic of related changes.

In this study, it is aimed to obtain the influence of strategic leadership on the employees' innovative work behaviours. Furthermore, it is expected to obtain the mediator role of readiness for change in this relation. In the study, sample is composed of 4-star hotel employees who live in Antalya, Turkey. This hotel is competing with other hotels in the region. In this hotel, most of the daily activities were performed manually. They have not used technological systems and information technologies in operations until their supervisor noticed that technology is everything for a volatile sector's organization. They bought technological practices, devices, and systems for the hotel's services. With this investment they aimed to i) compete with competitors, ii) open up to the world, iii) increase employee's performance, iv) minimize the failures. Managers decided to implement information technology applications on the hotel services. Most of the daily operations started to conduct through the use of new technologies. Hotelier and the leader of the employees know that the return of the investment will be profitable for them. In this study it is expected to prove mediator role of readiness for change on the relation between strategic leadership and innovative work behaviours.

BACKGROUND

Strategic Leadership

Leadership is both a process of inspiring others to accomplish planned aims and a function of sharing values (Tarigan & Kraus, 2017; Yukl & Lepsinger, 2006). Leaders are responsible for the formulation and implementation of organisational practices in the perspective of strategic requirements (Hosmer,1982). Bass (1981) defined leadership by emphasising on some points like; characteristic traits, focus on groups and teams, inducing power, an instrument to achieve aims and inspire. Basadur (2004) described the effective leader's characteristics as; helping subordinates for problem-solving, supporting them for creativity, mentoring employees for innovativeness, integrating individual and organisational aims, providing sustainability of innovative approaches, managing differences with the beneficial perspective, coordinating of all members in the organisation with harmony.

Strategic Leadership Theory goes back to "Upper Echelons Theory", which was developed by Hambrick and Mason (1984), which states output related dominance, social construct and symbolism refer to top management structure (Vera & Crossan, 2004). Leadership models and its outcomes relations were being investigated in the 1970s while upper echelons theory attracted the attention of scholars with defining the top management team's roles in mid-1980s (Boal & Hooijberg, 2000). Hambrick and Mason (1984) focused on the top management team's experience, characteristic traits, and values to understand how they perceive the environmental issues to compete with others. With this approach, the authors aimed to draw up the relationship between these specifications and the leader's profile.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Strategic leadership is considered as a leadership model at the top of the organisation who takes the whole responsibility of organisational operations. Strategic leadership is also evaluated as the top manager's perfections and skills for generating a vision to be a sustainable organisation in the uncertain business environment (Guillot, 2003). CEOs, general managers, chief executives, presidents top management teams and board members are accepted as the strategic leaders of organisations (Özer & Tınaztepe, 2017; Finkelstein & Hambrick,1996; Shrivastava & Nachman,1989).

Jooste and Fourie (2009) underlined the importance of strategic leadership in the implementation and control of strategic practices. Strategic decision producing, formulating organisational goals and strategies, adjustment of informational and compensational systems, selecting the best managers and coaches, making the resource and output balance, giving significance to customer requests and employee necessaries are the specifications of what makes a leader as a strategic leader (House & Aditya,1997). In this connection, Hosmer (1982) argues that strategic leaders have two main aims: i) making creative strategies and ii) integrating these strategies with implementations. In addition to these aims, strategic leadership generates strategic decisions making processes. Processes to make strategic decisions also bring up a mechanism for employees to develop organisational strategies (Shrivastava & Nachman,1989). Besides, strategic leadership includes forming of creative and sustainable strategic vision and sharing it with others (Lear, 2012).

According to Hambrick and Pettigrew (2001) leadership is considered at any level of an organisation or a structure while strategic leadership subsists in the top level of the organisation. Besides, Leadership Theory generally investigates the relations between leader and employees, whereas Strategic Leadership Theory also includes strategic and symbolic activities (Vera & Crossan, 2004). Kotter (1990) also emphasised that strategic leadership intends to generate change while management aims to maintain order and estimative results. Furthermore, managerial leaders plan and control the daily actions and regular operations in organisations with the power of past perspective while visionary leaders generally focus on future-oriented activities. In this context, strategic leaders try to make a synergy between visionary and managerial leaders (Tarigan & Kraus, 2017). Strategic leaders know what happened in the past, what is going on now and what will be in the future better than other leaders. This advantage of strategic leaders comes from the investigation of the environment detailed. It is well known that in today's business life, the environment of an organisation is one of the most important factors for its sustainability. Besides, the most valuable distinction between "management and strategic management" is regarded as environment and competitors. For this reason, strategic leaders tend to achieve sustainable success in the perspective of the short and the long term. Finally, it should be noted that the difference of supervisory leadership and strategic leadership here as the first one is a leadership model "in" organisations while the second one is a leadership role "of" an organisation (Tarigan and Kraus, 2017).

Strategic leaders are fit in leading others with positional power and inspirational energy. Hitt and Duane (2002) state that strategic leaders support, promote and motivate employees to benefit from their intellectual capital. There are many kinds of people in the organisations with a different language, religion, race, gender, ideology, opinion, education, and experience. Strategic leaders inspire all of the organisational members to achieve individual and organisational aims together whereas they have distinctness. According to Rowe (2001), strategic leaders inspire employees to do daily works innovatively to achieve and maintain better performance outcomes. In addition to daily activities, strategic leaders desire and plan long-term strategic activities to have a strategic advantage in the industry (Tarigan & Kraus, 2017). With this approach, strategic leaders obtain sustainable competitive advantage (Hosmer, 1982).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ireland and Hitt (1999) expressed the strategic leader's personality traits as; flexible, creative, innovative, strategic and coherent with others. Therefore, strategic leaders generate a successful vision which includes innovation processes (Hansen & Kahnweiler,1997). According to Davies and Davies (2004) the organisational talents and policies of strategic leaders are listed as; strategy-oriented, enhancement of core competencies, integration of individual and organisational expectations, implementation of planned actions. Furthermore, Hinterhuber and Friedrich (2002) revealed the four characteristics of strategic leaders as; promoting and motivating of employees, usage of technology for adaptation of internal and external requirements, have a strong vision about future, formulating values for members and shareholders. Hunt (1999) described strategic leadership skills as; creating and sharing a vision, enhancing capabilities and competencies, coaching next generation leaders, formulation of ethical and innovative organisational culture (Quadri, 2018). In addition to these, Papadakis, Lioukas and Chambers, (1998) also indicated that strategic leaders can analyse the environment perfectly and make innovative decisions about the organisation's sustainability. Strategic leaders have good networks outside the organisation to sniff the market. They make healthy cooperation and partnerships to have a sustainable power in the industry. Otherwise, strategic leaders prepare the organisation to change processes which are mandatory for the adaptation of environmental and technological deprivations in the turbulent sectors (Quong & Walker; 2010).

Bloom (1956) also defined strategic leadership competencies under three dimensions as; cognitive, psychomotor and effective. Cognitive competencies are related to thinking (creation, obtaining, formulation and shaping of information for making strategies) while affective competencies (management of employee's emotions) are connected with feelings. Besides, psychomotor competencies are important for doing strategies and implementation of practices (Schutte & Barkhuizen, 2016; Kotze & Nel, 2015; Geldenhuys & Veldsman, 2011). Concordantly, communication, participation, political awareness, internalising, organizing and influencing are sub-specifications of affective competencies of strategic leaders. Remembering, understanding, applying, analysing, evaluating and creating are also considered as cognitive strategic leadership competencies. Finally, perception, readiness to act, guided response, mechanism, adaptation, and origination are involved in psychomotor competencies of strategic leaders (Schutte & Barkhuizen, 2016).

Terminally, it is embraced strategic leadership abilities under 8 headings in the perspective of 21st century's volatile business environment. 1)*Development and sharing a vision*. Determination of a vision has a major role to achieve success. With this step, leaders induce employees easily about the implementation of planned strategies and practices. 2)*Building new and dynamic core competences to have a better place in the market*. In addition to existing core competencies, creating new competencies for making organisational significant tasks brings a strategic advantage to maintain the organisational continuity. 3)*Developing and effective use of human capital is also important for maintaining organisational sustainability*. Strategic leaders work with successful employees. They attract and retain talented and skilful employees in the organisation. Moreover, they enhance the available employee's capabilities and perfections in the organisation. Strategic leaders believe that employees are the most valuable resources for creating new innovations in this era. 4) *Strategic leaders invest in new technologies to compete with others*. Usage of technology works up with better job outcomes. In most industries usage of technology in daily works not only speed up operations but also increase the quality of the services with the satisfaction of employees and customers. 5)*Engagement with required and valuable strategies which can transform opportunities to profit in organisations*. Strategic leaders have to perform the best strategies for organisations progress. 6) *Generating a successful organisational culture to have an effective learn-*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ing, sharing and creating practices. Employees realize the new opportunities and transform them for beneficial activities and innovations when they have effective organisational culture. 7)*Control operations are important to reveal the differences between what was planned and done.* Strategic leaders develop flexible control norms to enhance employees innovative work behaviors. Besides, the establishment of a suitable model for control operations assists to continue organisational performance and competitive advantage. 8*) Ethic is also a very important concept for strategic leaders*. Establishment of ethical values plays a significant role in organisational prosperity. Trust, honesty, equity, transparency, and integrity in decision-making processes impact employees' perceptions about ethical values. Strategic leaders create an effective organisational culture that capable whole moral and ethical values are evaluated easily in it (Hitt, Haynes & Serpa, 2010; Hitt & Duane, 2002; Ireland & Hitt, 1999).

Readiness for Change

Organisations are generally confronted with the requirements of new implementations over their strategies and processes to compete with others (Armenakis et al., 1993). In addition to competition issues, organisations need to keep step with the environmental, technological changes to maintain sustainable operational and financial performance.

"Readiness for change" means that employees behaviourally, intentionally and psychologically are prepared and ready for change which is perceived as necessary implementation or an investment that have good results for them (Weiner, Amick & Lee, 2008). Conceptual definitions of readiness for change investigated in the literature detailed. Here it is aimed to summarize some significant points of related descriptions. Readiness is described as staff reaction for change, wanting to change, willingness to change and voluntary actions about change. Besides, beliefs, attitudes, intentions of organisational members that show change is required for organisational sustainability is considered as readiness for change. Employees perception for "*we need a change; we will do what is necessary for change"* is come up as readiness for change. Readiness for change is expressed as organisational member's acceptance level that shows beliefs about this change is a good and positive thing for employees and the organisation (Kirrane et al., 2016; Bouckenooghe, 2010). When employees understand that change is essential to continue the organisation's existence, readiness is consisting of with the positive perceptions of employees (Weiner, Amick & Lee, 2008, By, 2007; Rafferty & Simon, 2006; Madsen, Miller & John, 2005; Barrett et al., 2005; Hailey & Balogun, 2002; Chonko et al., 2002; Dahlan et al., 2002; Eby, Adams, Russell & Gaby, 2000; Joshi & Lauer, 1999; Simon, 1996; Armenikas, Harris & Mossholder,1993)

According to Bouckenooghe and colleagues (2009) readiness is divided into three dimensions as emotional, cognitive and intentional. Emotional readiness defines people's feelings about how change is introduced. Employee's feelings about the change plans in the organisation also take place in emotional readiness. On the other hand, cognitive readiness focuses on beliefs and attitudes towards to the change outcomes. Intentional readiness is also referring to employees' willingness about change process and change implementation (Kirrane et al., 2016). In addition to that, intentional readiness is regarded as employee's efforts and energy towards change to benefit from its impacts on their job outcomes (Zayim & Kondakci, 2015; Nikolaue et al., 2007; Oreg, 2006).

As discussed in the upper paragraphs "readiness" is described as employee's beliefs, intentions and attitudes of related changes are required for obtaining organisational success. Therefore, readiness is an important cognitive pioneer either resistance or support for change (Armenakis et al., 1993). Kotter and Schlesinger (1979) recommended some strategies like participation, support, communication, education,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

training to cope with resistance about the organisational change. Besides, effective management models have an impact on employee cooperation, coordination, perception, and readiness for implementing new practices in the organisations (Fox et al., 1988). To provide readiness of employees' it should be emphasised the importance of a change is required for organisational sustainability and well-being of employees in the message of change reasons. In this perspective, readiness message should focus on; i) the requirement for change, ii) perception about change will have positive impacts over organisational(profit) and individual (performance, abilities) work-related outcomes (Armenakis et al., 1993). If readiness is high on the employees' side, response toward change results will be seen as quickly as possible.

Bouckenooghe and colleagues (2009) summarized antecedents towards readiness for change as climate-based factors and process-based factors. Climate-based factors are related to internal elements of an organisation like how change is formulated while process based factors are correlated with how change is managed or implemented. With this approach, it is expressed that leadership can be evaluated under the climate based factors which are expected to be influential on readiness for change (Kirrane et al., 2016; Bouckenooghe, 2011).

It usually aims to increase organisational effectiveness and profitability with the "change" steps in the organisations. The intention of the organisation and employees for a change is also important for change in success (Weiner, Amick & Lee, 2008). Therefore, it is stated to prepare employees for a change process play an essential role in maintaining persistent positive advantages from change practices (McNabb & Sepic, 1995). In this context, the motivation of employees also has a significant value over individual readiness for change. If employees are not motivated about change; barriers, obstacles, and resistance may be seen as a response to the change process in the organisations (Benzer et al., 2017). Bandura (1986) explained that employees may show resistance towards to change if they believe that their abilities do not fit with the planned tasks because of the change. Besides, if staffs are not ready for change they may tend to counterproductive work behaviours across to expected proactive behaviours as a result of change outputs (Armenakis et al., 1993). That is why leaders need to encourage and influence employee's readiness about change with mentoring them. On the other hand, Lau and Woodman (1995) explained that employees who believed having control over the change process get positive and good beliefs about change and behave more beneficial for the organisational outcomes. In addition to participation and self-control, change effort, organisation condition in the marketplace, work environment, are important factors for an individual's perception about "change". In this perspective, it is seen that leadership is also a prominent factor in the readiness of employees for change applications (Armenakis et al., 1993).

The readiness of an employee is also influenced by interpersonal and social relations in the organisation. According to the Social Information Theory, an employee's readiness might be affected by a co-worker's readiness (Woodman, Sawyer & Griffin, 1993). For this reason, integration of organisational and individual's aims should fit with each other to enhance readiness success on implementation with the cumulative power (synergy) of employees. (Fox et al., 1988).

Innovative Work Behaviours

De Jong and Hartog (2007) implied that innovation is seen as a competitive power in today's business environment. Katz (1964) stated that organisations who want to be innovative should invest employees' abilities about innovativeness (p.132). It is also emphasised that innovative behaviours of employees have a great significance for achieving competitive advantage and sustainable performance (Pieterse et al., 2010).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Innovative work behaviours are identified as an application of new ideas to increase performance (West & Farr,1989). Problem recognition, idea generation, idea implementation, idea creation are sub-dimensions of innovative behaviours (Scott & Brucel,1994). The relation between innovation and performance enhances the attraction over innovative work behaviour concept in academic groups.

West and Farr (1989) expressed innovative work behaviours as; "*intentional introduction and application within a role, group or organisation of ideas, processes, products, and procedures*" (p.9). Later, Janssen (2000) stated that the restriction of innovative work behaviours as intentional efforts may not promote beneficial job outcomes. For this reason, innovative work behaviours are described as intentional, useful and profitable outputs related work behaviours. In addition to normal work-related tasks, innovative work behaviours include contextual and extra-role behaviours which are not expected to be rewarded (Janssen, 2000). Farr and Ford (1990) explained that innovative work behaviours tend to achieve an introduction for beneficial and new ideas, processes, procedures, services, and products. Built on this definition, achieving a business model which brings beneficial and profitable results for organisation and individuals is called as innovation. According to De Jong and Hartog (2007), innovative work behaviours are also described as a longitudinal concept which ranks between initiation and implementation.

Zaltman and colleagues (1973) indicated that innovation is comprised of two main steps. Initiation (production of an idea) and implementation (implementation of an idea). Later, West and Farr (1989) determined innovative work behaviours as intentional creation, introduction, and application of new ideas to increase the performance of employees, groups and organisation. Scott and Bruce (1994) stated that innovative work behaviours are forms in a multi-stage process. Janssen (2000) described this process as idea generation (production of valuable ideas), idea promotion (to find friends to support your idea-to build coalition for power) and idea realization (prototype or model application of innovation). Martins and Martins (2002) evaluated innovative work behaviour as idea generation, risk- taking, and decision making. They implied that if these norms are fitted in the working environment innovative behaviours encourage and enhance individual's abilities. Later, De Jong and Hartog (2007) mentioned innovative work behaviours under four dimensions. Opportunity exploration (identification of new opportunities), idea generation (aimed to solve problems and have sustainable performance with the formulation of new ideas), idea championing (promoting new ideas for getting followers, cooperation and collaborations with others to reveal the importance of the new idea), idea application (implementing step of ideas to understand its functionality with the expected aims) (Suhaimi & Panatik, 2016).

Passion and high energy of employees towards the work, bring the sustainable performance to the organisation (Macey et al., 2009). Flexible, open-minded employees usually tend to demonstrate innovative work behaviours. Interaction and coordination with colleagues and the flexibility of the work environment also make easier innovativeness of employees (Anderson et al., 2004). Therefore, leadership style is important for generating this flexible work environment in organisations (Yukl, 2002).

Mumford and colleagues (2002) discussed the factors which may shape the innovation as; working climate, interpersonal relations, organisational structure, strategies, and individual abilities. Besides, Agarwal and colleagues (2012) summarized the related antecedents of innovative work behaviours as; work-group relations, leadership, job tenure, and perception of support. Amabile (1988) also stated that motivational antecedents like leadership play a major role in employee's innovative work behaviours.

Innovation and creativity are generally sound like similar however they have main differences from each other. Creativity only focuses on new idea generation. Innovative work behaviour is a wide concept than creativity. It also includes commercializing creative ideas with business models, investments, imple-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

mentations, and practices. Innovative behaviour orients on to produce useful and profitable results. In creativity, it is not needed to produce a profitable benefit (De Jong & Hartog, 2007) Generally, creativity is evaluated as in the first phase of innovative work behaviours (West, 2002). In idea generation side, it is required to have creative ideas for a response to needs and problems. Work-related issues, disagreements, sustainability problems trigger the idea generation of employees (Drucker,1985). Idea generation is usually fuelled by the realization of necessaries. Creativity often takes place as the formulation of new ideas while innovation is the commercialization of creative implementations (Mumford & Gustafson,1988). Innovation is comprised of both the formulation and implementation of ideas (Reuvers et al., 2008). In this context, innovative work behaviour is regarded as a multi-stage process that includes implementation and creativity (Scott and Bruce,1994). Although there have been many descriptions of innovation and creativity, there is not a consensus about the relations between innovative work behaviour and creativity in the literature yet (Suhaimi & Panatik, 2016).

Relationships Between Strategic Leadership, Readiness for Change and Innovative Work Behaviours

Porter (1996) expressed that a leader must know what is going on outside related to the organisation and its products-services. Besides, he stressed that a strategic leader is always able to answer "how can an organisation respond to the environmental changes or customer needs"? Like Porter; Jonas III, Fry, and Srivasta (1990) advocated the new leadership roles should focus on creating new ideas, implementing them and make a balance between stability and innovation in the adaptation of environmental requirements (Crossan, Vera & Nanjad, 2008).

Ireland and Hitt (1999) also stated the significance of the relationship between strategic leadership and innovation strategy. Strategic leaders take into consideration of innovation while analysing opportunities and strategies (Elenkov, Judge & Wright, 2005) Strategic leaders formulate innovations to provide in accordance with the environmental requirements (Papadakis, Lioukas & Chambers, 1998). Selznick (1994) also underlined the importance of "change" concept in the formulation of a strategic leadership. Specifically, when it is needed a changing procedure in organisations, the strength of strategic leadership notion rises to prominence.

According to Vera and Crossan (2004) strategic leadership is defined as top management leadership style for achievement of the organisational aims with the promoting strategies in different situations (Benzer et al., 2017) Strategic leaders work for the integration of organisational and individual aims achievement to have a sustainable performance with sharing vision and improving required activities. In this perspective, change is valued as a required activity which is expected to bring fresh information to a corporation (Benzer et al., 2017). Strategic leaders like "change" activities for the purpose of making innovative strategies. Strategic leaders design a productive work environment. Employee's perception of such a positive environment may be effective on them working hard to be innovative (Avolio,1999). Nevertheless, Hurt, Joseph and Cook (1977) expressed innovative work behaviours as individual behaviours which demonstrate an employee's willingness to change. Because innovation is related and oriented to change, the relationship between them is rewarding to investigate in the literature (Spreitzer, 1995; Woodman et al., 1993).

Leadership is an essential influencing factor for motivating and mobilizing subordinates (Yukl, 2002). Leaders' efforts for organisational sustainability should also fit with employees needs and desires. Strategic leaders enhance the employees' abilities by mentoring and coaching. Strategic leaders

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

are evaluated as role models with their interest in innovations. In this regard, the impact of leadership on innovative work behaviours is also investigated in the literature (Jung, Chow & Wu, 2003; Mumford et al., 2002). Strategic leaders are generally focused on individual concerns during the change process. Strategic leaders appreciate employees' efforts for change implementation. Besides, strategic leaders create opportunities for individuals' developments. They prepare employees for change implementations with good and clear communication methods (Benzer et al., 2017). Strategic leaders influence employees as a change-setter perspective. Strategic leaders also encourage innovative behaviours in organisations by sharing their vision and motivating employees for their own and organisational well-being (Kamasak, Yozgat & Yavuz, 2017; Rhoades & Eisenberger, 2002). When strategic aims of leaders and employees are integrated, readiness towards to change is occurred easily to achieve organisational success (Klein & Knight,2005). Moreover, effective human resource management practices influence the innovation and organisational performance. For this reason, strategic leaders plan employee related practices carefully to have better financial outcomes (Zhou, Hong & Lıu;2013).

METHODOLOGY

This chapter is aimed to explain the relationship between strategic leadership and innovative work behaviours. According to the literature, it is expected to find out that strategic leadership has a positive impact on innovative work behaviours. It has also tried to reveal the role of readiness for change in this relation. For these purposes, firstly it has tried to explain the conceptual framework of the research model. In the theoretical part, strategic leadership, readiness for change and innovative work behaviours were described. Relations between variables were analysed in detailed accordance with the literature. In this section, research methodology is mentioned and statistical analyses are explained. Finally, results are evaluated with the theoretical perspective.

Figure 1. Research model



Reference to research model, hypothesis of the study is formed as:

Hypothesis One: Readiness for change has a mediator role in the relationship between strategic leadership and innovative work behaviours.

The tourism industry was chosen for this study. It is well known that tourism sector goes parallel with national and international dynamics like foreign trade, economic relations, policies of governments, country's politic structure, and security of the region. In addition to these, local problems of neighbour countries also influence the sectoral demand because of the guest's social worries. For this reason, sea-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

sonal activities of the tourism industry are considered as very volatile. Leaders and supervisors of hotel organisations not only aimed to compete with competitors but also purposed to continue the organisation's existence in this volatile times to maintain organisational performance. Besides, technological trends also have a major role in the industrial competition like economic and diplomatic dynamics. Porter (1985) expressed that innovation in technology make a great contribution on cost reduction and expansion of service differentiation. Hotel organisations need to follow technological developments to compete with others. It is an understanding thing that, technology usage both speed up the daily operations and increase the employees' self-progress. It is generally expected to increase operational and financial performance with technology usage. Innovation related investments in business model's also expand the individual's capacity. Increment of employee performance is anticipated to rise up the financial performance of organisation. Moreover, strategic emphasis on business model innovation exhibits the organisational value and profitability (Aspara, Hietanen & Tikkanen, 2009).

In this study, it is preferred to analyse a four-star hotel which takes place in Antalya. Antalya is a coastal city in the south of the Turkey. Antalya is embraced by the natural beauties and historical areas. In addition to these, there are many sandy beaches, archaeological sites, shopping malls that attract the tourists to the region. In the city, there are two international airports that have approximately 150.000 air traffic movements per year and it is stated that 11 million tourists visited Antalya between January and September in 2018. Moreover, there are more than 1000 hotels with four and five star. In the region, lodging industry works to enhance demand and the capacity to have a sustainable and profitable performance. According to March (1991) investments on technology usage expand capacity and explore new services and processes. Besides, scholars indicate that innovation oriented investments have positive impacts on the organisational outcomes like return margins, performance and profitability (Christensen 2013; Zahra 1996). Carvalho, Ribeiro, Cirani and Cintra (2015) also found that innovative companies have higher financial performance results than non-innovative companies. Under the circumstances, leaders pay attention to internal and external dynamics selectively. In this chapter, it is tried to reveal out the importance of readiness for change on technological investments in organisation. Moreover, it is expected to exhibit the relationship strategic leadership and the innovation with the better performance expectations.

In the chosen hotel, it was planned to use a new technologic system and instruments for the daily activities. For this purpose, the CEO of the hotel prepared a meeting with employees and explained his plans and investments in detail. He tried to provide user-friendly devices to maintain technological system success. In addition, he organized a training seminar for the change process. From room cleaning to accounting operations it was aimed to implement all operations in accordance with systems and technological devices. This survey was recognised after four months of these new practices were implemented in the hotel.

In this chapter it is used of Pisapia, Reyes-Guerra (2007) "Strategic Leadership Questionnaire" to measure strategic leadership. Strategic leadership questionnaire was measured with 35 items under five dimensions. Furthermore, a translation of 9 item scale of Bouckenooghe et al. (2009) was used to measure readiness for change. The scale is comprised of three dimensions and each dimension has three items. Finally, innovative work behaviours were measured by the Jong and Hartog's (2010) Innovative Work Behaviours Scale. The scale consists of four dimensions with 10 items. In the questionnaire form, sample items were rated 5 points Likert Scale ranging between 1 (completely disagree) and 5 (completely agree) in all scales. Only readiness for change questions were used with the past tense

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

form. There are also four demographic questions in the last part of the questionnaire form which does not need to respond mandatory.

The sample of this study consists of tourism establishment employees. The population of this study was generated from the sampling formulation. There are 247 workers in the whole hotel. Considering error margin and confidence interval, it was found to have suitable 151 forms were enough for statistical analyses (Barlett et al., 2001). Questionnaires were sent by e-mail to all employees. At the end of 30 days acquired and errorless 194 valid questionnaire forms were used for statistical analyses.

In this study to provide regression analysis assumptions, the normality and correlation analysis tests were investigated by IBM SPSS Statistics 21.00 Programme. In the normality tests, diagrams and Skewness-Kurtosis values; it was accepted that the data demonstrated normal distribution. In order to test relationships between strategic leadership and readiness for change, strategic leadership and innovative work behaviours, readiness for change and innovative work behaviours correlation analysis were used. Otherwise, factorial structures of the scales were analysed through LISREL 8.8 Scientific Software International Programme. Finally, with the regression model, the research hypothesis partially supported in the IBM SPSS Statistics 21 Programme tests.

RESULTS

According to the statistical analysis from IBM SPSS 21.00 Programme, means of variables were found as; strategic leadership 3.94, readiness for change 3.86 and innovative work behaviours 3.82. Besides, standard deviations of variables were also obtained as; strategic leadership 0.96, readiness for change 0.98 and innovative work behaviours 0.88. Pearson Correlation coefficients were used to evaluate the relationship between variables. The relationship between strategic leadership and readiness for change is significant and strongly positive (r=0.703). Besides, the relationship between strategic leadership and innovative work behaviour is also significant and strongly positive(r=0.712). The relationship between readiness for change and innovative work behaviour also has a significant, medium level and positive(r=0,684). Correlations between variables are significant at the level of 0.01.

Table 1. Means, correlations and standard deviations of variables

	Variables	Mean	Standard Deviation	1	2
1	Strategic Leadership	3.98	0.96		
2	Readiness for Change	3.86	0.98	0.703**	
3	Innovative Work Behaviours	3.82	0.88	0.712**	0.684**

**Correlation is significant at the 0.01 level(2-tailed)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In this study, Cronbach's Alpha method was used to test the reliabilities of scales. The reliability analyses show that all constructs possess satisfactory Cronbach's Alpha values: strategic leadership (α=0.88), readiness for change (α=0.86) and innovative work behaviour (α=0.90). Otherwise, factorial structures of the scales (Confirmatory Factor Analyses) were analysed through LISREL 8.8 Scientific Software International Programme. According to the results of the analyses, it was revealed out that scales have construct validities with good indices. Factor loadings of strategic leadership scale are ranged from .54 ($p < 0.001$) to .87 ($p < 0.001$). Factor loadings of readiness for change are range from .52 ($p < 0.001$) to .80 ($p < 0.001$). Factor loadings of innovative work behaviours are range from .68 ($p < 0.001$) to .92 ($p < 0.001$). Besides, the fit indices for the scales are ranked in Table 2. Arbuckle (2006) states that if a value of x2/df is less than 2.5 it shows a great and good model fit for the factorial structure, whereas if the value of x2/df is between 2.5 and 5 it has an acceptable model fit. Reference to Arbuckle (2006), the results of the scales are at the acceptable levels for a good fit. Moreover, a value of more than 0.95 for CFI, IFI indices; and a value less than 0.07 for RMSEA indices are good for the factorial structure of scales (De Vellis, 2016).

Table 2. Confirmatory factor analyses of scales

Variables	X^2	df	X^2/ df	RMSEA	TLI	IFI	CFI
Strategic Leadership	205.18	51	4.023	0.06	0.96	0.96	0.95
Readiness for Change	293.761	73	4.024	0.06	0.96	0.97	0.94
Innovative Work Behaviours	341.620	87	3.92	0.04	0.99	0.98	0.97

This study also aimed to find out the mediating role of readiness for change in the relationship between strategic leadership and innovative work behaviours. In this direction, to test the research model in accordance with Baron and Kenny's (1986) steps, hierarchic regression analyses were used. According to Baron and Kenny's (1986) 3 step model, it is advised to provide some assumptions to obtain the mediating role of a related variable. In the first step, it should be a significant relationship between strategic leadership and innovative work behaviours. In the second step, it is required to point out a significant relationship between strategic leadership and readiness for change. In the last step, i) readiness for change and innovative work behaviours need to be significantly related and ii) the relationship between strategic leadership and innovative work behaviours also have to decrease under the presence of readiness for change. In the last step if the model turns to meaningless ($p > 0.005$) it is called full mediating; while if model stays significant ($p < 0.005$) but the beta of the strategic leadership is declined it is evaluated as partial mediating. Reference to regression analyses, all assumptions of the mediating model was confirmed. Only in the last step, it is seen that the model is still significant but the beta of strategic leadership declined to 0.289 from 0.712(first step value). Besides, it was used Sobel, Aroian and Goodman tests via online statistical programmes. In accordance with these results, it was found that readiness for change significantly and partially mediates the relationship between strategic leadership and innovative work behaviours.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Hierarchic regression analysis results

Hypothesis 1- First Step Regression Analyses Dependent Variable: Innovative Work Behaviours			
Independent Variable: Strategic Leadership	*Beta* 0.712	*t* 11.224	*p* 0.000
	Adjusted R^2: 0.410	F: 121.822	*p* 0.000
Hypothesis 1- Second Step Regression Analyses Dependent Variable: Readiness for Change			
Independent Variable: Strategic Leadership	*Beta* 0.703	*t* 10.002	*p* 0.000
	Adjusted R^2: 0.511	F: 112.813	*p* 0.000
Hypothesis 1- Third Step Regression Analyses Dependent Variable: Innovative Work Behaviours			
Independent Variable: Strategic Leadership	*Beta* 0.289	*t* 7.268	*p* 0.000
Readiness for Change	0.523	9.662	0.000
	Adjusted R^2: 0.602	F: 163.009	*p* 0.000

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

FUTURE RESEARCH DIRECTIONS

This chapter aimed to demonstrate the relationship between perceived strategic leadership and innovative work behaviours. Besides, it tried to prove the role of readiness for change in this relation. Although innovative work behaviours have a positive impact on individual outcomes, it is required to analyse relations between innovative work behaviours and financial performance indicators. Furthermore, a longitudinal research for measuring readiness for change before technological practices implementation will have better explanatory power on change process performance.

CONCLUSION

Globalisation and environmental impacts of new innovations have revealed out the necessity of new leaders to make a balance with environment and organisation. The specification of a new model leader is defined as a fit oriented with environmental changes and organisational adaptation by flexible planning and decision making (Hitt, Haynes & Serpa, 2010). In this context, Ireland and Hitt (1999) also mentioned for the importance of strategic leaders in the 21st century's business environment to get strategic competitive advantages and sustainable company performance. Lear (2012) indicated that strategic leaders can increase organisational performance or maintain organisational sustainability in turbulent and unpredictable environments with the implementation of innovative strategies. Therefore, innovative and creative decisions will provide better strategic advantages in the volatile industries.

Elenkov, Judge and Wright (2005) determine strategic leadership as; the process of generating a long-termed vision, providing a good dialogue with all employees, touching to subordinates needs and supporting employees for change practices. Specifically, in change processes, the inspiration of employees has a great value for organisational success. Besides, it is stated that employees' readiness for the change is the key factor for implementation's effectiveness (Bilgin, Bilgin & Kilinc, 2017; Eby et al., 2000). In the literature review, it was found that supportive and strategic leadership has a positive impact on innovative work behaviours of employees and readiness for change (Pieterse et al.,2010; Reuvers et al., 2008).

In this study, it was obtained that perceived strategic leadership has a positive impact on innovative work behaviours. Besides, it has been revealed that readiness for change has also a positive impact on innovative work behaviours. In this context, both strategic leadership and readiness for change are explanatory on the innovative work behaviours. But, in this sample study, readiness for change has a partial mediating impact on the relationship between strategic leadership and innovative work behaviours. It means that readiness for change increases the explanatory power of the relationship between strategic leadership and innovative work behaviours. If we take the readiness for change in the model, the impact of the strategic leadership on the innovative work behaviours cannot be strong unlike the entrance of readiness for change in the model. Accordance with the results it is stated that perceived strategic leadership has a major role in employees' innovative work behaviours. In addition to this, it also needs to have readiness for change to maintain sustainable innovative behaviours. Results show similarity with the literature findings (Carvalho, Ribeiro, Cirani & Cintra, 2015; Christensen 2013; Zahra 1996; March, 1991). It is advised to leaders and managers to prepare employees for change practices with cooperation, education, and participation. It is also recommended for managers and leaders to invest in task-employee and technology fit devices and systems to have a sustainable strategic advantage with the usage of these models.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Agarwal, U. A., Datta, S., Blake-Beard, S., & Bhargava, S. (2012). Linking LMX, innovative work behaviour and turnover intentions: The mediating role of work engagement. *Career Development International*, *17*(3), 208–230. doi:10.1108/13620431211241063

Amabile, T. M. (1988). A model of creativity and innovation in organizations. *Research in Organizational Behavior*, *10*(1), 123–167.

Anderson, N. R., de Dreu, C. K. W., & Nijstad, B. A. (2004). The routinization of innovation research: A constructively critical review of the state-of-the-science. *Journal of Organizational Behavior*, *25*(2), 147–174. doi:10.1002/job.236

Arbuckle, J. L. (2006). *AMOS (version 7.0)* [Computer software]. Chicago: SPSS.

Armenakis, A. A., & Harris, S. G. (2002). Crafting a change message to create transformational readiness. *Journal of Organizational Change Management*, *15*(2), 169–183. doi:10.1108/09534810210423080

Armenakis, A. A., Harris, S. G., & Mossholder, K. W. (1993). Creating readiness for organizational change. *Human Relations*, *46*(6), 681–703. doi:10.1177/001872679304600601

Aspara, J., Hietanen, J., & Tikkanen, H. (2010). Business model innovation vs replication: Financial performance implications of strategic emphases. *Journal of Strategic Marketing*, *18*(1), 39–56. doi:10.1080/09652540903511290

Avolio, B. J. (1999). Full leadership development: Building the vital forces in organizations. *Sage (Atlanta, Ga.)*.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Barlett, J. E., Kotrlik, J. W., & Higgins, C. C. (2001). Organizational research: Determining appropriate sample size in survey research. *Information Technology, Learning and Performance Journal*, *19*(1), 43–50.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. doi:10.1037/0022-3514.51.6.1173 PMID:3806354

Barrett, J. H., Haslam, R. A., Lee, K. G., & Ellis, M. J. (2005). Assessing attitudes and beliefs using the stage of change paradigm—Case study of health and safety appraisal within a manufacturing company. *International Journal of Industrial Ergonomics*, *35*(10), 871–887. doi:10.1016/j.ergon.2004.12.004

Basadur, M. (2004). Leading others to think innovatively together: Creative leadership. *The Leadership Quarterly*, *15*(1), 103–121. doi:10.1016/j.leaqua.2003.12.007

Bass, B. M. (1981). From leaderless group discussions to the cross-national assessment of managers. *Journal of Management*, *7*(2), 63–76. doi:10.1177/014920638100700205

Benzer, J. K., Charns, M. P., Hamdan, S., & Afable, M. (2017). The role of organizational structure in readiness for change: A conceptual integration. *Health Services Management Research*, *30*(1), 34–46. doi:10.1177/0951484816682396 PMID:28166670

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bilgin, Y., Bilgin, G. D., & Kilinc, I. (2017). Strategic Leadership in Civil Society Organizations: A Research on Turkish Charities Performing International Operations. *Voluntas*, *28*(2), 839–863. doi:10.100711266-016-9780-6

Bloom, B. S. (1956). *Taxonomy of Educational Objectives. The classification of educational goals: Handbook I, cognitive domain*. New York: Longman.

Boal, K. B., & Hooijberg, R. (2000). Strategic leadership research: Moving on. *The Leadership Quarterly*, *11*(4), 515–549. doi:10.1016/S1048-9843(00)00057-6

Bouckenooghe, D. (2010). Positioning change recipients' attitudes toward change in the organizational change literature. *The Journal of Applied Behavioral Science*, *46*(4), 500–531. doi:10.1177/0021886310367944

Bouckenooghe, D. (2012). The role of organizational politics, contextual resources, and formal communication on change recipients' commitment to change: A multilevel study. *European Journal of Work and Organizational Psychology*, *21*(4), 575–602. doi:10.1080/1359432X.2011.591573

Bouckenooghe, D., Devos, G., & Van den Broeck, H. (2009). Organizational change questionnaire–climate of change, processes, and readiness: Development of a new instrument. *The Journal of Psychology*, *143*(6), 559–599. doi:10.1080/00223980903218216 PMID:19957876

Burns, J. M. (1998). Transactional and transforming leadership. *Leading Organizations, 5*(3), 133-134.

By, R. T. (2007). Ready or not. . . . . *Journal of Change Management*, *7*(1), 3–11. doi:10.1080/14697010701265249

Chonko, L. B., Jones, E., Roberts, J. A., & Dubinsky, A. J. (2002). The role of environmental turbulence, readiness for change, and salesperson learning in the success of sales for change. *Journal of Personal Selling & Sales Management*, *22*(4), 227–245.

Christensen, C. (2013). *The innovator's dilemma: when new technologies cause great firms to fail*. Harvard Business Review Press.

Crossan, M., Vera, D., & Nanjad, L. (2008). Transcendent leadership: Strategic leadership in dynamic environments. *The Leadership Quarterly*, *19*(5), 569–581. doi:10.1016/j.leaqua.2008.07.008

Dahlan, N., Ramayah, T., & Mei, L. L. (2002). Readiness to adopt data mining technologies: An exploratory study of telecommunication employees in Malaysia. *Practical Aspects of Knowledge Management*, *2569*, 75–86. doi:10.1007/3-540-36277-0_8

Davies, B. J., & Davies, B. (2004). Strategic leadership. *School Leadership & Management*, *24*(1), 29–38. doi:10.1080/1363243042000172804

De Carvalho, A. O., Ribeiro, I., Cirani, C. B. S., & Cintra, R. F. (2016). Organizational resilience: A comparative study between innovative and non-innovative companies based on the financial performance analysis. *International Journal of Innovation*, *4*(1), 58–69. doi:10.5585/iji.v4i1.73

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

De Jong, J., & Den Hartog, D. (2010). Measuring innovative work behaviour. *Creativity and Innovation Management*, *19*(1), 23–36. doi:10.1111/j.1467-8691.2010.00547.x

De Jong, J. P., & Den Hartog, D. N. (2007). How leaders influence employees' innovative behaviour. *European Journal of Innovation Management*, *10*(1), 41–64. doi:10.1108/14601060710720546

DeVellis, R. F. (2016). *Scale development: Theory and applications*. Sage Publications.

Drucker, P. F. (1985). *Innovation and entrepreneurship: Practice and principles*. London: Heinemann.

Eby, L. T., Adams, D. M., Russell, J. E., & Gaby, S. H. (2000). Perceptions of organizational readiness for change: Factors related to employees' reactions to the implementation of team-based selling. *Human Relations*, *53*(3), 419–442. doi:10.1177/0018726700533006

Elenkov, D. S., Judge, W., & Wright, P. (2005). Strategic leadership and executive innovation influence: An international multi-cluster comparative study. *Strategic Management Journal*, *26*(7), 665–682. doi:10.1002mj.469

Finkelstein, S., & Hambrick, D. C. (1996). *Strategic leadership: Top executives and their effects on organizations*. Minneapolis, MN: West.

Fox, D. G., Ellison, R. L., & Keith, K. L. (1988). Human resource management: An index and its relationship to readiness for change. *The Personnel Administrator*, *17*(3), 297–302. doi:10.1177/009102608801700305

Geldenhuys, C. A., & Veldsman, T. H. (2011). A change navigation-based, scenario planning process within a developing world context from an Afro-centric leadership perspective. *SA Journal of Human Resource Management*, *9*(1), 1–17. doi:10.4102ajhrm.v9i1.265

Guillot, C. W. M. (2003). Strategic leadership defining the challenge. *Air and Space Power Journal*, *17*(4), 67–75.

Hailey, V. H., & Balogun, J. (2002). Devising context sensitive approaches to change: The example of glaxo wellcome. *Long Range Planning*, *35*(2), 153–178. doi:10.1016/S0024-6301(02)00035-3

Hambrick, D., & Pettigrew, A. (2001). Upper echelons: Donald Hambrick on executives and strategy. *The Academy of Management Executive*, *15*(3), 36–44.

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, *9*(2), 193–206. doi:10.5465/amr.1984.4277628

Hansen, C., & Kahnweiler, W. M. (1997). Executive managers: Cultural expectations through stories about work. *Journal of Applied Management Studies*, *6*(2), 117–138.

Hinterhuber, H. H., & Friedrich, S. A. (2002). The technology dimension of strategic leadership: The leadership challenge for production economists. *International Journal of Production Economics*, *77*(3), 191–203. doi:10.1016/S0925-5273(01)00160-8

Hitt, M., Haynes, K., & Serpa, R. (2010). Strategic leadership for the 21st century. *Business Horizons*, *53*(5), 437–444. doi:10.1016/j.bushor.2010.05.004

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hitt, M. A., & Duane, R. (2002). The essence of strategic leadership: Managing human and social capital. *Journal of Leadership & Organizational Studies*, *9*(1), 3–14. doi:10.1177/107179190200900101

Hosmer, T. L. (1982). The importance of strategic leadership. *The Journal of Business Strategy*, *3*(2), 47–57. doi:10.1108/eb038966 PMID:10299154

House, R. J., & Aditya, R. N. (1997). The social scientific study of leadership: Quo vadis? *Journal of Management*, *2*(23), 409–473. doi:10.1177/014920639702300306

Hunt, J. G. (1999). Transformational/charismatic leadership's transformation of the field: An Historical essay. *The Leadership Quarterly*, *10*, 129–144. doi:10.1016/S1048-9843(99)00015-6

Hurt, H. T., Joseph, K., & Cook, C. D. (1977). Scales for the measurement of innovativeness. *Human Communication Research*, *4*(1), 58–65. doi:10.1111/j.1468-2958.1977.tb00597.x

Ireland, R. D., & Hitt, M. A. (1999). Achieving and maintaining strategic competitiveness in the 21st century: The role of strategic leadership. *The Academy of Management Perspectives*, *13*(1), 43–57. doi:10.5465/ame.1999.1567311

Janssen, O. (2000). Job demands, perceptions of effort-reward fairness and innovative work behavior. *Journal of Occupational and Organizational Psychology*, *73*(3), 287–302. doi:10.1348/096317900167038

Jonas, H. S. III, Fry, R. E., & Srivastva, S. (1990). The office of the CEO: Understanding the executive experience. *The Academy of Management Perspectives*, *4*(3), 36–48. doi:10.5465/ame.1990.4274659

Jooste, C., & Fourie, B. (2009). The role of strategic leadership in effective strategy implementation: Perceptions of South African strategic leaders. *Southern African Business Review*, *13*(3), 51–68.

Joshi, K., & Lauer, T. W. (1999). Transition and change during the implementation of a computer-based manufacturing process planning system: An analysis using the equity implementation model. *IEEE Transactions on Engineering Management*, *46*(4), 407–416. doi:10.1109/17.797963

Jung, D. I., Chow, C., & Wu, A. (2003). The Role of Transformational Leadership in Enhancing Organizational Innovation: Hypotheses and Some Preliminary Findings. *The Leadership Quarterly*, *14*(4-5), 525–544. doi:10.1016/S1048-9843(03)00050-X

Kamasak, R., Yozgat, U., & Yavuz, M. (2017). Knowledge process capabilities and innovation: Testing the moderating effects of environmental dynamism and strategic flexibility. *Knowledge Management Research and Practice*, *15*(3), 356–368. doi:10.105741275-017-0068-4

Katz, D. (1964). The motivational basis of organizational behavior. *Behavioral Science*, *9*(2), 131–133. doi:10.1002/bs.3830090206 PMID:5888769

Kirrane, M., Lennon, M., O'Connor, C., & Fu, N. (2017). Linking perceived management support with employees' readiness for change: The mediating role of psychological capital. *Journal of Change Management*, *17*(1), 47–66. doi:10.1080/14697017.2016.1214615

Klein, K. J., & Knight, A. P. (2005). Innovation implementation: Overcoming the challenge. *Current Directions in Psychological Science*, *14*(5), 243–246. doi:10.1111/j.0963-7214.2005.00373.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kotter, J. P. (1990). *A Force for Change: How Leadership Differs from Management*. New York, NY: The Free Press.

Kotter, J. P., & Schlesinger, L. A. (1979). Choosing a strategy for change. *Harvard Business Review*, *57*(2), 106–114. PMID:10240501

Kotze, M., & Nel, P. (2015). The influence of trait-emotional intelligence on authentic leadership. *SA Journal of Human Resource Management*, *13*(1), 1–9. doi:10.4102ajhrm.v13i1.716

Lau, C. M., & Woodman, R. W. (1995). Understanding organizational change: A schematic perspective. *Academy of Management Journal*, *38*(2), 537–554. doi:10.5465/256692

Lear, L. W. (2012). *The relationship between strategic leadership and strategic alignment in high-performing companies in South Africa* (Unpublished doctoral dissertation). Graduate School of Business Leadership, University of South Africa, South Africa.

Macey, W. H., Schneider, B., Barbera, K. M., & Young, S. A. (2009). *Employee Engagement: Tools for Analysis, Practice and Competitive Advantage*. New York, NY: Wiley-Blackwell. doi:10.1002/9781444306538

Madsen, S. R., Miller, D., & John, C. R. (2005). Readiness for organizational change: Do organizational commitment and social relationships in the workplace make a difference? *Human Resource Development Quarterly*, *16*(2), 213–233. doi:10.1002/hrdq.1134

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*(1), 71–87. doi:10.1287/orsc.2.1.71

Martins, E., & Martins, N. (2002). An organisational culture model to promote creativity and innovation. *SA Journal of Industrial Psychology*, *28*(4), 58–65. doi:10.4102ajip.v28i4.71

McNabb, D. E., & Sepic, F. T. (1995). Culture, climate, and total quality management: Measuring readiness for change. *Public Productivity & Management Review*, *18*(4), 369–385.

Mumford, M. D., & Gustafson, S. B. (1988). Creativity syndrome: Integration, application, and innovation. *Psychological Bulletin*, *103*(1), 27–43. doi:10.1037/0033-2909.103.1.27

Mumford, M. D., & Licuanan, B. (2004). Leading forInnovation: Conclusions, Issues, and Directions. *The Leadership Quarterly*, *15*(1), 163–171. doi:10.1016/j.leaqua.2003.12.010

Mumford, M. D., Scott, G. M., Gaddis, B., & Strange, J. M. (2002). Leading creative people: Orchestrating expertise and relationships. *The Leadership Quarterly*, *13*(6), 705–750. doi:10.1016/S1048-9843(02)00158-3

Nikolaou, I., Gouras, A., Vakola, M., & Bourantas, D. (2007). Selecting change agents: Exploring traits and skills in a simulated environment. *Journal of Change Management*, *7*(3-4), 291–313. doi:10.1080/14697010701779173

Oreg, S. (2006). Personality, context and resistance to organizational change. *European Journal of Work and Organizational Psychology*, *15*(1), 73–101. doi:10.1080/13594320500451247

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Özer, F., & Tınaztepe, C. (2014). Effect of strategic leadership styles on firm performance: A study in a Turkish SME. *Procedia: Social and Behavioral Sciences*, *150*, 778–784. doi:10.1016/j.sbspro.2014.09.059

Papadakis, V. M., Lioukas, S., & Chambers, D. (1998). Strategic decision-making processes: The role of management and context. *Strategic Management Journal*, *19*(2), 115–147. doi:10.1002/(SICI)1097-0266(199802)19:2<115::AID-SMJ941>3.0.CO;2-5

Pieterse, A. N., Van Knippenberg, D., Schippers, M., & Stam, D. (2010). Transformational and transactional leadership and innovative behavior: The moderating role of psychological empowerment. *Journal of Organizational Behavior*, *31*(4), 609–623. doi:10.1002/job.650

Pisapia, J., & Reyes-Guerra, D. (2007). *The strategic thinking questionnaire (STQ)*. Defray Beach, FL: Strategic Leadership International.

Pisapia, J., Reyes-Guerra, D., & Coukos-Semmel, E. (2005). Developing the leader's strategic mindset: Establishing the measures. *Leadership Review*, *5*, 41–68.

Porter, M. (1996). What is strategy? *Harvard Business Review*, *74*, 61–78. PMID:10158474

Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York, NY: Free Press.

Quadri, H. A. (2018). Strategic Innovation Leadership Framework for Sustainable Management of Electricity Distribution Company in Nigeria - Post Privatization. *PM World Journal*, *7*(3), 1–13.

Quong, T., & Walker, A. (2010). Seven principles of strategic leadership. *International Studies in Educational Administration, 38*(1), 22-34.

Rafferty, A. E., & Simons, R. H. (2006). An examination of the antecedents of readiness for fine-tuning and corporate transformation changes. *Journal of Business and Psychology*, *20*(3), 325–350. doi:10.100710869-005-9013-2

Reuvers, M., Van Engen, M. L., Vinkenburg, C. J., & Wilson-Evered, E. (2008). Transformational leadership and innovative work behaviour: Exploring the relevance of gender differences. *Creativity and Innovation Management*, *17*(3), 227–244. doi:10.1111/j.1467-8691.2008.00487.x

Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: A review of the literature. *The Journal of Applied Psychology*, *87*(4), 698–714. doi:10.1037/0021-9010.87.4.698 PMID:12184574

Rowe, W. G. (2001). Creating wealth in organizations: The role of strategic leadership. *The Academy of Management Perspectives*, *15*(1), 81–94. doi:10.5465/ame.2001.4251395

Schutte, N., & Barkhuizen, N. (2016). The Development of a Strategic Leadership Competency Measure for Public Sector Leaders–A Pilot Study. *Development*, *2*(3), 21–29.

Scott, S. G., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal*, *37*(3), 580–607.

Selznick, P. (1994). *The moral commonwealth: Social theory and the promise of community*. Univ of California Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Shrivastava, P., & Nachman, S. A. (1989). Strategic leadership patterns. *Strategic Management Journal*, *10*(S1), 51–66. doi:10.1002mj.4250100706

Simon, N. J. (1996). Organizational development: Meeting the challenge of change: The issue of readiness. *Competitive Intelligence Review*, *7*(2), 86–88. doi:10.1002/cir.3880070213

Spreitzer, G. (1995). Psychological empowerment in the workplace: Dimension, measurement, and validation. *Academy of Management Journal*, *38*(5), 1442–1465.

Suhaimi, I. W., & Panatik, S. A. (2016). A Literature Review on Relationship between Leader-Member Exchange and Innovative Work Behaviour. *Journal of Global Business and Social Entrepreneurship*, *1*(2), 32–41.

Summer, C. (1980). *Strategic behaviour in Business and Governmet*. Boston, MA: Little, Brown& Co.

Tarigan, J., & Kraus, W. A. (2017). The Impact of Strategic Leadership Program as ODI on the Usage Accounting Information System and Financial Performance. *Journal of Progressive Research in Social Sciences*, *6*(1), 410–421.

Thong, J. Y., & Yap, C. S. (1995). CEO characteristics, organizational characteristics and information technology adoption in small businesses. *Omega*, *23*(4), 429–442. doi:10.1016/0305-0483(95)00017-I

Vera, D., & Crossan, M. (2004). Strategic leadership and organizational learning. *Academy of Management Review*, *29*(2), 222–240. doi:10.5465/amr.2004.12736080

Weiner, B. J., Amick, H., & Lee, S. Y. D. (2008). Conceptualization and measurement of organizational readiness for change: A review of the literature in health services research and other fields. *Medical Care Research and Review: MCRR*, *65*(4), 379–436. doi:10.1177/1077558708317802 PMID:18511812

West, M., & Farr, J. (1989). Innovation at work: Psychological perspectives. *Social Behaviour*, *4*, 15–30.

West, M. A. (2002). Sparkling fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups. *Applied Psychology*, *51*(3), 355–387. doi:10.1111/1464-0597.00951

Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Towards a theory of organizational creativity. *Academy of Management Review*, *18*(2), 293–321. doi:10.5465/amr.1993.3997517

Yukl, G. (2002). Leading change in organizations. *Leadership in Organizations, 5,* 273-304.

Yukl, G., & Lepsinger, R. (2006). Leading change: Adapting and innovating in an uncertain world. *Leadership in Action, 26*(2), 3-7.

Zahra, S. A. (1996). Technology strategy and financial performance: Examining the moderating role of the firm's competitive environment. *Journal of Business Venturing*, *11*(3), 189–219. doi:10.1016/0883-9026(96)00001-8

Zaltman, G., Duncan, R., & Holbek, J. (1973). *Innovations and Organizations*. New York, NY: Wiley.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Zayim, M., & Kondakci, Y. (2015). An exploration of the relationship between readiness for change and organizational trust in Turkish public schools. *Educational Management Administration & Leadership*, *43*(4), 610–625. doi:10.1177/1741143214523009

Zhou, Y., Hong, Y., & Liu, J. (2013). Internal commitment or external collaboration? The impact of human resource management systems on firm innovation and performance. *Human Resource Management*, *52*(2), 263–288. doi:10.1002/hrm.21527

This research was previously published in Strategy and Superior Performance of Micro and Small Businesses in Volatile Economies; pages 57-77, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 60
Managing and Shaping Change in International Projects

Jürgen Janssens
asUgo Consulting, Belgium

ABSTRACT

Companies are either international by nature, either their workforce is, or business dynamics and agile optimization create an extended web making it international. This obliges managers to gear up for the needs of this evolving DNA. This is especially the case in strategy critical project portfolio contexts focusing on organizational change, process transformation, or roll-out of headquarter-driven products/services. This chapter will address the required hard and soft assets: integrating the cultural essence and maturity of the ecosystem, combining experience with a pragmatic approach, and being dedicated to continuous shaping of collaborations. Additional focus will be set on managing in the digital age. To give more depth to the tangible value, different real-life cases will be integrated. Together, the theoretical insights and the empirical examples will offer a big picture view that will benefit the management of hybrid portfolios in geographically blended environments.

INTRODUCTION

In the current ecosystems, companies are all virtually international: either they are international by nature because of their locations, either their workforce has diverse backgrounds; or their business dynamics lead to global interactions, making it de facto international - even when operating from a single location. This obliges managers of permanent organizations and managers of temporary project organizations to integrate the needs of this international DNA, together with other managerial skills and capabilities.

One specific dimension concerns project portfolios focusing on organizational change, process transformation, or cross-site roll-out of headquarter-driven products. Due to their transversal nature, these types of projects tend to be larger, and are often more influenced by the international footprint of the organization than projects focusing on subject specific matters in an isolated department. In large companies, they are even key for the realization of the strategic backbone, and are fueled by hybrid, international teams.

DOI: 10.4018/978-1-7998-7297-9.ch060

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

A frequent example concerns companies that have grown across different countries (organically or through takeovers) and that want to obtain optimization benefits by standardizing the way of working of all divisions across the different countries. Despite/because of the complexity of the latter, this is often combined with the deployment of a new ERP (that will support the new way of working) and the set up of new organizational roles (to execute the new way of working).

Realizing such corporate undertakings is only possible in a structured and coordinated way. Therefore, companies have to set up temporary project organizations. Leading them well requires more one out-of-the-box solution. To lead them well, international project managers have to master a solid set of complementary hard and soft management skills.

Before unveiling this blended skill and tool set, the essence of project management will first be highlighted, including its importance in international contexts.

Secondly, the practical value of the synchronization with the site/country-specific reality will be analyzed. It will be illustrated that rather than blindly counting on past experience, managers should realize the targets, while integrating the cultural essence. In this sense, a series of tools will be explained that help in evaluating the Change Climate. Doing so will contribute to understanding the identity of local units, independent of eventual regional stereotypes or subjective extrapolations by international managers.

Thirdly, the cultural essence and the maturity of the ecosystem in which international project managers work will be analyzed. Emphasis will be set on hands-on approaches. Reality shows namely that it is more important to respect the spirit of management best practices, than sticking rigorously to the letter.

In complement, it will be stressed that moving forward in international ecosystems implies that managers should go beyond their operational perimeter. Managers have to regularly turn up their sleeves to shape the transversal dynamic, while keeping the strategy and the management philosophy in mind.

Lastly, a specific type of international project shaping will be addressed: contexts involving Digital Transformation. This is an aspect that is very important to keep in mind. The Digital Age is namely fundamentally changing the value proposition to and from the customer. The growing global pressure for companies to adapt entails several risks if the dynamic is not managed correctly. This specific kind of context will therefore be analyzed in detail.

Overall, after completing the chapter, the reader must be able to understand how to manage and shape change in international projects by building upon this blended set of tools and skills.

PROJECT MANAGEMENT: FOUNDATIONAL CONCEPTS

Project management methodologies like PMBOK and Prince 2 refer to a project as a temporary endeavor undertaken to create a unique product or service based on an agreed upon business case, and with a limited duration (Office of Government Commerce, 2010; Project Management Institute, 2013).

In agile, the definition of a project follows the same idea, as having a start and end date, focused on delivering a product and the likes. Project management as such, however, is organized differently. In some cases, the responsibility is shared between several persons.

From a macro perspective, however, the differences between agile and Waterfall driven programs are negligible. In the further discussion on project matters, the PPM definitions illustrated in Table 1 will therefore be used (Janssens, 2017).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Distinction between project management, program management and portfolio management

	Project	Program	Portfolio
Definition	The delivery of one or more outputs, contributing to a program or offering a direct strategic benefit.	A group of projects contributing to a common outcome or to one or more strategic benefits.	A significant share of the organization's total investment in the changes to meet the strategic objectives. Re groups multiple programs.
Time vision	Temporary (relatively short-term)	Temporary (can last several years)	Permanent (continually changing and aligned to the strategy)
Planning	Project level plans with focus on detailed delivery.	High level plans, supported by detailed plans.	Continuous process of prioritization and alignment to meet strategic objectives.
Scope	Narrow defined scope.	Wide scope, changing along the clarification of the requirements and solutions.	Transversal strategic perspective of the whole organization.

Source: Janssens, 2017

For a detailed understanding of traditional project management, the author refers to the aforementioned sources and methodologies. It is however essential to note that Agile and Waterfall projects alike share the need for follow-up, management and delivery – which is particularly relevant in international contexts.

Cultural differences may namely lead to longer decision-taking, reduced creativity and ability to take independent decisions, diffuse communication, additional room for positive and negative changes, adapted team dynamics, or different foundations for cooperation (Johansen, 2009).

In addition to aspects related to culturally diverse backgrounds, these environments involve also structural layers of additional complexity, like reconciling headquarter ambitions with local reality and international regulations, or balancing one structured approach with various, culturally diverging working styles.

The structuring power of project management applied by managers that have the necessary skills and tools is thus important to move from multi-national risks to the unleashed potential from international, complex environments.

INTERNATIONAL, COMPLEX ENVIRONMENTS

In international, complex environments, managers are continuously challenged to stay ahead of the curve. Communicating smoothly, defining purpose, managing globally while facilitating locally, balancing process understanding with helicopter views, anticipating spillover effects, being a strategist, a born speaker, a listener… are only some facets of the ultimate manager. In international contexts, their toolbox needs to be further enriched with soft and hard skills.

An ecosystem offering such challenges requires the management of projects, programs and portfolios. Often, the set-up of a solid project portfolio structure and mixed teams is required in international companies to realize large, organizational transformations. The final goal is to deliver the expected strategic benefits for the company, while integrating international constraints, and respecting time, quality and budget requirements.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The importance of good international project management is emphasized by the growing trend of projects taking place simultaneously at several locations. This is enabled by evolutions in digitalization (Schwab & Samans, 2016) and in outsourcing (Deloitte, 2016). It is thus important to know how to manage such mixed resource pools and their environment.

For this, research on leadership skills in very large, international projects (requiring a budget up to $5 billion) has indicated the primordial role of "the art of project leadership." This concerns soft issues, like leadership, organizational culture and behavior of project leaders and teams (Asvadurov et al., 2017). This assumes, however, the availability of project management "science", like processes and technical expertise. As this is not always present, it is thus essential to understand how the combination of both groups of skills and means – soft project art and hard project management science- make the difference in practice.

Therefore, the author wants to bring different managerial prerequisites together. Attention will be dedicated to the company culture, the organizational maturity, the integration of pragmatic solutions and the building of organizational bridges. They will be illustrated with real life cases.

To ensure that these assets remain future proof, specific awareness will be provided based on shaping in the Digital Age. Altogether, integrating these complementary components should open possibilities to work with multicultural teams in international contexts.

SOLUTIONS AND RECOMMENDATIONS

Canalizing Company Culture

Company Culture and Cultural Change

The success of managerial decisions depends on different factors. At the core, vision and managerial experience are of uttermost importance. At the same time, awareness and the ability to anticipate change appear to be at the center of the success (or failure) of many projects (Gulla, 2012).

For an efficient management of change, actions have to be taken at the beginning of the project. This will provide solid foundations for the future and avoid problems that would otherwise have grown over time. In small projects, this preparation is done by the project manager or owners of the concerned processes. For large projects, it is advised to have a dedicated change manager.

Secondly, guiding change requires a down to earth vision, as transformational matters implying human change are usually faced with resistance. Smoothing the road to acceptance is traditionally done through information and guidance, complemented by training sessions and follow-up. The final goal is to make sure that the concerned people understand, and, in the end, really own the future way of working. This should involve all stakeholders impacted by the projects, going from senior managers to final end users.

When preparing and guiding the process, managers need to take into account the impact of their words and their actions. As communicators, they need to keep in mind that others may have a totally different understanding due to their specific background or their organizational culture.

Managing the negotiations in an international project implies to take into account, for example, that Chinese and Indian employees have different expectations. Similarly, Egyptian and Israeli people value (in)direct communication differently, Norwegian and French staff have a different relation to hierarchy,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

or blended teams prefer different types of project structure (and decision taking). Specialized literature can help in depicting these specific geographical influencing factors (Johansen, 2009; Salacuse, 2004).

Company Culture and Cultural Change

Different tools and techniques are available to grasp the essentials of the overall culture (Cameron & Quinn, 2011). They need to be used for each site that is impacted by the project. Especially in international contexts, it can be damageable to build upon generalizations, expecting that people from one site, for example, will react in the same way as people from other regions with a similar size or headcount.

The author will focus on the distillation of three dimensions: the climate for change, the mindset of the stakeholders, and the impact of the project.

- The evaluation of the Change Management Climate gives an indication of the recent exposure to change. It is influenced by aspects such as the quality of internal communication, priority setting habits, the way resistance to change is managed, the presence of change agents, and the like.
- It is built through interviews with stakeholders. The results indicate the organizational aspects requiring attention. This can range from consistent training for each project, to priority setting rigor on management level, or consistency in the decision-taking process.
- The Stakeholder Assessment evaluates the willingness to change versus the capability to change. Usually, people are interviewed in each group of stakeholders. This helps to identify change agents capable to mentor colleagues or support the project. Adversely, it might shed light on the more change-resistant departments, requiring specific guidance.
- The Project Impact assessment evaluates who will feel the biggest impact on what level. Usually, angles to explore are: organization, governance, culture, technology and business processes.

In Figure 1, the change diagnostics have been done for a company desiring the put in place new transversal processes for its different departments (Janssens, 2016). The change climate has been evaluated by the executive director of the organization through an assessment of 50 statements, to be evaluated on a scale from 1 (strongly agree) to 5 (strongly disagree). The answers result automatically in an updated graph.

The stakeholder assessment has been obtained through a (different) self-assessment, completed by the senior managers of each division, resulting each in a divisional image. The aggregated picture shows the final graph. The project impact assessment is based on the feedback of the executive director.

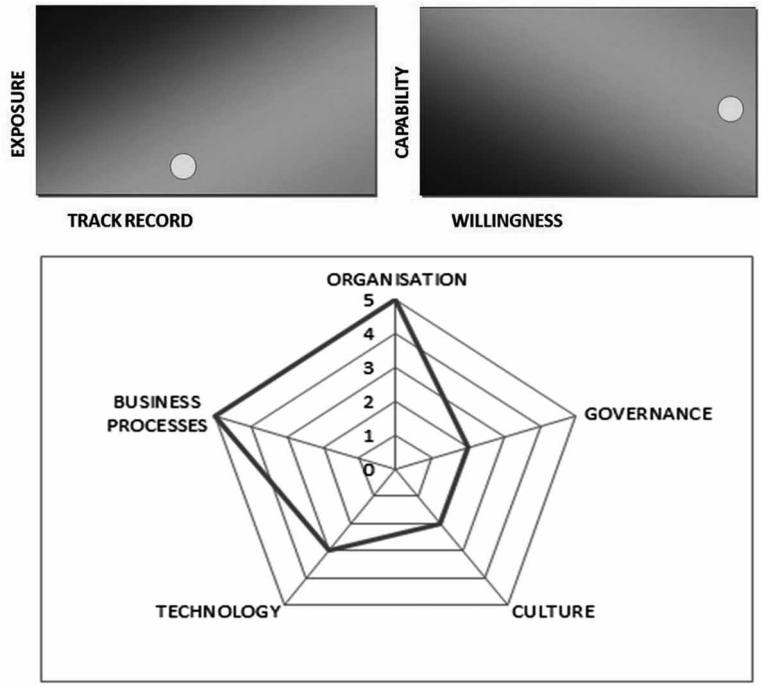
The combined change diagnostic illustrates a project in an environment with a limited exposure to change and a limited change track-record; a moderately positive stakeholder support; and the highest impact of the project being expected on business processes and organizational fluidity.

To take this change management climate into account, the outcome from previous projects has to be captured and good practices selected carefully. Also, focus on quick-wins is needed to reassure and involve users, and extra focus in communication, business involvement and transparent reporting.

The stakeholder assessment shows that the project will take place in an environment favorable to change management, but with a strong need to guide the latent change awareness. Based on the aggregated assessment, a part of the department appears to be able to support the initiative, if they receive additional support. As change agent, they seem appropriate to promote the project to key users or have a positive influence on the local promotion of change.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Change management climate, Stakeholder assessment, Project Impact assessment
Source: Janssens, 2016



As the project is likely to impact business processes and organizational fluidity, one will have to reinforce attention to these aspects – or to the expectations stakeholders have on this level. On the other hand, it is an indication that the stakeholders are realistic concerning the possibilities of the future way of working. This will make it easier to embed the technological changes.

As mentioned earlier, this change management assessment needs to be done for each site involved in the project. It can be damageable to expect that people from one regional division will react in the same way as people from other one with a similar size or headcount. Similarly, structurally performing the assessment in each site in the beginning of the international project allows managers to have an objective, non-biased understanding, regardless from subjective, personal preconceptions.

Integrating Maturity

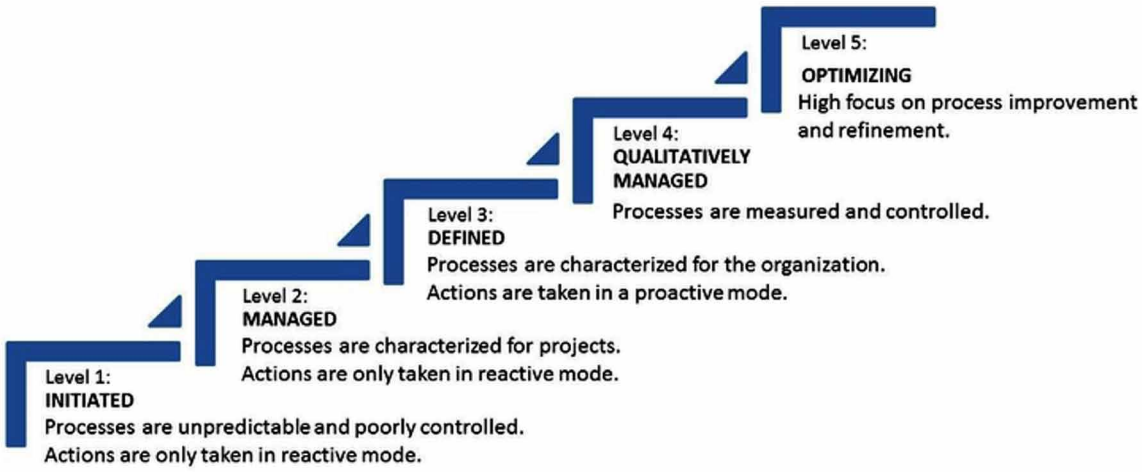
Maturity Frameworks

Companies are constantly looking for strategic advantages and efficient delivery. To be fruitful it is important to have a sufficiently mature organization, or to manage in line with reality. Different models exist to assess the organization's current capabilities, identify where they want to be in the future and implement improvements in a structured way, with measurable results. A first useable framework is the Capability Maturity Model Integration (CMMI).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CMMI provides organizations with the fundamentals for effective process improvement. It covers a wide spectrum of industries including manufacturing, software engineering, finance, aerospace and telecommunications. CMMI covers Waterfall and agile environments (Chrissis et al., 2011; Forrester et al., 2011; McMahon, 2010). The assessment leads to five possible maturity levels that can be used as base for the development of a roadmap to improve performance (see Figure 2).

Figure 2. Maturity levels in CMMI
Source: Own elaboration



A second framework is the Portfolio, Program and Project Management Maturity Model, P3M3.

P3M3 builds upon Prince 2 and MSP. It looks across an organization at how it delivers its projects portfolios. It can be used for activities related to the (temporary) project organization as well as for activities of the permanent organization (Sowden et al., 2010).

For each maturity level, P3M3 drives progress through seven Process Perspectives: Management Control, Benefits Management, Financial Management, Stakeholder Management, Organizational Governance, Risk Management and Resource Management. When keeping cross-industry applicability and international expertise in mind, a third approach worth using is the Program and Portfolio Management Maturity Model.

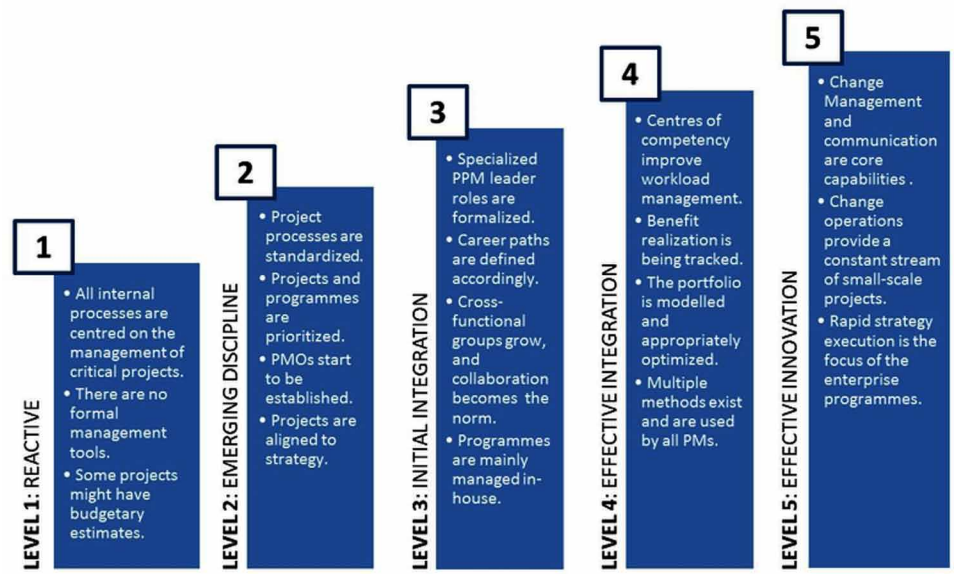
The model distinguishes five dimensions (see Figure 3): Interdependence of People, Portfolio practices and processes, Project Value management, Technological Growth, and Human Relationships. The evaluation results in a specific maturity level (Mieritz et al., 2007).

This model shares the transversal expertise captured in CMMI and P3M3, but focuses more on actionable steps, that prove to be of added value in practice. Further in this publication, the maturity levels will refer to those as defined in Gartner's model.

Overall, maturity models give managers the occasion to perform a factual health check and do an assessment towards a full development plan (Sowden et al., 2010). Conversely, rather than a means to identify weaknesses and apply only 'quick wins', maturity improvement should be managed as a long-term process, involving incremental changes on different levels.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. The five maturity levels of Gartner's model
Source: Mieritz et al., 2007



By completing the maturity model with elements that are specific to the international footprint and/or workforce of the company, it is possible to provide the project managers with a foundational base that reconciles organizational understanding with international grip.

Projects, Programs, Portfolios and Maturity

Maturity for Program and Portfolio Management

For each management team, it is essential to have grip on the maturity level. One of the challenges at level 1 and 2, for instance, is to build transversal foundations while still leaving room for focused actions.

On the one hand, an environment with a low maturity entails the risk that initiatives will not last due to poor organizational acceptance. It is therefore important to focus on the medium term by building foundations, also in environments with an internationally blended workforce.

Companies that are at the other end of the spectrum (i.e. level 5) face different challenges.

At NASA, for example, the Space Shuttle Onboard Software project had to prepare the activities prior to departure. Quality requirements were extremely high. Through continuous improvements, the project evolved into a very mature environment (Hickey et al., 2011). Executives, however, were not concerned with the teams' drive for excellence since a culture of excellence was already present. Rather, they ensured that the staff did not become complacent, and that they constantly focused on improving the process performance (Paulk et al., 2000).

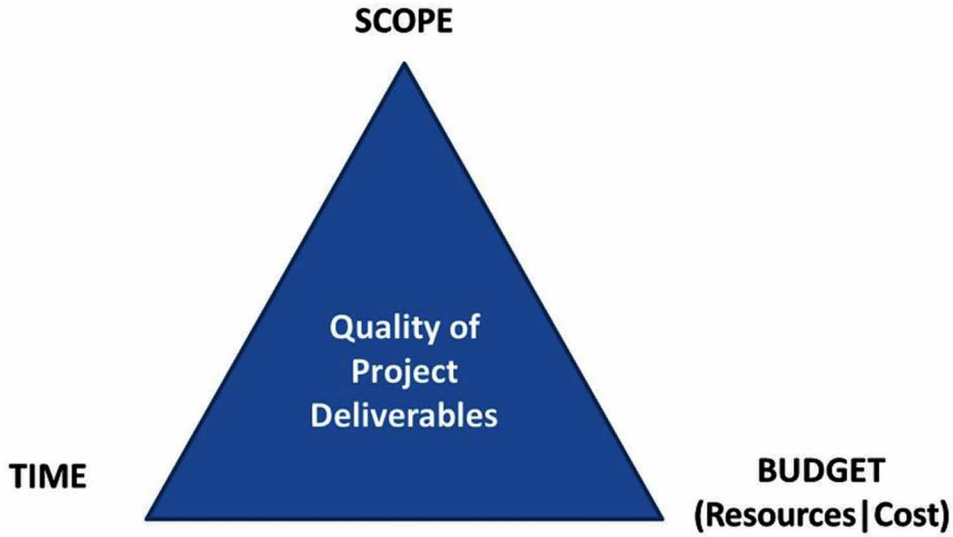
Once the maturity level is defined and the roadmap established accordingly, a critical mind remains of utmost importance. Even with a clear direction being defined, the use of best practice models has to be seen as a facilitator within a larger dynamic, rather than as an omnipotent catalyst.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Maturity for Project and Resource Management

Traditionally, project fundamentals are represented by the Project Management Triangle composed by time, resources (or cost) and scope – and eventually throughput for Kanban –see Figure 4– (Steyaert, 2016). The idea is that project success is driven by a balance between different constraints.

Figure 4. The Project Management Triangle
Source: Steyaert, 2016



Although the concept is widespread, it is not straightforward to have project management and resource management managed optimally together in reality.

Some companies give people extra work, without taking into account other pending tasks; or they ask people to work longer to solve delays, rather than looking at the real causes (e.g. lack of prioritization). Sometimes, there is some progress coming from an increased awareness for the matter. A lack of factual information, however, tends to take away the oxygen that can turn sparks into a fire powering the engine of advancement.

The lack of appropriate tooling is a frequent reason for which resource management is not well done. This can be even more the case for teams working in different locations or subject to other cultural habits with regards to planning and resourcing.

Although (the will to improve) project and resource management maturity is not directly linked to tooling, it does play a role in practice, as well in young companies as in well-established ones (Threon, 2015). It is therefore advised to set-up a clear governance, centrally and locally, before initiating the project.

Maturity for Strategy Management

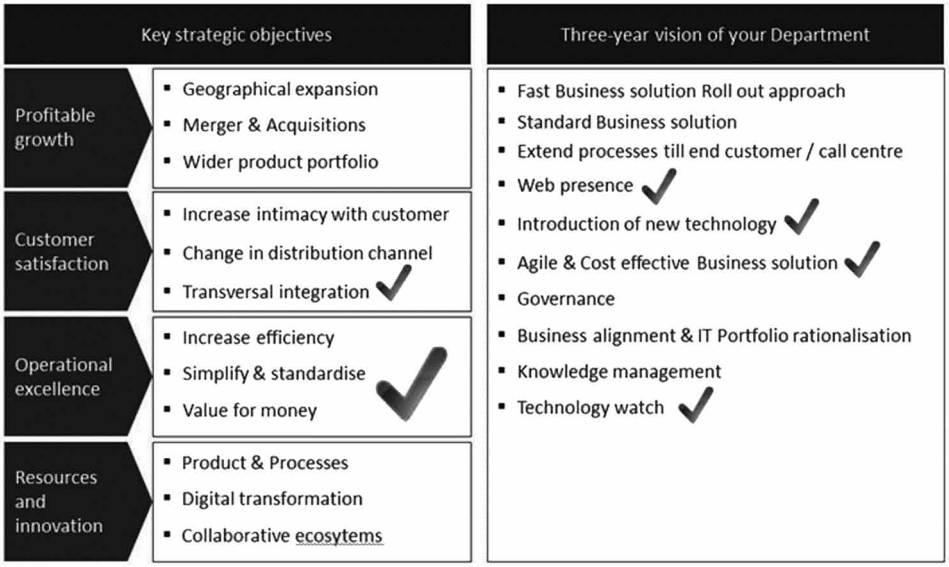
There is a strong dependency between corporate strategy management and the reality of project, resource and portfolio management. It is therefore essential to integrate the different aspects that are impacting in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

practice: the management of the contribution to the corporate and portfolio strategy, the communication on the strategy and the management of the resources.

A first attention point is the management of the strategy contribution. As such, programs have to contribute to the realization of the corporate strategy (Axelos, 2011), no matter if they are steered centrally or locally. To do so, it has to be factualized upfront to what extent each project has to contribute to the local strategy, and to what extent to the international ambitions of the company. This will contribute to solid foundations, but also, and especially, to a better understanding across the sites and mixed teams (see Figure 5).

Figure 5. Evaluation of the strategic contribution of the project, submitted in the business case
Source: Own elaboration



A second attention point is strategy communication outside of the executive floor. Project members often state that the company has no strategy, or that the strategy is too high-level or not clear (Couto et al., 2017). Assuming that most companies have a real strategy, this can be linked to a lack of qualitative communication. Obviously, it cannot be expected that everyone understands the repercussions of a strategy. It is the duty of managers, however, to ensure that the strategic pillars are cascaded down, in all sites and teams.

By doing so, people will understand more easily what path a company is following, understand the contribution project work can offer to the realization of the strategy, and come up with proactive proposals that can help to attain it (Bushnell & Stone, 2013; Groysberg & Slind, 2012).

A third attention point for strategy is resources. As mentioned, the balance of resources must be monitored carefully across the different contributing resource pools. Otherwise, project portfolios do not always deliver their full value to the realization of the strategy. Moreover, projects that do deliver the defined scope despite resource constraints risk to do it at the detriment of time, quality or budget. This, in turn, involves a risk for the bottom line contribution to strategy.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Overall, maturity of strategy management goes thus beyond international blue oceans (Kim & Mauborgne, 2015), or deciding on top down silver linings for local realizations. As explained, strategy management needs to be seen from a systemic angle to make it fit within the corporate reality of program ecosystems that require a company to reach global targets through coordinated, multi-national delivery.

Maturity: Risk Factor or Managerial Lever?

People can react in different ways to a maturity diagnosis, especially when the maturity level is below expectations.

On the one hand, managers can, based on cultural or personal convictions, decide to neglect the low maturity, either because it is not seen as a priority, or because the potential impact is regarded as unimportant. Some might be reluctant to act as long as they don't have the mandate for it (Axelos, 2011). Similarly, it can demotivate people. Some might even get angry at key actors on managerial level in an attempt to find a guilty responsible.

Undeniably, it can be harsh to be faced with a factual indicator of a lower than expected maturity. Some cultures tend to be more sensible for matters potentially associated with "losing face." It can even trigger fear of failure, given that "over-managing" in an "under-performing" environment raises the risks of recurring failures (Gulla, 2012).

On the other hand, the fact that the maturity is below expectations can be handled as a genuine variable on which actions can be taken, at least in some regional teams. It becomes then a lever to canalize non-factual discussions and trigger an improvement roadmap in line with reality.

While waiting for the maturity roadmap to be materialized, some might start the development of tools to compensate for a low(er) maturity. A more potent approach is to use the maturity as a managerial lever for additional support. This requires more preparation because of the involved political/human dynamics, especially in culturally mixed contexts. The author refers to dedicated literature for details on stakeholder management and organizational negotiations (Axelos, 2011; Cameron & Quinn, 2011; Couto et al., 2017; Laloux, 2014; Todnem By, 2005).

The advantages, however, can be multifold on the short term: having a priority review of projects within the portfolio, obtaining additional resources or budget, obtaining the adaption of timelines, or negotiating significant reallocation of the workload of resources among regions.

In complement, managers can request more structural actions beyond the borders of the individual project portfolios to senior stakeholders.

To further inject quality, it is worth considering experience exchange with non-competing companies in an internationally comparable situation. Depending on the cultural habits of informal networks, this is done through personal or professional networks.

Case: Monnet Chocolate

Companies

To give more depth to the maturity picture, a concrete example will be shared. While illustrating real-life experience, the name and specificities of the concerned company have been adapted.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Corporate Context

Monnet Chocolate Europe is the European entity of an international chocolate manufacturing company. Throughout the 20th century, it has grown organically through acquisitions of competitors. Later on, it has been integrated in a multi-product conglomerate. Despite its group obligations, Monnet Chocolate Europe is relatively autonomous for its operational strategy.

It manages an extensive project portfolio, ranging from ERP supported transformation programs to technology projects for external business development. A marginal percentage is managed through agile.

Organizational Maturity and Strategic Support

In the beginning of the reference period, Monnet Chocolate's maturity for project and portfolio management was evaluated between 1 (Reactive) and 2 (Emerging Discipline). Internal processes were focused on the management of critical projects. All projects had a budgetary estimate. There was a growing desire to have project processes standardized. Prioritization and strategic alignment only happened in theory, however, given that all projects had to fight for resources, and struggled against conflicting deadlines within the same portfolio.

On strategy, the portfolio ecosystem faced a lack of communicational transparency. The strategy was well understood and taken into account by most senior stakeholders. Conversely, non-senior stakeholders often stated that the company had no strategy or that the strategy was not tangible enough. This was mainly due to incomplete communication, or a lack thereof. This created frustration within the projects and weighed upon the project and portfolio managers.

Resource Management, Project Management and Factual Data

One of the most impacting weaknesses was the relation between resource and project management.

Projects suffered either from a lack of resources or from resource over-allocation. Resource conflicts were managed reactively rather than structurally. Solving a bottleneck from one resource, for instance, was not a guarantee that it would not happen again shortly after.

On portfolio level, senior management did not evaluate spillover risks either. Periodically, costs and time pressure were rebalanced by involving resources from other countries. While softening peaks, it did not prevent problems from happening again as root causes remained unsolved.

No factual information was available about (non) project workload. A centralized tool supported the matching of project constraints and resource management, Planview Enterprise. However, it was not used by all programs yet, neither for all non-project work. The resulting view was thus incomplete. This reduced a part of the added value of the tool and weakened the adherence to the process.

Bottom-line, managers risked to deliver projects late or at a higher cost, while stretching resources beyond their limits. This was even at the risk of losing people, as awareness for burn-out was nonexistent in most regional pools.

Impacts

Overall, managers experienced the repercussions of the lack of maturity on several levels. Resource management conflicts impacted progress and delivery, as well as the morale of the teams. The delivery

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of priority programs was at risk, as well as the delivery of non-priority (but still scheduled) projects. Altogether, this reduced the ROI and the contribution to the strategy.

In addition, managers were faced with drastic reduction of potential levers. Using problems as an opportunity for change – or as a means for negotiation – is usually a potent management tool. But as situations lacked factual information and structure, nothing tangible was available to negotiate about.

Mitigation

To tackle the recurring problems, the CIO and the Governance Officer decided to set up a central Project Office. Its task was to factualize the portfolio reality and shape the portfolio foundations.

The initial focus was the development of a center of excellence. Existing approaches were centralized and best practice sharing was stimulated. In complement, the interaction between resource and project managers was improved by reinforcing the support for Planview usage. To do so, the fundamentals of project and resource management were re-explained, and periodic explanations were given illustrating the concrete value for managers, beyond their cultural and regional habits. In parallel, reviews worked on improving the data quality.

In a second stage, a review process on resource capacity management was started across the European resource pools, with a focus on the organizational units and/or projects that were most mature. Later, this approach was extended to other perimeters. Gradually, this unfolded into an international cross-portfolio follow-up.

To complete the 'single source of truth' – based management, a monthly review was started of portfolio KPIs. The goal was to objectivize the 'word-of-mouth' and mitigate where needed.

HR wise, project careers were embedded in development paths. As for management challenges cascading from the permanent organization to the temporary units, experience exchanges were set up between senior stakeholders and managers from other companies, as well as with reference users of specific tools.

Results

After two years, Monnet Chocolate Europe's maturity rose from 1 to 2.4. Senior business and IT stakeholders, as well as the community of project managers, evaluated that the main gains were the existence (and operational use) of a portfolio follow-up on KPIs and resources, the adherence to best practices, and the evaluation of roadmap timelines.

Indirectly, the company reinforced the positive effect by creating burnout prevention groups throughout its different sites.

To attain level 3 and have real portfolio prioritization bodies that are actively linked with strategic discussions and allow managers to be in control, significant efforts are still needed. Aforementioned initiatives need to be continued to create a sustained dynamic, covering the full perimeter of the temporary and permanent organization.

Ultimately, the company has to strengthen the portfolio capabilities, to ensure that the leading roles are - or can be- managed by internal resources. This will greatly contribute to a more constructive and potent climate across the different sites for all project managers.

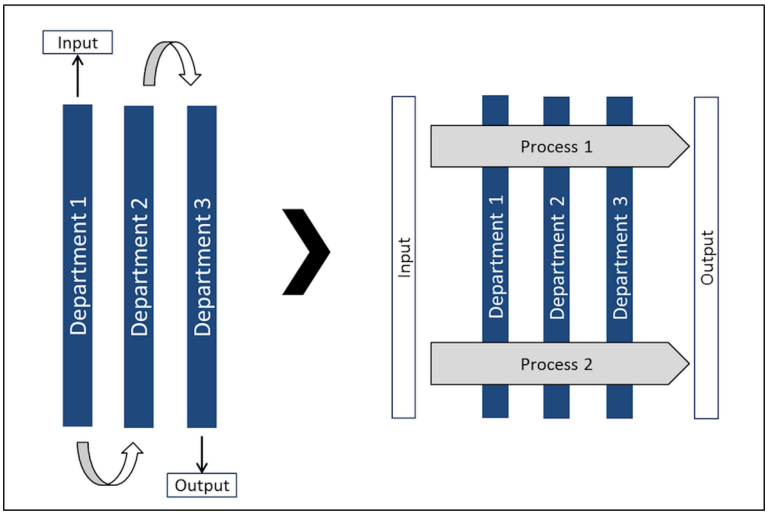
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Expertise, Pragmatic Solutions, and Organizational Bridges

In addition to integrating the cultural essence and maturity of the ecosystem, managers that want to be internationally successful have to look beyond their expertise and experience. They should also invest in building organizational bridges.

As such, corporate silos are necessary (see Figure 6). They provide the structure that allows companies to function. On the other hand, they also cause structural problems potentially impacting internal or external customers, locally or globally. Some decisions need therefore to be made across silos. Managers should connect, and eliminate problems caused by silos, rather than tearing them down. As indicated by Smith & O'Connell (2012), cooperation, communication and understanding other departments' priorities are foundational to break the barriers.

Figure 6. Silos should be connected
Source: Own elaboration



Best practices exist to do so, but they should be seen as guiding inspiration, rather than as rules that provide their full value when being strictly applied (Office of Government Commerce, 2010).

To adapt approaches to the reality at stake, different types of information need to be taken into account. A first set of information is related to the change reality of the organization. This can be tuned in based on the insights obtained with the diagnostic tools explained in section 1.

A second one is related to the cultural identity of the team members. When managing large roll-out based projects, for instance, it is advised to integrate the cultural aspects in the organizational backbone.

Earlier mentioned Belgium-based Monnet Chocolate integrated specific traits of Russia (people only execute requests from their direct hierarchy), Brazil (many problems need informal fixing), Italy (human respect is key) and others, by having a local manager of each country join the executive force of their international transformation. This enabled them to combine a proven methodology with local adherence.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

When shaping transversal bridges, the perceived value has to be taken into account. This implies reconciling a sound approach with pragmatic solutions. It is namely not through the perceived complexity of a solution that people get convinced and adhere, but through its clarity and feasibility (Rad, 2017).

In Kaizen, for example, immediate realization is (to a certain extent) favored over ultimate perfection. Similarly, the software development world is opting for "good enough" solutions. This does not mean that quality should be neglected. It does reinforce, however, the need for targeted, pragmatic solutions, be it at the level of the managerial approach or for the final service/product.

To make the need for workable, transversal solutions more tangible a concrete example will be shared. While illustrating real-life experience, names and specificities of the company have been adapted.

Case: Hing-Ka

Managerial Challenge

Hing-Ka Europe is the European division of an international manufacturing company active in the aerospace industry. It was founded in the 1980's, as the European branch of a Japanese company, Hing-Ka, which itself is a subsidiary of a conglomerate.

The European division is active in the production of plane parts and the development of flight navigation solutions for the B2B market. The scope of the current case is the portfolio organization supporting flight navigation and autonomous flying projects.

The senior management team was facing a historical milestone. The products generating the major revenue share were potentially at risk, as multi-annual contracts were ending, while no new contracts were secured yet. At the same time, the historical comfort had resulted into a contented mindset amongst the employees towards the development of new opportunities. There was thus a high risk to turn virtually overnight from a stable, iconic company with steady results into a fallen, extenuated glory.

Double Dynamic

To tackle this risk, the senior management team set in motion a double dynamic, supported by the regional vice-president.

A first aspect of this dynamic consisted in changing people's mindset. It decided to move from a traditional 'project delivery' environment to an organization driven by market development, innovation and premium quality delivery. Employees were asked to come out of their comfort zone and engage actively in this new dynamic, be it locally, or across the national borders.

In parallel, a taskforce-driven project was launched, consisting of a cross-departmental audit, and the realization of the related change. Its goal was to identify the zones of improvement that had to be worked on to make the switch happen in reality. It covered the entire process, from the idea generation to final customer acceptance. The task force was a mixed team led by an internal and an external expert.

Concretely, the work was split in three phases: Firstly, team interviews captured the essence of what worked and what didn't. Secondly, mixed teams joined off-site for a detailed explanation of the company's vision and strategy, and a group review of the (anonymized) outcome of the interviews. This helped to identify the core problems for which causes and solutions were identified and shared. This offered a good view of the main action zones. Thirdly, corporate fundamentals were reviewed in detail (project portfolio, project process, project roles) and combined with earlier collected input.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The resulting actions were the base for targeted clarifications, improvements and changes, all aimed at contributing to regenerating the company from the inside to kick-start its jump forward.

Actionable Outcome

The effective impact of the approach has to be further evaluated over a long period of time. On the short term, this approach has however proven to fit to the challenges Hing-Ka's managers were facing for the internal rebirth and the development of opportunities across their pan-European portfolio.

The involvement of blended teams, for instance, set the foundation for the adherence to business acquisition focused changes and organizational shifts senior management put in motion later on. This has been particularly true for collaborations with French, German, Japanese and Belgian teams.

Similarly, the fact that the approach was hands-on and guided by expertise contributed to results that were perceived as close to reality, while still ensuring a change forward.

Transversally, business development teams and engineering teams are now more closely involved in a cross-fertilizing innovation process. This leads to a collaborative climate that favors customer and result focused innovation.

Lastly, throughout the entire project, quick wins had to be reconciled with lasting structural efforts. The resulting outcome was therefore closer to a good enough than to ultimate perfection. But, in the end, it enabled the management team to move forward significantly enough in the chosen direction, while still ensuring continued delivery in an internationally very challenging context.

Managing Internationally: The Digital Age

A specific type of shaping is expected in Digital Transformation contexts. Digital Transformation is a process in which human and corporate society is shifted to new ways of working and thinking with digital and social technologies. It involves a change in leadership, a different mindset, the encouragement of innovation and new business models, and an increased use of technology to improve the customer experience, locally and globally (Terrar, 2015).

Customer experience alone, for instance, is seen as a clarion call for CIOs, as avoiding complexity – and resulting efficiency drains – requires working on the cross-pollination across disciplines (Wharton, 2015). Doing so benefits namely the understanding of the skills and processes of the different teams. This, in turn, opens the possibility to better collaboration, cleaner solutions and increased value for the customer.

The success of Digital Transformation goes through integrating technological possibilities and dynamic customer journeys in the corporate DNA. Doing so obliges managers to mastermind a new way of functioning, new perspectives on projects and processes, and create a new dynamic that, in the end, will allow their companies to be more in the driving seat of the 'global' Fourth Industrial Revolution.

Before analyzing strategy development or actionable translations, it is important to agree on what Digital really is. For some, it is about increasing international technological strength. Others see it as collecting zealous amounts of data, being in constant communication with customers, or completely reshaping the company.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Anticipation and Adaptability

Digital is a dynamic sequencing of each of the above. It is a new way of thinking about service and product delivery, about organizing a company, about interacting with the larger ecosystem - and about creating value. Digital Transformation is thus not about technology itself, but about how companies integrate it to transform their businesses and shape the way of working.

With data collection happening through apps, for example, people can be seen as customers that use the apps' services. But as data generated by people are increasingly managed by the people themselves, consumers are, for instance in healthcare, turning into suppliers. This leads to the obligation to rethink products or develop new services (De Brouwer, 2015).

Embarking on Digital is thus about outlining and managing a dynamical way of working. With a clear strategy, skilled people and powerful data, digitally activated companies should namely get a fine-grained sense of the relations between customers and their ecosystem, take proactive decisions and, ultimately, adapt their business models to share and tune people's journey-focused experience.

Strategic Vision: Models and Methodologies

Professionals have developed tools that make this reinvention process more tangible and the outcome more actionable towards the thriving management teams.

A baseline can be built based on the Digital Quotient. This metric for the digital maturity of a company has been developed by consultancy McKinsey, based on an evaluation of 18 practices related to digital strategy, culture and capabilities, in 150 companies around the world (Catlin et al., 2015).

Companies can shape their digital road map by making choices with regards to the components of the Digital Quotient: Building a Strategic Commitment to Digital, Developing Digital Capabilities, Creating an Adaptive Culture, and keeping an Internal Coherence towards the realization of the Digital Strategy. This vision is the foundation for future actions, and the management with a clear sense of direction.

A holistic approach to structure the strategic digital thinking from conception up and until the realization has been developed by Caudron & Van Peteghem (2014). The 'Digital Transformation Modeling' methodology aims at clarifying the potential impact of Digital on an organization's activities, create future scenarios and build a plan based on these insights.

In essence, the process consists of five steps: Creating insights, Assessing potential impacts, Developing scenarios, Building Business Case(s), Staying alert through trend-watching. Figure 7 illustrates the assessment of potential impacts for an existing consultancy company. For an in-depth analysis of the framework, the author refers the reader to Caudron & Van Peteghem (2014), and Janssens (2017).

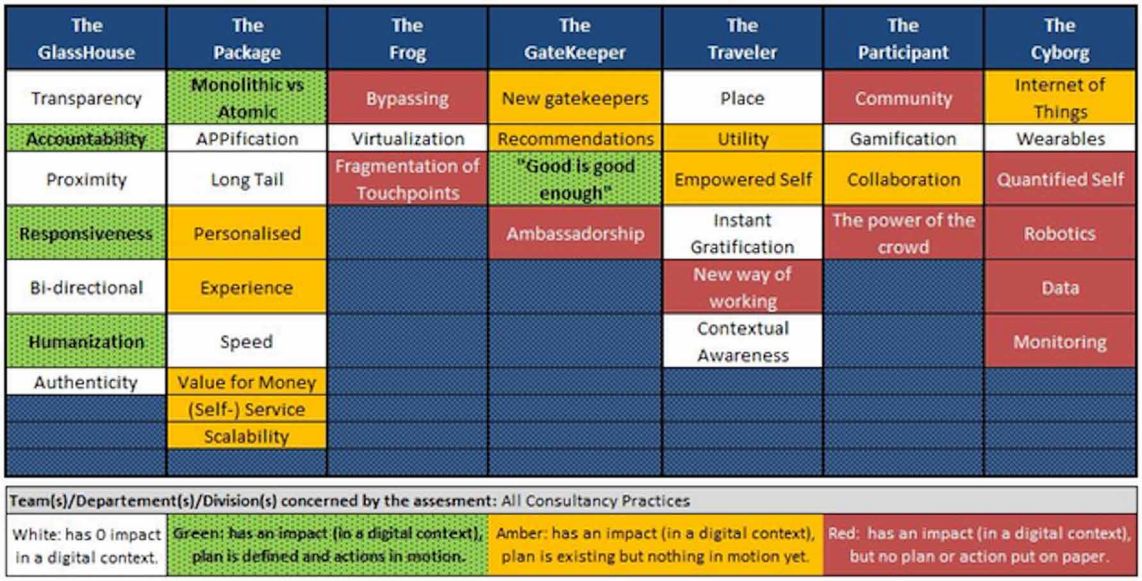
Skills and Big Data Power: Seize for Success

Healthy ambition requires that an organization gives itself the technical and human means to succeed. For the Digital journey, transversal capabilities can be developed by focusing on customer value, data experimentation, ecosystem collaboration, digital platforms, and maturity. In geographically or culturally hybrid contexts, specific attention will be needed on maximizing the blended potential.

The analysis of the different technologies is not in scope of this chapter. An element to keep in mind, however, is that technological possibilities need to be balanced with the potential budget as well as with

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 7. Evaluation of the drivers of impact for an existing consultancy company
Source: Own elaboration



The GlassHouse	The Package	The Frog	The GateKeeper	The Traveler	The Participant	The Cyborg
Transparency	Monolithic vs Atomic	Bypassing	New gatekeepers	Place	Community	Internet of Things
Accountability	APPification	Virtualization	Recommendations	Utility	Gamification	Wearables
Proximity	Long Tail	Fragmentation of Touchpoints	"Good is good enough"	Empowered Self	Collaboration	Quantified Self
Responsiveness	Personalised		Ambassadorship	Instant Gratification	The power of the crowd	Robotics
Bi-directional	Experience			New way of working		Data
Humanization	Speed			Contextual Awareness		Monitoring
Authenticity	Value for Money					
	(Self-) Service					
	Scalability					

Team(s)/Departement(s)/Division(s) concerned by the assesment: All Consultancy Practices

White: has 0 impact in a digital context.	Green: has an impact (in a digital context), plan is defined and actions in motion.	Amber: has an impact (in a digital context), plan is existing but nothing in motion yet.	Red: has an impact (in a digital context), but no plan or action put on paper.

the company's appetite for change. By the same token, the ability of leaders to take an active role in the transformation is decisive when choosing suitable technology.

Secondly, organizations need to scale *towards* and *for* success. If the ramp-up results in high interactivity with the customers' ecosystem, for example, it is possible that data volumes will quickly skyrocket. If this sudden growth is not managed, the digital drive will be refrained, which may result in a negative cycle. Sizing for growth and success is thus essential.

Lastly, data power implies virtually always Big Data. In 2014, human and machine data was expected to reach 40ZB by 2020. In 2017, IDC expected the growth to continue further to 163ZB by 2025 - of which a quarter in real-time (Reinsel et al., 2017). Managing intelligently with the data fuel in mind is therefore vital.

Empowering Digital People

Bringing a technically prepared and data fueled company digitally onboard requires sound management and skilled people. People might have to change their way of working or the way they are organized. It might even involve the investment in talent and new skills.

People need therefore to be hired with a passionate enthusiasm about digital, a healthy level of 'functional craziness' and seasoned to think beyond the traditional silver lining.

At the same time, management of skills disruption is an urgent concern in the Digital Age, and the rate of skills change accelerates across old and new jobs (Schwab & Samans, 2016). To be compatible with this relentless skills change, companies need thus to look for people that are open to frequent change and that can adapt easily.

To ensure compatibility, managers need to create a stimulating environment. Notwithstanding periodic debates on whether quirky office layouts result in better output, it is clear that stimuli are a must.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In the Silicon Valley, methods are available in spades, going from Google Ventures' techniques to more anarchic approaches (Bushnell & Stone, 2013). As such, it comes down to creating a climate and culture where thinking beyond the traditional references is stimulated.

In complement, it can be fruitful to review periodically ideas discarded early in the business process, to see if no hidden gems were thrown away. Atari, for example, listed the six worst ideas of the past period and brainstormed on how to turn them into good ones. At worst, it offered precious lessons. At best, products became a success (Bushnell & Stone, 2013). Google has been following a comparable approach.

Secondly, managers need to nurture their people for and with Digital. High performers have namely a beneficial influence on company results and potentially on other colleagues. It is thus important to think upfront about how to retain them. With predictive HR management, companies can anticipate employee expectations and identify needs for mentoring, while taking into account cultural particularities. By doing so, employee engagement will be stimulated. In turn, this will lead to increased bottom line productivity.

Thirdly, managers need to learn to talk digital. They do not need to know everything. They should be able to ask questions to their teams, however, and understand the answer. Digital teams tend to be culturally mixed, implying different human expectations. Latino workforce, for instance, has a more humility driven way of career management than American people. Nevertheless, a manager showing sincere interest creates respect among passionate people. It will reinforce faith in the company's digital culture and will cascade to other employees.

Having the appropriate human capital on board is thus one of the cornerstones to manage digitally. This implies creating an appropriate environment and culture, nurturing people, and managing them with a solid understanding of what digital means for them.

Dynamic Feedback and Agile Projects

In pre-digital times, companies were designed to gain market share. In the Digital Economy, companies need to be designed for reactivity, flexibility and agility. The challenge is therefore to build an integrated operational backbone that embraces a continuously evolving service backbone, and shape the respective capabilities, while implementing a clear, but dynamic (digital) business strategy (Ross, 2016).

A fair share of this nimble way of working is coming from agile software development: rapidly creating prototypes, testing them, and getting releases out smoothly. This philosophy is also influencing the development of business deliverables, given that data powered services are driven by software engines.

For details on agile approaches, the author refers to dedicated literature. But some attention points should be taken into account.

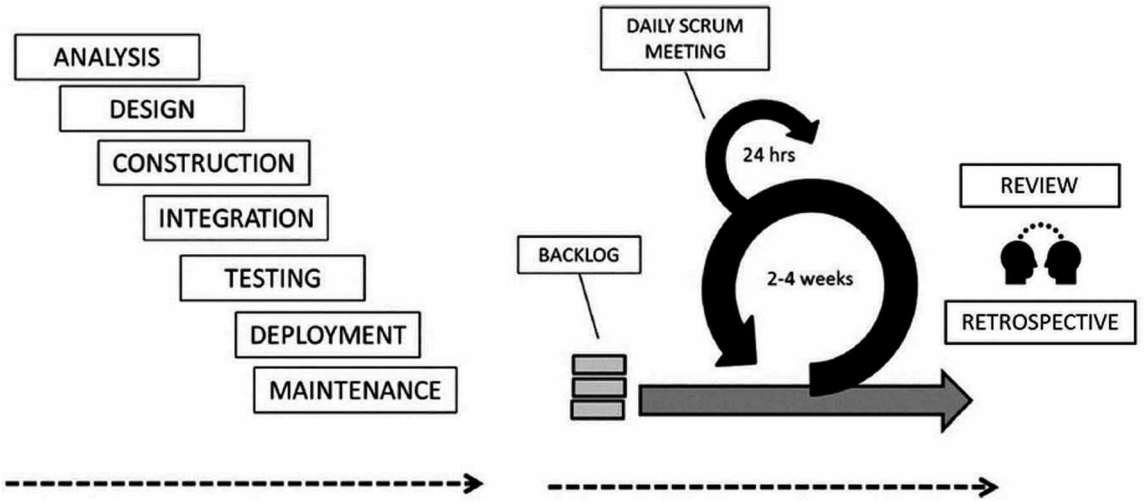
Firstly, the fluidity associated with agile requires discipline of the main actors. Scope control, failing fast and regular iterations are part of the core principles. The success of agile comes thus from the unconditional availability of decision takers towards rapid feedback.

Secondly, follow-up loops need to be managed carefully. No matter if they are scrum or Kanban, they need to aim at quality. Indirectly, this implies that baselines are important to fuel further improvement (see Figure 8).

Thirdly, agile perimeters might have to integrate with more traditional ecosystems. To make such hybrid contexts work, managerial compromises have to be made, despite eventual cultural tendencies to keep approaches unchanged. When agile subsets are inserted in a waterfall environment, they have to work with less autonomy and with a different time perspective. Similarly, waterfall entities will have to adapt to a flexible way of working.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 8. Combining waterfall approaches and agile might be needed
Source: Own elaboration



Also, radically simplified management theories (Laloux, 2014) have a strong potential, but need to be taken with a grain of salt. They might seem compatible with going beyond traditional ways of working. Nevertheless, Digital still needs structure and guidance. Simplification should not equal chaos (Rad, 2017). Simplification should be limited to a lean way of working, rather than going for a deconstruction of supporting governance.

Lastly, the overarching focus on agility should not become a goal on itself. In a dynamic environment where decisions have to be made based on continuously evolving insights, managers should be able to develop their quantified intuition and take decisions that make a difference. The aim of agility is therefore to be in support of the overall goal: providing appropriate solutions to customer needs and preferences.

FUTURE RESEARCH DIRECTIONS

Companies are either international by nature or global business dynamics turn them into internationally challenged players. This obliges managers to stay sharp. This is especially the case in portfolio contexts, as they are essential for the realization of the company's strategy.

In practice, this requires a combination of leadership skills and managerial means. Integrating these complementary components contributes to canalizing efforts and unveiling potential. Such environments are, however, evolutionary by nature. It is thus essential to continue to nourish the management toolbox.

A possibility is to go beyond the fine-tuning of existing models. Complementary value could be obtained by analyzing the constraints that come with increasingly hybrid portfolios. Similarly, cross-pollination of permanent and temporary organizations should be further explored.

In the same train of thought, as steady expansion of agile will lead to an increased importance of human trust, self-organization and delegated ownership (Rad, 2017), future research should analyze ways to stimulate ownership. As projects are at the cross-roads of present and future, this implies taking

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

into account the generational heterogeneity and the broad spectrum of expectations/needs inherent to culturally and/or geographically blended teams.

Lastly, attention should be paid to the influence of evolutions driven by increased automation and artificial intelligence (AI). Beyond being consequences of technology spurred business models, both evolutions shift jobs from white to blue collar, and involve requirements on technology and business for which many organizations are not necessarily mature yet in the same way in every geographical sub-area.

Further analysis of such ecosystems could provide precious insights on how to further improve portfolio management in times of increased Digital Darwinism.

Obviously, best practices will require regular revisiting as this context is in constant evolution. But the author believes that the recurring efforts will be largely compensated by the advantages in quality and outcome of the concerned managerial portfolio guidance.

CONCLUSION

Given the speed of innovation and dynamic competition, managers need to regularly sharpen their skills and competences to allow them to achieve success in international environments.

Successfully managing and shaping change within project portfolios and organizational ecosystems assumes the integration of some important variables. The chapter shed light on specific 'project management science' insights and managerial soft skills that can contribute to a sound management, if they are balanced intelligently.

Firstly, it has been explained that managers of international projects need to stay tuned with the local reality while working towards their corporate targets. Insights have been given on how to perform change diagnostics to capture the site-specific change climate, the stakeholders' feeling and the project impact. Illustrating it with a company putting in place a transformation portfolio has offered an understanding of the knowledgeable value of these insights.

Secondly, a complementary emphasis has been put on capturing and using the organizational maturity. Several frameworks were highlighted and a foundational one has been put forward to increase the understanding of the ecosystem in which international project managers work. An experience based example has shown the tangible potential before and after activating the maturity in the managerial toolbox.

Thirdly, it has been emphasized that crafting solid management implies to tune best practices to a knowledgeable approach for the full value to unfold. An equally important quality for managers desiring to have a lasting international footprint is to invest in transversal collaborations, while keeping the strategy and the management philosophy in mind.

Lastly, several elements have been combined in digital contexts, where companies face global challenges due to the changing value proposition. Essentials have been explained to shape a digital strategy and manage digital teams.

By combining theoretical insights with empirical examples, the chapter aims at offering a big picture view, and paving the way for joint exchanges between academic knowledge and field shaped expertise. Consequently, the author believes that further synergies between temporary and permanent environments will lead to bidirectional insights and best practices, that will also benefit the guidance by managers of hybrid portfolios that combine both identities in geographically blended environments.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Asvadurov, S., Brinded, T., & Brown, T. (2017). The art of project leadership: Delivering the world's largest projects. *The McKinsey Quarterly*.

Axelos. (2011). *Managing Successful Programmes*. Norwich, UK: TSO.

Bushnell, N., & Stone, G. (2013). *Finding the Next Steve Jobs: How to Find, Hire, Keep and Nurture Creative Talent*. London: Headline Publishing Group.

Cameron, K. S., & Quinn, R. E. (2011). *Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework*. San Francisco, CA: Jossey-Bass.

Catlin, T., Scanlan, J., & Willmott, P. (2015). Raising your Digital Quotient. *The McKinsey Quarterly*.

Caudron, J., & Van Peteghem, D. (2014). *Digital Transformation: A model to Master Digital Disruption*. BookBaby.

Chrissis, M., Konrad, M., & Shrum, S. (2011). *CMMI for Development: Guidelines for Process Integration and Product Improvement*. Boston, MA: Addison-Wesley Professional.

Couto, V., Caglar, D., & Plansky, J. (2017). *Building Trust While Cutting Costs.* Retrieved from http://www.strategy-business.com/

De Brouwer, W. (2015). *The Era of citizen Doctors.* Retrieved from https://www.scanadu.com/blog/the-era-of-citizen-doctors

Deloitte. (2016). *Deloitte's 2016 Global Outsourcing Survey*. Retrieved from: https://www2.deloitte.com/

Forrester, E., Buteau, B., & Shrum, S. (2011). *CMMI for Services: Guidelines for Superior Service*. Boston, MA: Addison-Wesley Professional.

Groysberg, B., & Slind, M. (2012). *Talk, Inc.: How Trusted Leaders Use Conversation to Power their Organizations*. Boston, MA: Harvard Business Review Press.

Gulla, J. (2012). Sevens Reasons IT Projects Fail. *IBM Systems Magazine*. Retrieved Dec 13, 2016, from http://www.ibmsystemsmag.com/

Hickey, C., Loveall, J., Orr, J., & Klaussman, A. (2011). *The Legacy of Space Shuttle Flight Software*. Reston, VA: American Institute of Aeronautics and Astronautics. doi:10.2514/6.2011-7307

Janssens, J. (2016). Blending Technology, Human Potential, and Organizational Reality: Managing Big Data Projects in Public Contexts. In A. Aggarwal (Ed.), *Managing Big Data Integration in the Public Sector*. Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9649-5.ch007

Janssens, J. (2017). Digital Transformation journeys in a Digitized Reality. In M. Khosrow-Pour (Ed.), *Encyclopedia of Information Science and Technology*. Hershey, PA: IGI Global.

Kim, W., & Mauborgne, R. (2015). *Blue Ocean Strategy, Expanded Edition: How to Create Uncontested Market Space and Make the Competition Irrelevant*. Boston, MA: Harvard Business Review Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Laloux, F. (2014). *Reinventing Organizations A Guide to Creating Organizations Inspired by the Next Stage in Human Consciousness*. Leuven, Belgium: LannooCampus.

McMahon, P. (2010). *Integrating CMMI and Agile Development: Case Studies and Proven Techniques for Faster Performance Improvement*. Boston, MA: Addison-Wesley Professional.

Mieritz, L., Fitzgerald, D., Gomolski, B., & Light, M. (2007). *Toolkit Best Practices: Program and Portfolio Management Maturity Model.* Gartner RAS Core Research, Retrieved from http://www.gartner.com/it/products/research/core.jsp

Office of Government Commerce. (2010). *Managing Successful Projects with PRINCE2*, 2009. Norwich, UK: TSO.

Paulk, M., Weber, C., Curtis, B., & Chrissis, M. (2000). *The Capability Maturity Model – Guidelines for Improving the Software Process*. Paris, France: Addison Wesley.

Project Management Institute. (2013). *A guide to the Project Management Body of Knowledge (PMBOK guide)*. Newton Square, PA: Project Management Institute.

Rad, N. (2017). *Agile as a disruption*. Brussels, Belgium: Presented at Agile Project Management Knowledge Sharing.

Reinsel, D., Gantz, J., & Rydning, J. (2017). *Data Age 2025: The Evolution of Data to Life-Critical.* IDC White Paper. Retrieved from http://www.seagate.com/www-content/our-story/trends/files/Seagate-WP-DataAge2025-March-2017.pdf

Ross, J. (2016). *Digital Disruption: Transforming your Company for the Digital Economy*. Retrieved from http://cdn.executive.mit.edu

Salacuse, J. (2004). *Negotiating: The Top Ten Ways that Culture Can Affect Your Negotiation*. Retrieved from https://iveybusinessjournal.com

Schwab, K., & Samans, R. (2016). *The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. Global Challenge Insight Report. Geneva, Switzerland: World Economic Forum P. V.

Smith, N., & O'Connell, P. (2012). *How Excellent Companies Avoid Dumb Things*. London: Palgrave Macmillan.

Sowden, R., Hinley, D., & Clarke, S. (2010). *Portfolio, Program and Project Management Maturity Model (P3M3): Introduction and Guide to P3M3*. London, UK: OGC.

Steyaert, P. (2016). *The Kanban Experience*. Humbeek, Belgium: Okaola.

Terrar, D. (2015). *What is Digital Transformation?* Retrieved from http://www.theagileelephant.com/what-is-digital-transformation/

Threon. (2015). *Optimized Resource Management.* Presented at the Innovation Week, Ghent, Belgium.

Todnem By, R. (2005). Organizational change management: A critical review. *Journal of Change Management*, *5*(4), 369–380. doi:10.1080/14697010500359250

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wharton. (2015). *Digital Transformation Reimagining the User Experience*. Philadelphia, PA: Knowledge@Wharton.

ADDITIONAL READING

Campens, H. (2011). *Organizational Change Management*, Presented at the Solvay Business Voice Series, Brussels, Belgium.

Caudron, J., & Van Peteghem, D. (2014). *Digital Transformation*. Tielt, Belgium: LannooCampus.

Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2013). *Embracing Digital Technology*. Cambridge, MA: MIT Sloan Digital Review.

Gluck, F., Kaufman, S., Walleck, A., McLeod, K., & Stuckey, J. (2000). Thinking Strategically. *The McKinsey Quarterly*.

Higgins, J. (2015). *Digital Transformation of European Industry and Enterprises*. Brussels, Belgium: DG Internal Market, Industry, Entrepreneurship and SMEs

Hinssen, P. (2014). *The Network Always Wins. How to Win in the Age of Uncertainty*. Ghent, Belgium: Mach Media.

This research was previously published in Managerial Competencies for Multinational Businesses; pages 150-173, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 61
Emerging Trends and Opportunities for Industry Development at the Sub-National Level in Russia

Leyla A. Gamidullaeva
Penza State University, Russia

Natalia S. Merkulova
Kursk State University, Russia

Ludmila I. Kryachkova
Financial University Under the Government of the Russian Federation – Kursk, Russia

Zoya A. Kondratieva
Financial University Under the Government of the Russian Federation – Kursk, Russia

Yulia A. Efimova
Financial University Under the Government of the Russian Federation – Kursk, Russia

Sergey V. Matukin
Penza State University, Russia

ABSTRACT

The authors believe that the transition to Industry 4.0 will have a strong impact on the level of urbanization in Russia. The level of urbanization is influenced by many factors, which include the level of economic development of the country, migration of the population, natural and climatic conditions. The highest level of urbanization is typical for industrialized regions. This suggests that it is necessary to develop industry and move to Industry 4.0. The purpose of this chapter is to show the relationship between urbanization and Industry 4.0, as well as to increase the level of knowledge about digital production, the internet of things, the Industry 4.0, and urbanization. The chapter explains the role of Industry 4.0 in the current changing environment. The chapter deals with the most important problems and opportunities of the fourth industrial revolution.

DOI: 10.4018/978-1-7998-7297-9.ch061

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

In this chapter the authors search for trends, which occur in the traditional sectors of the economy as a result of digitalization, and above all in the labor market, industry and agriculture, financial services and education. Modern information and communication technologies substantially change all social relations, in connection with the notes that now it's the formation of a new, information society, which is called the "digital economy". Despite the somewhat similar properties with traditional economic relations, it differs in some respects from them, which makes its relevance from the point of view of the interest of the scientific community. One of the key areas of the state development is economic. We should understand the "digital economy" as a lever of economic structure and the environment in general. Horizons are expanding, a window of opportunity is opening by the younger generation, which can realize their ambitions and knowledge, creating favorable secure social environment for our future.

BACKGROUND

Contributions to the development of the digital economy have been made by foreign researchers such as Stephen M. Mutula (2010), Ari-Veikko Anttiroiko (2008), Georgios Doukidis, Nikolaos Mylonopoulos, Nancy Pouloudi (2003), Ionica Oncioiu (2013), Elena Druicã (2017).

The use of digital economy in industries has been reflected in the science. In the world of scientific literature, this area of knowledge is presented with such authors as: Nikolaos Mylonopoulos (2003), Bob Ritchie, Clare Brindley, Pedro Isaias (2017), Di Francesco Virgilio (2017), Ionica Oncioiu (2017), Elena Druicã (2017).

However despite the large number of works devoted to digital economy, the specifics of applying it in different industries haven't been given due attention. Innovation and the impact of the digital economy on society provided the theoretical and practical approaches for its development, increasing the awareness of understanding the term "digital economy" and what advantages there are to ensure the information technologies and innovations as basic resources. The publication of Elena Druicã (2017) focuses on rethinking of classical economic theory in the context of new technologies, information and innovation that makes her publication the best research for economists and social researchers, academicians, professionals and practitioners. In the opinion of Ionica Oncioiu (2017) digital technologies support an important tool in the modern economy business. As the economy continues to change, companies are looking for solutions for the expansion and development of its organization.

In the information economy, handling and the exchange of information and knowledge are the basis of its activities. The U.S. economy, works well, because it was due to the revolutions in the field of information technology (IT), which influenced the growth, employment, inflation, and labor productivity. Fundamental factors, driving growth in these new economies include technological innovations, e-commerce and digital conversion, higher education and skills in the IT field, open trade and a balanced budget. According to Pedro Isaias, digital economy is the main driving force of change, innovation and competitiveness for different companies and entrepreneurs. Study of the development of these initiatives can be used as a basic tool for future business success (Isaias, 2017).

According to Di Francesco (2017) in the digital age, numerous technological tools are available to improve business processes. In case of effectively using, knowledge sharing and organizational success increase significantly. According to analysts of Microsoft, a key role in the further development of the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

world IT industry must be played by a mass adoption of the so-called "The technology platforms" - sets of compatible technologies, products and channels of distribution, as well as the ecosystems of their distribution and usage. The main elements of the new technology platforms are now considered: cloud computing, mobility, Internet of Things technology, big data analytics, business intelligence, and machine learning. Thanks to the cumulative effects of these advanced platform technologies there has been a gradual "transformation of products into services" and the expansion of the chains of value creation, delivery of goods and services, as well as the extension of the supply chains of human capital."(The term used by the chief economist of Microsoft Preston McAfee, 2017).

The world is constantly changing, and recently one can hear about the growing role of advanced technologies and innovations in the development of the economy. New technologies allow increasing the efficiency of production and business processes. Traditional approaches and methods of work are changing as the penetration of advanced technologies in all new industries and spheres of human activity.

The influence of digital technologies is at both the global and the local level. On the one hand, the digital economy as a collection of new industries is the fastest growing part of the world economy in the traditional sense. Recent years the development of new technologies has led to the emergence of huge markets for cellular communication, Internet services, online gaming industry and others. On the other hand, new technologies have transforming impact on some aspects of the work of the established economic entities that basically is replacing the analog working mechanisms - whether it is the means of communication or industrial machines - to digital or semidigital elements, as well as the further modernization - for example, the already existing.

The growth of the digital economy follows the growth a number of markets, directly related with digital and mobile technologies. The digital economy during at least 10-15 years will be heavily dependent on traditional one. At the current stage of technology development and the current status of the markets for digital economy should not be seen as a goal, but as a means to improve the efficiency of economic activity. In the age of computerization and high technology digital economy affects every aspect of life: health, education, Internet banking and government *(Vasin and Gamidullaeva, 2018).* Digital Economy has received stimulus in all developed countries including Russia. On the basis of foreign policy developments and global trends, Russia is solving the problem of global competitiveness and national security, and a digital economy development in the country plays a great role in this issue. Some elements of the digital economy have been already successfully operated. For today the process of making digital documents and data, the resolution of the electronic signature, the communication with the state also goes on the electronic platform.

MAIN FOCUS OF THE CHAPTER

Issues, Controversies, Problems

In 2018 there are several trends in the digital economy development in Russia:

Cyber Security

The issue of cybersecurity goes to a new level in the context of the growth of IoT and robotics, as well as the increasing cyber attacks. The budget for cybersecurity by 2017 has been raised to $19 billion, and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

worldwide amounted to more than $80 billion. The proportion of Russian costs is more than 55 billion rubles. According to Gartner, the world market turnover of cybersecurity by 2018 will be close to $100 billion. They discuss the possibility of banks in Russian system in coding and encryption. At the conference in Munich the Head of Communications of the Russian Federation Nikolay Nikiforov proposed to develop a common regulatory framework and international standards for advanced technologies. Russian companies, leading the activities on the international market, since May of this year must comply with the updated rules for the processing of personal data according to the rules of the GDPR.

Cross-Border Cooperation

Russian companies are actively integrated in international alliances that define the technological standards in the years ahead. In May 2017, the head of the company "Russian export" Igor Chaika signed an agreement of cooperation with Alibaba, under which the Chinese trading platform will open the Russian national pavilion for the implementation of food products and household chemicals. The prospect of such undertakings is obvious. Thus in 2017 by the initiative of the Russian export center the playground "Made in Russia" (sector B2B) began to work. Requests for products from the catalog come from different parts of the world: Africa, Asia and South America. As a result long-term international partnerships with participation of Russian manufacturers develop.

The Establishment of Common IT Platforms

This allows you to synchronize the digital solutions that stimulate the emergence of associations that are interested in the qualitatively different technology solutions. So in the summer of 2017 "Sberbank" and "Yandex" agreed on the establishment of a joint platform of electronic commerce based on aggregator of goods and services "Yandex.Market". The total cost of the updated project is estimated up to 60 billion rubles *(Gamidullaeva, et al., 2019).*

Another striking example is association of the Russian "Uber" and "Yandex.Taxi" into a single site online taxi, the deal will have been closed in 2019.

The Digitalization of Public Services

Setting a course for the digitalization, the state motivates the company to develop high-tech Resource and sets a plate of IT. Within the framework of the "digital economy" Russia plans to hold the internet in remote areas of the country, place the state docs in cloud storage facilities, to ensure that by 2025 it will provide 80% of the public services in electronic format. Also there is a plan for the establishment of 50 smart cities, the launch of the 10 sectoral platforms in the figure and the transition 10 enterprises in the high-tech format. For comparison a Denmark digitalization program was adopted in 2001. Population and business interact with the State primarily through online services, due to which the country annually saves $136 million.

B2B-Marketplaces

They replace morally obsolete electronic platform where everything can be sold by everyone. Aggregators of goods and services are the trend of the past 10 years; retail consumers are already accustomed to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

use them. Businesses also need comfortable conditions for online purchases and variability of methods of payment for goods and services category. So on the site Yorso there is convenient search for large amounts of seafood. Agro24 is a modern online platform to buy food. Such services appear increasingly, they're different in convenience and variety of search parameters of products.

In Russia, nowadays most of the issues arising in the use of information and telecommunication technologies in various spheres of activity are resolved. However, the regulatory environment has a number of disadvantages, which stop the formation of the new institutions of the digital economy, development of information and telecommunication technologies and related economic activities. The huge number of citizens of the Russian Federation recognizes the need for the possession of the digital competencies, but the level of use of personal computers and the Internet in Russia is still lower than in Europe, and there is a serious gap in digital skills between separate groups of the population.

The doubtfulness of program (mentioned above) is proved with the following:

- The successful functioning of more than 10 companies (operators of ecosystems), competitive in global markets", while maintaining focus on the export of oil and gas seems very unlikely;
- The successful functioning of more than 500 small and medium-sized enterprises in the field of digital technologies and platforms and provide digital services" is not typical for Russia, when all of the innovations come from small and medium-sized businesses.
- The number of graduates of higher education in the areas of information and telecommunications technologies is 120 thousand people per year" looks unbelievable. Now days there are 5000 students in Information Security, and 36.1 thousand students in Informatics and computer engineering. That is to achieve the target of 120 thousand we need to increase graduates in three times.

There are some advantages. How, for example, it can be that the digitalization will help accelerate the optimization of the cost of sectors of the economy, minimizing the deficit of services. More than there was a reduction of the number of hospitals and doctors. And for encouraging the patients, telemedicine is proposed for consultation, when the doctor, starting with the second reception, can give advice to the patient via the Internet. Time, money, the cost of logistics is saved, but the number of physicians can be discharged. It leads to the growth of unemployment. Similar innovations will affect and educational sector.

Risks and Problems

The following are just a few:.

- The threat of "digital sovereignty" of the country and the redefinition of the role of the State in a transboundary world of "Digital" Economy;
- Violation of privacy / potential surveillance of citizens;
- Reducing the level of data security;
- Reducing the number of employment of low and medium professional skills;
- Increasing the level of complexity of business models and patterns of interaction;
- Change in the behavior of producers and consumers;
- Need in reviewing the administrative and tax codes.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In such socio-economic conditions the development of different spheres must be implemented with the use of information and telecommunication technologies of a qualitatively new level that allows use data in digital form as a key factor of production; the information technology industry should provide the necessary platform and services. Undoubtedly the plan of development (spoken earlier) is very faithful. Indeed there are problems in industry such as: staff shortage, "brain drain", the lack of a unified environment, in which the technological leaders would unite the efforts to establish new platforms and etc. All this points are important tasks throughout the state.

Qualitatively and quantitatively opportunities to do through a computer almost everything will increase; for example, receiving a variety of services. It is cheaper and more efficient within adequate measures of protection. The digital economy is both advantage (compared with classical way), and the threat to society, because in many respects we should deal with data security. Therefore you need to plan at the same time, substantial costs, for example, to ensure the safety of money on accounts of people, their personal data. The central bank, for example, could create a special institute which would ensure the safety of financial information of physical and juridical persons. Within the framework of the Eastern Economic Forum (September 13, 2018) Experts called the problem of Russian digital economy and this is lack of normative-legal base.

THE INFLUENCE OF DIGITAL ECONOMY ON THE LABOR MARKET

The development of the digital economy has an impact on the labor market: changing the structure of employment, new requirements for professional competence and the growing demand for IT professionals in the field of information and communication technologies (ICT). At the same time, people working in all sectors of the economy, must have a digital literacy and digital information skills, using modern telecommunication and software products.

The digital skills – they're the competence of the population in the use of personal computers, the Internet and other ICT, as well as the intention of the people to acquire relevant knowledge and experience.

Depending on the purpose of the use of ICT there are two categories of persons with digital skills:

- **A Professional:** Professional skills are necessary for the development, operation and maintenance of the information and communication systems (preparation of specification, design, development, installation, operation, support, maintenance, management, evaluation, research and development in the field of ICT).
- **A User:** The skills are necessary for the effective use of ICT skills for work, study or personal purposes.

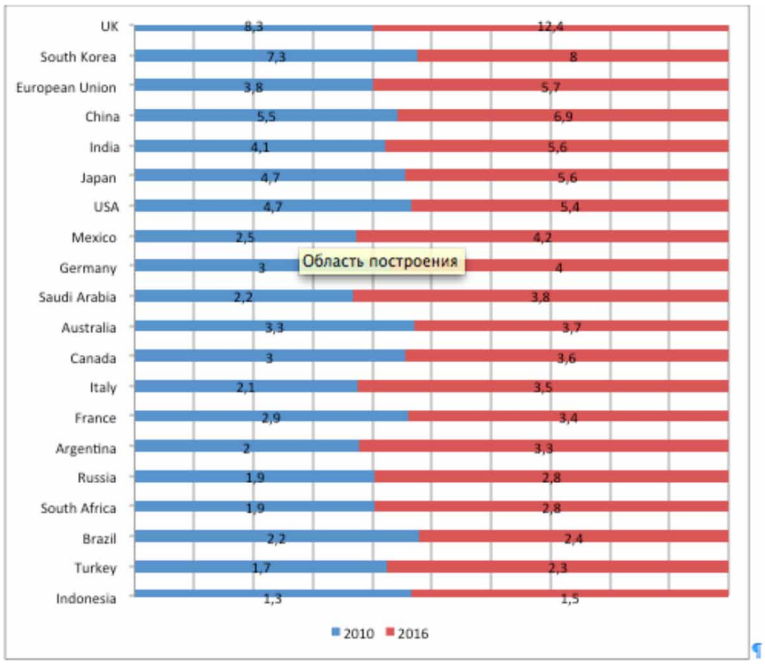
In 2015, the number of software developers and applications, databases and networks, specialists on ICT and ICT users, support of telecommunications and broadcasting - is estimated to be 1.2 million (approximately 2%). Specialists in information and communication technologies are relatively young: 38% below the age of 30, one third - 30-39 years. The total number of staff in these age groups is 22 and 27%. A quarter of IT professionals (23%) are working in the IT industry, 10% in the communications sector, about 20% in the financial sector, trade and public administration (6-7% of the total population are ICT specialists in communication technologies).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Information and communication technologies have become a part of our lives: four fifths of the population of the world (81%) aged 15 to 72 years has used a personal computer, the same situation concerns with the Internet. The quantity of daily network users comes closer to 60%. According to The Boston Consulting Group (BCG), the share of the digital economy (also called web or internet transition) to the GDP of developed countries has grown since 2010 up to 1 point and is now 5.5%. In developing countries this figure increased from 3.6% to 4.9% of GDP.

The UK is a world leader in the proportion of the digital economy in GDP. Sector which includes the IT and telecom, online trading, government spending associated with the internet, takes the second place in the economy of the country in the wake of the real estate and telecommunications manufacturing and trade.

Figure 1.



Dissemination of digital technologies in everyday life alters the path of access to services, information and knowledge. Rapid technological changes should make maximum use of the new opportunities offered by information and communication technologies, expanding the usage of digital technology to increase the demand for new skills. At the same time the key of effective implementation is the basic skills in the use of information and communication technologies that allow a person to deal with digital activities and adapt quickly to the new and precarious work.

Over the next 30 years the technology will overcome the biological limitation of human potential. The available devices that are connected through the Internet, will be able to transfer context sensitive information, which is directly related to our emotions. Exoskeleton and prosthetics in combination with the brain can make rights stronger and return mobility of older persons and persons with disabilities. The sensors and computers, embedded in contact lenses and the permanent implants will allow you to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

hear the whisper from the distance, give a natural night vision and allow you to immerse yourself in a virtual and supplemented by reality. Neurometabolic drugs increase the cognitive ability of the people and transform work and education.

In addition there is the evident global trend to robotizaion. Robots will be entrusted with the care of patients, procurement of supplies, the harvest, the maintenance of the company's infrastructure and providing many other services. Bots headed by the terabytes of data will be responsible for the automation of the business processes, training and the provision of services - functions and roles have traditionally been inherent in man. However, the expanding technologies are quite expensive, and those who cannot afford such upgrades, will not be able to compete in the augmented economy. Network accessories will also become an attractive target for hackers who want to control the mind and body. Robotics may lead to an increase in unemployment.

The population survey on the use of information technologies and telecommunications networks, conducted by the National Statistical Service, showed that the most common computer skills are related to the text editor (Used 42% of the respondents), transfer files between computer and peripheral devices (29%), work with tables (23%). The proportion of "advanced" users who can change the configuration of the software, is not more than 3%, the same data applies to people who have the possibility to install or reinstall your operating system. The task to write software, using the power of programming languages, is normal for only 1% of the population in this age group.

The skills to use the software for editing photos, video and audio (21% of the population), show that Russia is almost at the same level as Ireland (23%), Czech Republic (21%), Cyprus (20%). In Luxembourg, Denmark, Finland and the United Kingdom, these computer operations can perform every second. At the level of the development of the digital literacy it is possible to estimate data on the total population using the network for various purposes that require a certain skill level when you work with content, the search engines and software products.

The fact that the vast majority of Internet users has the ability to communicate over the network, demonstrates the importance of social networks (76% of the population aged 15-72 years via the Internet in the past three months). More than two fifths of the three-month Internet population (42-44%) use the network to find information about products and services, and phone calls and video, electronic letters. Nearly one-third has personal experience of the upload files to the web-sites, social networking, cloud storage for general access.

The main reason for the failure occurs from the use of the Internet, is the lack of skills. In 2017 it was registered every fourth respondent (from those who have not enjoyed the network). In comparison with the 2015 this figure had increased by 3 percentage points (from 22% to 25%).

The technology is transforming the relationship between people and their work. Freelance market increases, with access to the internet resources and tools work together. Companies are making rapid innovation technologies such as 3D-printing and application programming interface (API). In the coming years, these trends will change the structure and principles of work as a whole. For some participants, businesses reduce the barriers will bring new opportunities. On the other hand, competition in the "free earnings" will mean lower wages, lack of benefits and economic uncertainty.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THE DIGITAL TRANSFORMATION OF AGRICULTURE

Innovative development of agriculture in the world economy has now reached a high level and sustainable growth. While there are hidden reserves, the use of which will give a new impetus to its development in the third millennium. One of them is the digital economy.

Currently each country in transition to a digital economy, depending on the level of economic development, the level of education, the readiness of the normative-legal base, technology development of state and application of information systems, focuses on the strategy of digital transformation to achieve a positive effect. Digital Economy in agriculture will be able to ensure the sustainability of agricultural development, the development of the agrarian science, agricultural education, compliance with environmental regulations.

Digital Economy in agriculture will allow the development of a model agricultural growth in developing countries, oriented at both the domestic and external markets. This will ensure the growth of the main product groups, aimed at both the export demand and for domestic consumption. Sustainable development is an organization of agricultural production, in which the new generation would have access to the resources and could lead agriculture in scale, ensuring the needs of the population for food.

To avoid global problems in the field of food and bio-safety humanity needs a new kind of agriculture, which corresponds to the model of circular economy (without the waste) and the principles of sustainable development. The heads of international organizations and national governments are increasingly devote themselves to the transition to a new economic model and "smart" agriculture as an integral part of it.

"Smart" agriculture is based on the use of automated decision-making systems of complex automation and industrial robotics, as well as the technologies of designing and modeling of ecosystems. It includes minimizing the use of external sources (fuel, fertilizers and agrochemicals) with the maximum use of local factors of production (renewable energy, biofuels, organic fertilizers, etc.).

Advanced Intelligent technology agriculture provides effective protection from pests, restoration and protection of beneficial properties of soils and groundwater and remote end-to-end monitoring compliance with the requirements of certification of organic agriculture. These technologies include the use of biopesticides to integrated pest management, Nano biotechnologically clean water and soil, integrated farm management, etc.

The Innovative Development of the agricultural sector, in turn, requires the use of information and communication technologies. They can ensure effective communication, interaction in the online mode. In the conditions of the network economy technological platform should become one of the major elements of digital ecosystems. For agrarian digital ecosystems it can become of main idea a technology platform of the food and processing industry, and complementary: space and geo-informational technology - products of global competitiveness.

The development of information systems and computerization of the opens up new opportunities for agriculture by improving the quality of work and improve performance. The important role played by the enterprise, producing agricultural machinery and equipment. At the same time this development in the field of software processes control spraying and tillage, fertilizer for the crops.

Recently the market of consulting services in the agrarian sector is gaining popularity all over the world. The reasons for this were: increased interest in the implementation of information technologies and the need for practical experience in this area. Farmers need advice because they do not pay sufficient attention to the tracking of recent advances in technological progress, since for them, the quantity and quality of manufactured goods much more important. Consulting is focused on business activities,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

focused on projects, which allows you to pursue an independent assessment of the effectiveness of new information technologies. In this case the consultant, who regularly visits the farm, and makes recommendations to improve production and introduction of innovative technologies, comes to the rescue. This support helps farmers to spend money not only on the purchase of traditional, but new information technologies. In addition, advisory, management and organizational centers are made to help agriculture through their financial and investment projects. World-wide network of new technologies is the basis for the creation of uniform information space, but new technologies are rapidly developing and implemented with high-tech developments.

In addition, there is a need for economic and legal basis for the definition of the rights and responsibilities of individuals when creating information resources and the objective of stimulating their regulators.

An example of the development of the digital economy in agriculture is a factory "Kuban". It within the program "Electronic agriculture" the integrated program implemented a powerful plant subsystem by the creative team from various industry crop NRU and cybernetics RESEARCH INSTITUTE OF AGRICULTURE on a single methodological basis has been implemented integration of knowledge of different ICS organization (offline). The requirement of integration of information, its modes of processing, as well as the requirement of functional completeness served as a basis for compiling the list of tasks and their classification (340 automation tasks), as well as to the structure of the logical database (151 type of records), common to all crop enterprises.

In modern conditions when implementing the model site for agricultural enterprises this logical structure of the database can become an integral part of all systems of precision farming, spatial monitoring of soil and other ICS from one position. This will allow realizing the standard solutions, almost for free for manufacturers of the goods. This logical structure and classification of these tasks of automation can become the basis for the standardization of the platform digital sector of agricultural crops. Such an approach for other industries, including animal husbandry, while placing certain databases in a particular cloud, for example, a powerful database system (DBMS), extends a digital platform in all sectors of agriculture. It is clear that these databases will be integrated with each other.

As shown in the domestic and international practice, with the introduction of a typical farm plot and mandatory reflection in the overall cloud statistical information, the system of statistical accounting must be substantially changed. The integration of a single information field of the agricultural knowledge with typical locations of agricultural organizations, agricultural research institutes and universities; the standard ICS and primary accounting system, implemented through Internet technology, are the basis of the digital platform, a logical structure which is ready for the future integration with various digital devices.

Digital Economy in agriculture will form a new structure of digital ecosystems of the agrarian sector. Together with the digital assets of the agricultural sector in the technology platforms there will be innovative projects. For the establishment and operation of digital the agrarian sector of the global economy of the twenty-first century requires coordinated actions of all participants, specialists, with new competencies, high financial costs, developed the IT structure, methodical and legal support.

FINANCIAL SERVICES AND E-COMMERCE

Electronic commerce is meaningful institute of digital economy, penetrates into a growing number of legal relations in the sphere of trade, and covers the entire spectrum of relations - direct interaction with

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

consumers-to-consumers (C2C), the interaction of sellers-to-consumers (B2C), the interaction between businesses (B2B), the interaction of business and the state in digital form (B2G), etc.

The Internet commerce is one of the most dynamically developing technology markets in the world. The rapid growth of the market due to, first of all, fast enough the global spread of broadband (fixed and mobile) access to the Internet. In the e-commerce the segment "m-commerce" slows down the increase (in 2016 he grew to 63.8%), but is still developing more dynamic market as a whole. The market of electronic commerce "m-commerce" is presented in Figure 2.

Figure 2.



With the development of the gadget industry the proportion of purchases that users commit by means of mobile devices gradually increases; thanks to this mobile commerce becomes a separate segment of e-commerce. According to eMarketer, sales in the segment of m-commerce in the world grew by 40.3% in 2017 up to 1 357 billion dollars, which is 6.0% of the total volume of retail sales. For comparison, in 2017 the total sales of retail e-commerce throughout the world reached 2 304 billion dollars, on the segment share of m-commerce accounted for 58.9% of online sales.

It is worth noting that the increase in the market of e-commerce (+24,8% in 2017) was markedly lower than that of sales through mobile devices. It is expected that the dynamics of growth of mobile sales will remain high, but will gradually slow down to 22.2% in 2021, when the sales volume in the segment will be at the level of 3 556 billion around the world.

"Globality" in internet is fully exposed to trading platforms in all countries. In 2017 cross-border trade is one of the main drivers for the growth of e-commerce around the world. Local giants go to foreign markets, steadily being transformed in the global players, looking for business opportunities in new regions. While the buyers are motivated with the opportunity to is guaranteed to obtain a high-quality product at the right price from anywhere in the world, internet retailers cross-border electronic commerce provides tremendous opportunities for the expansion of the market for their products and attracting new clients. The number of online purchases at foreign websites will increase from year to year. Consumers from different countries are looking at foreign sites goods unavailable in their region or price and quality which are more attractive.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Trade in the Internet is gradually becoming an integral part of the world economy. However, the development of a new direction in theaters is different pace. Asian region is situated in the absolute leaders in segment, almost twice as overtaking North America on drug Internet commerce (mainly at the expense of China). This trend is due to the strong economic growth in developing Asian countries and informatization.

However, the new market is less true and transparent in comparison with traditional retail due to the specifics of existing virtual technologies. But it is the global nature of the trade is at the same time as a powerful driver of growth and a key barrier to creating the necessary legal and financial instruments for legalization of the sector. In some cases, the emerging commodity-money relations is already becoming difficult to regulate the rules in force in the territory of one country (in particular, allowed to sell goods - for example, medicines, and ways of delivery), it becomes evident that the necessity of regulation of the internal and cross-border Internet-trade on the basis of uniform principles, regardless of jurisdiction, is needed.

However, the common practice for regulation at this point has not happened yet. While there was a clear trend related to the popularization of protectionist measures (except for the United States and several other countries where taken on the course of market self-regulation) in most developed and developing countries in the world in order to stimulate the national Internet retailers and manufacturers. The commodity structure of the e-commerce market includes a lot of various categories - from the spare parts for cars, hazard appliances to perfumes and art objects (practically all that is presented in a traditional retail).

The trend of e-commerce will be the mobile commerce. Now more and more users prefer to make purchases on their way in a convenient for them at the appropriate time. Retailers constantly improve applications for customers convenience and easy to execute orders through smartphones. According to the Statist, income from sales of mobile is growing steadily. In 2017 it amounted to $550 billion, an increase of 30% compared to 2016 year.

As expected, in 2018 this figure will increase by 20% and will reach $670 billion. Easy to pay for goods with smartphones (buying in one click), the use of new technologies (payment by fingerprint or payment authentication using selfie), as well as push notifications, showing greater efficiency compared to the e-mail broadcast, contribute to the growth of mobile transactions. So, the day of the Chinese sale of “Singles Day” (90% of sales was implemented with mobile phones, and in the United States in the popular network Starbucks coffee 10% of orders been decorated with smartphones.

The ability to directly buy goods on social platforms, a growing number of bots and services artificial intelligence, the popularity of instant messengers and IoT devices with voice operated control will promote the development of mobile commerce. Consumers prefer to use different devices when making a purchase - to search for goods and read reviews about it with smartphones, and execute the order with the desktop. It is important to monitor the sale, committed with different devices and make the transition from one to another smooth and integrated. The ability to identify the buyer allows companies to have recourse to it personally at the right time, bearing in mind the preferences and needs. The technology of the cross-tracking device can help you to explore user behavior and to understand its “path” to purchase, as well as to develop client-oriented marketing strategy at different devices.

Thus, each customer will be able to receive individual recommendations and will see the ads, based on his past purchases and preferences, geolocation and the trends of the market. According to the largest news portal Business Insider, by 2020 80% of the companies planning to introduce chat bots and other automated systems, in order to understand the intentions of users and to ensure a positive customer experience. Another trend of e-commerce is a social commerce. Recently “influencers” are gaining more

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

popularity, capable to influence its target audience and unobtrusively to promote those or other goods and services.

According to the consulting and auditing firm PwC, for 50% of the respondents social networks are the main platform, enabling them to make purchases. According to a study conducted by the company, BrightLocal specializing in CEO, 85% of users' degree of confidence to online reviews as great as to personal recommendations from friends and acquaintances. Influencers generate traffic, drawing on the target page visitors. More than 40% of the companies represented online, have the significant increase in traffic from social media. One of the problems facing e-commerce is the use of blockers of advertising.

According to eMarketer, by the end of 2018, 30% of internet users will block your ads. Most ad blockers installed on the desktop and PC, but their application on mobile phones increases gradually. The USA and China will determine the trends in e-commerce. China is the undisputed leader, taking first place in the turnover and providing 40% of the world retail e-commerce. The country sets the global trends - the Chinese sale Bachelor's Day on the quantity of sales overtook the American Black Friday and Cyber Monday.

The USA, in turn, occupies a leading position in the field of technological innovation, American users have a wealth of experience of online shopping and have a high purchasing power. To understand how e-commerce will develop in the coming years, we draw our attention to these countries. The role of e-commerce in the development of the world economy, in turn, necessitates the task of the development of statistical indicators and appropriate methods of calculation and analysis.

Currently, we are witnessing rapid growth of financial services, at the same time as a stimulus for the intensive development of technological solutions for the industry. Under the Financial Technologies (hereinafter - The FinTech) we understand the application of innovative technologies in order to provide financial services. However, with a lot of technologies, used in the financial industry, boundaries of the term "branch of Financial Technologies" are blurred.

The main segments of the financial technologies at the moment are: payments and transfers, crowd-funding, asset management, the financial marketplace, the blockchain. In this regard, we see the growing trend to create a fully digital bank, which, in its activities focuses mainly on those who prefer using online banking services.

In the first half of 2017, the volume of investment around the world in this branch of economy has increased by 49% compared to the same period of the previous year and reached the level of 15 billion US dollars. Banks and large financial groups embarked on the path of technological development, the consequence of which the provision of their clients was more extensive with financial services. The consequence of the rapid development of financial technologies worldwide the number of fraudulent crimes in the area has been increasing. In this regard, the first place outside the security not only of the transaction, but also the identity management of users.

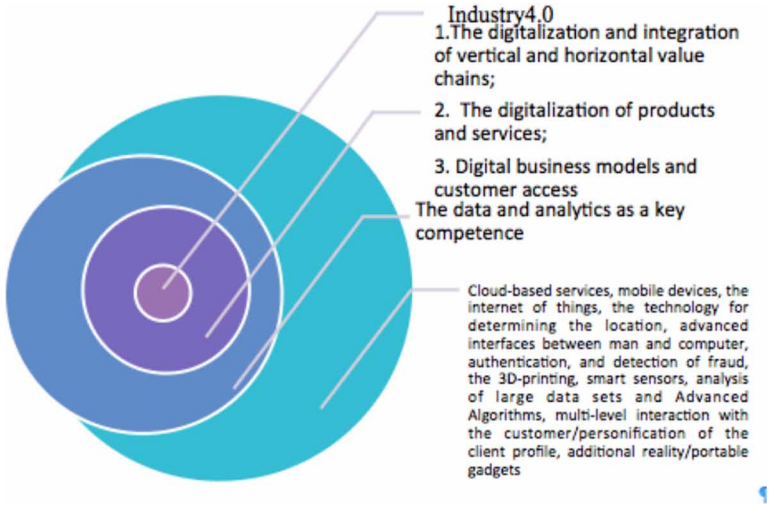
According to some estimates, currently there are many prerequisites for significant changes in the sphere of FinTech, the consequence of which we see its evolution and beyond the standard payments and credits. A new stage in the development of financial technologies is based on cloud computing technology, which gives much more opportunities for critical infrastructure changes, and the functioning of the financial sector of the economy. The widespread introduction of artificial intelligence in the area of financial technologies is having the place. Among them there are the chat bots for customer service, robotic players on the stock market, machine learning and big data for decision on the loan for the client.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THE TRANSFORMATION OF THE INDUSTRY INTO THE DIGITAL ECONOMY

The modern world business is now at an important stage of transformation - moving to the digital economy. At the same time, the steak holder queries are becoming more and more difficult, acquiring the complex and resource-intensive in nature. At the same time, political interests often have a very significant pressure, substantially limiting the ability of many entrepreneurs and corporations to fulfill the expectations of stakeholders and the realization of the principles of sustainable development at the microeconomic level. In these circumstances, the formation of new mechanisms for sustainable development of business organizations that meet the requirements of the digital economy becomes significantly important *(Gamidullaeva, et al., 2019).* The main "end-to-end technology" for business organizations is represented at the Figure 3.

Figure 3.



All of these processes are global in character, which is at the root of the transform approaches and mechanisms for sustainable development of business organizations. The world's largest producers of fossil fuels, oil and gas had limits, and it's required of new solutions to create highly integrated intelligent systems for generation and distribution of electric networks of the new generation Smart Grid.

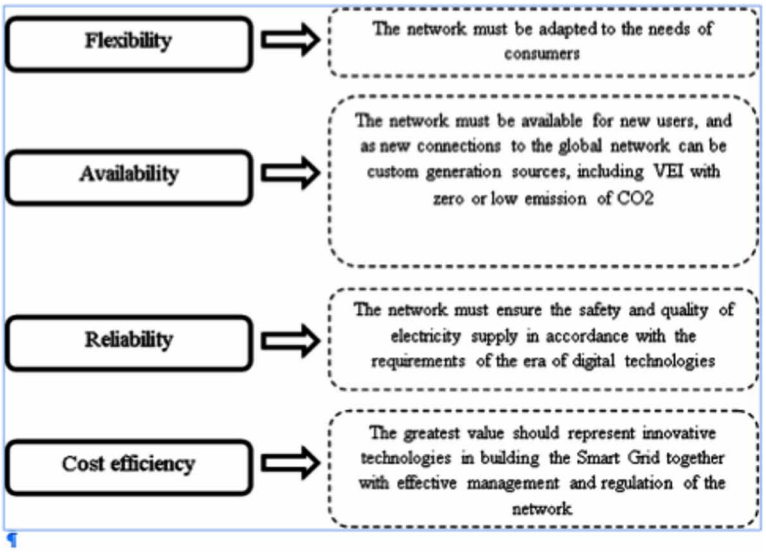
Smart Grid has the following aspects of the functionality presented in Figure 4.

Smart Grid currently serves the concept of intellectual active adaptive network, which can be described with the following features:

- The saturation of the active network elements, allows you to modify the topological network parameters;
- A large number of sensors, which measure the current operating parameters for assessing the status of the network in different modes of operation of energy systems;
- The system of collection and processing of data (program-technical complexes), as well as check the active network elements and electrical installations of consumers;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 4.



- Availability of executive bodies and mechanisms in real time to change topology network parameters and the interaction with the neighboring energy objects;
- Tools for automated assessment of the current situation and the forecast of buildings for work in the network.

It's a high-speed control system and information exchange. Based on the above-mentioned characteristics of the network, it may be defined as a file attached to the source for the creation and installation of software and hardware for consumers, as well as for the analysis of information and management systems to ensure reliable and high-quality power transmission from the source to the receiver at the right time and in sufficient quantity.

The major technological trends in the field of digital transformation of the industry are as follows:

- The mass introduction of intelligent (quantum) sensors in equipment and production lines technology (Industrial Internet Things);
- The transition to automatic production and mass adoption of robotic technologies;
- The storage of information and the holding of calculations with your own objects on the resources made available ("cloud" technology);
- The transition to a mandatory digitized technical documentation and electronic document management ("Paperless" technology);
- Digital design and simulation of technological processes, facilities, products throughout their entire life cycle from idea to operation (the use of engineering software);
- The use of technology building materials instead of a slice ("additive technology, 3d printing);
- Use of mobile technologies for monitoring, management of processes in life and at work.

The development of digital (electronic) economy of the load on the digital infrastructure, based on the communications and telecommunications, is greatly increasing. Users need access to various platforms,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

services and services in electronic form. The very notion of "user" is fundamentally changing, because in the digital transformation in this category there are not only people, but also representatives of the "Internet of Things" (connected devices), the number of which already exceeds the number of people in the times, and will soon exceed the already and by orders of magnitude. Thus, we are talking about loads on the communications and telecommunications and their bandwidth, surpassing the existing by several orders of magnitude.

Obviously, building communication systems and telecommunications, due to such requirements, through the traditional hardware realization of network functions will lead to the exorbitant costs and networks or obstruct their surplus equipment, which is a dead-end path. To solve the problem one can use a digital transformation of the communications systems and telecommunications, the transition to a software implementation of network functions.

"Digital Logistics" emerges as a response to the global challenges of the digital economy for the traditional sector of transport and logistics, such as the rapidly changing, globalized and super competitive trading environment, the complexity of supply chains, rapid changes in customer expectations, the limited resources of the infrastructure. So, the digital economy, in particular, electronic commerce increases the availability of information on the demand and supply. However, the conclusion of the electronic trade transactions and retail sales can be hindered the logistics problems of delivery of goods, works or services. The problem of logistics in e-commerce is associated primarily with a faster pace of formation and realization of supply chains of goods compared with traditional trade. This feature of e-commerce determines the need to improve the mechanisms for Predicting demand, which should contribute to a more rational planning of the stock of goods in warehouses in different geographic regions, reducing the time the movement of goods and cost of delivery. Within the framework of the development of e-commerce, it is necessary to develop and deploy the technologies analysis of data on demand for the planning of the distribution logistics.

Perspective directions of the development of the digital logistics are also linked with the development of the Internet of Things (use of automatic order supplies and raw materials for the production and automatic delivery of finished products to the consumer, bypassing the intermediaries) and unmanned technologies in transport systems.

Education in the Digital Economy

Technology is changing education. Schools and universities currently offer online courses; the teacher online offer new ways to study the training materials; schools regularly integrate tablet computers and other technology to the class. Education, science, research, culture and the media are key areas that implement new digital backup and serve as major factors contributing to the further development and digital technologies. This means that all citizens can take advantage of the huge opportunities in these areas for learning, development and participation in economic and social life *(Potapova, et al., 2019).*

The education system should better equip people skills and knowledge to meet the needs of the digital working environment and society of knowledge. It should also increase the level of literacy in the media. It's of great need to promote wider use of digital media in education throughout life. Together with all stakeholders in the field of education, they will strive to develop a strategy for digital learning, which systematically uses, expands and realizes the possibilities of digital media to provide high-quality education. However, the problem of social adaptation of the population to the challenges of the digital economy, associated with the constant improvement of skills and the development of new skills in the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

online space of digital ecosystems remain. In this regard, especially important active labor market policies, support income, continuous training and more flexible education system *(Tolstykh, et al., 2018).*

In the system of modern education it is necessary to introduce new technologies, as required by the needs of society, to teach today that will need tomorrow. Education should contribute to the development of society, the growth of its capabilities. It is necessary to shape the identity, fostering they thought, and who can realize their creativity in a broad sense of the word. Creativity is a process of searching, adoption and implementation of the complex, complicated problems. Creativity is a process (purposeful work) turning the impossible into the possible.

In spite of the digital transformation of the educational process, changes in forms and methods of training, competencies, the classic fundamental education remains important for the formation of the modern system of professional education. The educational trajectory of today changes under the influence of the external environment, under the influence of the digital environment, taking into account the requirements to the new professions, change the value orientations of people, predominantly focus on applied science and practice. The profession appears faster than they are being developed and formed educational programs. Therefore, the system of additional professional education has a key role to provide advanced training programs or professional retraining on the popular professions that will help you to be competitive in the modern information environment. Digital economy, based on digital technologies, suggests a new way of technological production, requiring new skills and new conditions of development.

To the modern specialist a number of major requirements are produced:

1. IT literacy. In modern society, the establishment of digital competences and the use of information and communication technologies in professional activity.
2. Language and mobility. The Specialist is able to learn different foreign languages, as it requires the professional suitability.
3. The desire to learn. Motivational component in the modern world expresses the ability and readiness for teaching and training has played a leading role in the development of the personality, including self-education. High motivation is generated when the person is in search for the satisfaction of their needs for creativity. In the development of the concept of "Industry 4.0" is formed by the society of continuous learning, able to learn throughout their lives.
4. Labor migration. A person is able to master the different professions and in the retraining throughout life.

Currently, the formation of the so-called digital society, in which the interaction between subjects of the economy decided by a number of production issues. This interaction is based on three components: information, knowledge, communication. A number of difficulties related to the transformation of the state mechanisms to the Cyberspace of socio-economic systems raises in the digital era in all sectors of the economy of the country. The Russian educational system at the stage of the formation of the digital society faces a number of problems, the main of which are:

1. The transfer of knowledge, the formation of skills and abilities to own is carried out using the digital and information technologies that is associated with the need to use all the opportunities of electronic, remote and interactive learning.
2. The world economic space defines the demand for new types of competencies.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Currently, education of the future is undergoing a digital transformation that goes beyond the time frame of life, beyond the educational institutions using the unique capabilities of network and digital technologies, with involvement in the educational process all direct and indirect participants. The role of the teacher in the age of digital economy is changing; there are new forms of interaction between the teacher and the students, the so-called network interaction.

Recently, in terms of digital public relations, the leading role in the pedagogical process belongs to the electronic educational technologies. One of the most popular pedagogical trends is the formation of massive open online courses (MOOCs)for systems level and additional education. Coordinating the governing body of the education in most states now approved by the order of application of educational organizations of e-learning and distance education programs. According to this document the organizations which are carrying out educational activities, have the right to implement educational programs or their parts with the use of e-learning, distance education technologies, organizing training sessions in the form of online courses, and students who mastered the educational programs in the form of online courses, provided the appropriate document, and gives the right to allow the learner to the intermediate appraisal in other educational organization.

One of the innovative projects in education is considered to be the MOOCs, which allow solving a number of problems facing the modern education. Open Educational Resources to help in the digital pedagogy to ensure the mass education (the number of registered on different courses comes to hundreds of thousands of people), the availability of each learning in any territorial in the world and the high quality of education, as these courses are the best Russian and foreign teachers. These modern digital technologies allow you to integrate Russia into the world educational environment and shape the lives of new professions for digital organizations. One of the priority directions in the trajectory of digital pedagogy is the formation of digital educational environment in which success will be implemented MOOCs. This promising form of distance education gives you the freedom to learning, gives you the opportunity to self-select their future profession, and improves the motivation of learners in the acquisition of skills to be competitive in the digital space. MOOC removes the spatio-temporal limitations in the study of the educational course or its parts are beyond the scope of one of the educational organization.

Nowadays the largest platform for MOOCs is operated by global electronic educational services; including Coursera platform, KHAN, edX Udacity, and others. This indicates that the information educational environment is available, and the training becomes a global process using the structure of the MOOCS – including lectures-Video, training exercises, homework, and references. During the period of the digital transformation the role of the university instructor- who must use all possible techniques, methods, tools of electronic and distance learning,- is vital to the innovative growththe business communities. The teachers are the authors of the online courses that enhance students creativity to enable them to manage the processes of sustainable socio-economic development in the context of digital transformation.

RESULTS

1. It's noted that the modern digital economy is the postindustrial, characteristics of postindustrial economy are presented.
2. The definition of digital economy is submitted, its essence is revealed, the main objectives and indicators of the digital economy evaluation and development are mentioned.
3. The education in the digital economy is examined.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

4. The transformation of the industry in the digital economy is analyzed.
5. The financial services and e-commerce is considered.
6. A digital transformation of Agriculture is examined.
7. The influence of the digital economy on the labor market is considered.

FUTURE RESEARCH DIRECTIONS

To sum up our excursion into the "Digital" economy, we would like to stress once again that the total digitalization, automation and the introduction of appropriate technology is a natural process, and therefore inevitable. At the same time, today there is no picture of the future (neither the nearest, nor the distant), which means that the result of forthcoming changes isn't determined. Because of the fateful circumstances the beginning of the digitalization coincided with the end of globalization and the Global Economic Crisis.

The end of the extensive development model of capitalism will inevitably require revision of many of the fundamental tenets of contemporary world order. This means that under the auspices of the digitalization completely new world can be created; such a world which will become a staple of other than today's one, system of values, management paradigm, social norms and economic laws. Of course, such a sight already has both supporters and opponents, whose violent confrontation we will all be able to witness in the near future.

From feasibility, the intensity and the coherence of action it depends how quickly our digital future will come, what are the social, economic and other problems we face on this path, and, finally, whether our future represent digital slavery or triumph of humanism, spirit and intellect over all the difficulties and problems.

The most important phase of the upcoming struggle will be not economic or technological rivalry, but the formation of a new civilizational paradigm capable to unite humanity, give it intuitive and attractive image of the future and outline the main milestones toward its construction.

CONCLUSION

So, digital technology is rapidly changing the familiar forms and methods of economic life around the world. The business is changing not only the individual companies - are changing the industry, regions and entire states. The development of the digital economy starts to go beyond the changes in the technologies and even in business - it becomes a factor in the macroeconomic and political. Not only the engineers, scientists and entrepreneurs, but also policy, philosophers and social activists are trying to reflect the changes. Some see it as a tool of fundamental changes in public life, the others, on the contrary, hope that the digitalization of economy will become an alternative to painful reforms.

In this sense, the experience of developed states gives food for thought, first and foremost, of what can speak the macroeconomic effects of the mass use of digital technologies. It turns out that the effect of this is expressed not so much in a quantitative increase of labor productivity, but in the qualitative changes of industries, agriculture, labor market, finance, education, their manageability and flexibility. In addition, the leading foreign analysts expect that as the expansion of the presence of digital technolo-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

gies in different segments of the economy, there will be enormous transition indicators of economic efficiency of their application to a new, higher level. And now the world is on the threshold of such a leap.

The digital economy is a new type of economic relations in all sectors of the world market, which is now growing at a rapid pace and already in the near future, with the growth of high technology, can become the main type of commodity-money exchanges in the global world. The establishment and improvement of new technologies is happening so quickly that it's not possible to follow it. Therefore it is necessary to be included in the general information and technological flow of updates and try to apply them effectively.

ACKNOWLEDGMENT

The reported study was funded by RFBR according to the research projects No. 18-010-00204, 18-310-00253\18.

REFERENCES

Anttiroiko, A.-V. (2008). *Electronic Government: Concepts*. Methodologies, Tools, and Applications. doi:10.4018/978-1-59904-947-2

Boston Consulting Group. (2016). Retrieved from http://files.runet-id.com/2016/itogi2016/presentations/14dec.itogi2016-1-12-30-13-30-- rydih.pdf

Di Virgilio, F. (2017). *Social Media Application for knowledge management in modern organizations.* Retrieved from https://www.igi-global.com/book/social-media-knowledge-management-applications/179197

Doukidis, G., Mylonopoulos, N., & Pouloudi, N. (2003). *Social and Economic Transformation in the Digital Era*. Retrieved from https://www.igi-global.com/book/social-economic-transformation-digital-era/905

Druicã, E. (2017). *Driving Innovation and Business Success in the Digital Economy*. Retrieved from https://www.igi-global.com/book/driving-innovation-business-success-digital/165239

Gada, K. (2016). *Digital Economy in 5 minutes.* Retrieved from https://www.forbes.com/sites/koshagada/2016/06/16/what-is-the-digitaleconomy/#74c40ef77628

Gamidullaeva, L. A., Potapova, I., & Shatokhin, M. (2019). Increasing Territorial Economic Growth Through Cost Optimization in the Digital Economy. In U. Benna (Ed.), *Optimizing Regional Development Through Transformative Urbanization* (pp. 225–250). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-5448-6.ch011

Gamidullaeva, L. A., Vasin, S. M., & Mkrttchian, V. (2019). Regional Economic Growth and Open Innovation Platforms: Emerging Trends and New Opportunities. In U. Benna (Ed.), Optimizing Regional Development Through Transformative Urbanization (pp. 163-184). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-5448-6.ch008

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Isaias, P. (2017). *Innovation in the digital economy.* Retrieved from https://www.igi-global.com/book/user-innovation-entrepreneurship-phenomenon-digital/178736\

Isaias, P., & Carvalho, L. (2017). *User Innovation and the Entrepreneurship Phenomenon in the Digital Economy.* Retrieved from https://www.igi-global.com/book/user-innovation-entrepreneurship-phenomenon-digital/178736

Mahesh, S. R. (2003). *Business Intelligence in the Digital Economy: Opportunities, Limitations and Risks*. Retrieved from https://www.igi-global.com/book/business-intelligence-digital-economy/117

Mahesh, S. R. (2008). *Handbook of Research on Global Information Technology Management in the Digital Economy*. Retrieved from https://www.igi-global.com/book/handbook-research-global-information-technology/472

Mutula, S. M. (2010). *Growth In the digital economy.* Retrieved from https://www.igi-global.com/chapter/growth-digital-economy/361010

Oncioiu, I. (2013). *Business Innovation, Development, and Advancement in the Digital Economy.* Retrieved from https://www.igi-global.com/book/business-innovation-development-advancement-digital/70671

Oncioiu, I. (2013). *Business Innovation*. Development, and Advancement in the Digital Economy. doi:10.4018/978-1-5225-5448-6.ch003

Oncioiu, I. (2017). *Driving Innovation and Business Success in the Digital Economy*. Retrieved from https://www.igi-global.com/book/driving-innovation-business-success-digital/165239

Potapova, I., Vasin, S. M., Gamidullaeva, L. A., Tolstykh, T., & Belyanina, L. (2019). Drivers of Urban Development in Terms of Education Based on Digital Technologies. In U. Benna (Ed.), *Optimizing Regional Development Through Transformative Urbanization* (pp. 48–70). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-5448-6.ch003

Tapscott, D. (1995). *The Digital Economy*. Retrieved from http://dontapscott.com/books/the-digital-economy/

Tolstykh, T. O., Vasin, S. M., Gamidullaeva, L. A., Nedelko, S., Eremina, E., Ko-shevoj, O., & Mkrttchian, V. (2018). The Control of Continuing Education Based on the Digital Economy. In P. Isaias & L. Carvalho (Eds.), *User Innovation and the Entrepreneurship Phenomenon in the Digital Economy* (pp. 153–171). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2826-5.ch008

Vasin, S. M., & Gamidullaeva, L. A. (2018). About Russian Regional Users' Innovation Based on Digital Information. In P. Isaias & L. Carvalho (Eds.), *User Innovation and the Entrepreneurship Phenomenon in the Digital Economy* (pp. 304–319). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2826-5.ch015

KEY TERMS AND DEFINITIONS

B2B (Business-to-Business): Is a term that defines the type of information and economic interaction, classified by type of interacting actors, in this case juridical persons which deal with the other business.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

B2C (Business-to-Consumer): Is a term that refers to the commercial relationship between the business and the private, the so-called "end" consumer; also a form of electronic commerce, the purpose of which is direct sales to the consumer.

B2G (Business-to-Government): Is the relationship between business and the state. Usually the term is used for the classification of e-commerce sites. An example B2G-systems can serve as a system of electronic procurement.

C2C: Is a term that refers to the scheme of electronic commerce between final consumer (consumer) and the end-user, in which the buyer and seller are entrepreneurs in the juridical sense of the word.

Digital Economy: Is economic activities, based on the digital technologies related to e-business and e-commerce, produced and marketed their electronic goods and services. Payments for goods and services are often produced by electronic money.

E-Commerce: Is the scope of the economy which includes all the financial and trade transactions, carried out with the aid of computer networks, and business processes related to such transactions.

ICT: Is information and communication technologies.

This research was previously published in Industrial and Urban Growth Policies at the Sub-National, National, and Global Levels; pages 342-363, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 62
Restructuring and Globalization of Telecommunications Industry

Sasmita Mohanty
University of Aveiro, Portugal

ABSTRACT

Restructuring and globalization are very important for every technology sector. It provides key competitive advantages to the companies over their rivals. Telecommunications sector is an important strategic segment of the modern economy. Telecommunications is also an advanced technology sector and its restructuring is essential to optimize its revenues. Now it has been evolved to information and communication technologies (ICT), which is the main driving force of growth worldwide. In fact, ICT has paved the way for modern globalization. Overall, ICT and ICT-enabled sectors are among the main contributors of global economy. This sector has passed through several restructuring and evolves continuously. Its globalization is obvious as it is the main technology which promotes globalization. In this chapter, the authors provide the restructuring of telecommunications sectors since the time of its inception in the early 19th century. They also analyzed the strategic changes that promote the restructuring and globalization of this sector.

INTRODUCTION

Telecommunications industry plays several essential roles in the modern society. Telecommunications has become a basic need in the modern human life. In the business sectors, it has even more important roles. In the modern times, it has been expanded in different forms to be known as the information and communication technologies (ICTs). Due to the essence of ICT, its infrastructure is available in every corner of the world. It has been spread in the form of core, regional, metro and local networks. Most of the access areas are covered through the wireless networks and the core parts are mainly optical fibers. Along with the support of computing, ICTs change the lifestyles and business landscapes which were not possible before their conjugation. The Internet is the clear outcome of the conjugation of these two enabling technologies that has changed the world's communication and business frameworks. That is why, ICT sector is very often regarded as the nervous system of the current world.

DOI: 10.4018/978-1-7998-7297-9.ch062

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Telecommunications sector has gone through several stages of evolutions. In the early years, it was started as a point-to-point communication enabling two individuals to communicate. Then came, the broadcasting systems in which the information was transmitted from one source to multiple destinations. Gradually, with the advances of computing, this system evolved in to software enabled multimedia systems. This is how global entertainment and news sectors came into existence. In the last three decades, ICT has disrupted the global businesses several times. First, the arrival of the Internet changed the global business landscapes. The popularity of the mobile communications further enhanced the proliferation of businesses. Mobile communication evolves every decade and it disrupts the global economy in several new ways. The other famous disruptions of the last two decades are: the proliferation of social networks, and arrival of the Internet of things (IoT). It is needless to say that this sector needs regular restructuring with the changing times. New demands propel new inventions in ICT which finally results in restructuring. In ICT, in the recent years, we have witnessed several restructuring at various levels. Some of them are at the foundation level in which the driving technologies themselves have been changed significantly. The others are mainly found at the application and management levels. The changes in the applications are either user or market driven. At the management level, the changes are due to the strategic modifications of the investors to optimize their positions in the market.

Globalization of ICT is a natural choice for the investors. They want larger markets and modern day trade rules facilitate the access to foreign markets. The services landscape in ICT is very much potent in revenue generation. ICT services have evolved in many different ways. The segments which used to generate huge revenue before two decades now have been pushed back by the new services. Globalization brought new enterprises in to the market and at the same time several existing enterprises have disappeared. Irrespective of these changes, ICT sector went up gradually to be the main driver of the global economy. Thus it is clear that restructuring and globalization of ICT sectors are very much significant in the modern world. ICT industry is the main facilitator of the growth and development. The countries which are doing great economically have excellent ICT infrastructure. It is true that the countries which are economically weak are also backward in ICT. Human development index (HDI) and the ICT growth too run in parallel. Countries which are advanced in technology and uses better ICTs have better HDI.

In this chapter, we provide restructuring trends of global telecommunications industry. Restructuring is essential for telecommunications, and we analyze the issues related to it. We show the intensities of globalization in different times and their effects on the market. We present chronological restructuring of telecommunications sector starting from its beginning until the recent years. We present the globalization of telecommunications at different times and its effect of the global trade.

The main objective of this chapter is to provide the overviews of restructuring and globalization in the telecommunications sector since its beginning. Strategic changes in this sector have forced multifaceted restructuring. Globalization is one of the main leading strategies for its expansion. Restructuring and globalization together are very much at the forefront of the telecommunications revolution around the world. We analyzed the past and contemporary literatures to find out the nature of restructuring in different era.

In this chapter, we have eight sections. In Section 2, we review the related literature for this chapter. In Section 3, we provide the methodologies used for this work. In Section 4, we analyze the strategic changes in the telecommunications sector in the last few decades that had motivated the major restructuring in the sector. In Section 5, we show different types of commonly observed restructuring in telecommunications sector. In Section 6, we present the globalization aspects of telecommunications companies. In Section 7, we have discussed the future research directions. We have highlighted the future researches

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

which are important for the growth and restructuring prospects of the ICT sector. Finally, we conclude in Section 8 with the main points.

LITERATURE REVIEW

Telecommunications is a well-researched area. A large number of research activities are being carried on telecommunications management. Its restructuring is very much common since the days of its inception. However, since the beginning of liberalization in the late 1970s and 1980s, restructuring became a key strategic requirement. Based on the strategic changes over the decades, several literatures are available. Since the invention of the telephone, expansion of cross-border telecommunications services continues. Ericsson started its manufacturing of telephone sets and other telecom equipments as early as 1878. Similarly, the cable and wireless started their manufacturing in the 1860s. All these companies globalized their businesses. In the liberalization era, globalization became a key strategic move and become a priority for the leading players of telecommunications operation and equipment vending.

Bruce (1989) studied the restructuring of telecommunications sector in developing countries. Restructuring in developing countries is more important than in the developed countries. In the developing countries, the demand is lower compared to the developed countries and the markets in the developing countries are less exploited. The opportunities for the operators are more in the developing countries as the market is not saturated. However, the prices and other sensitive issues must be planned according to the market dynamics. The costs for infrastructure building and network deployment are costly and the returns may take a long time. Therefore these aspects must be addressed at the planning phase to avoid revenue blackouts. The author has shown the cases of several developing countries where the governmental assistance has been provided and regulatory changes have been passed in favor of restructuring for ICT developments. Bell (1990) analyzed the effects of monopoly in the pre-1980s era and the compared the new scenarios of liberalization and completion. In 1984, AT&T was broken down to 19 smaller companies. British Telecommunications in the UK was privatized in the same year. Similarly, the Japanese telecommunications company NTT was privatized in the 1980s. These are the structural reforms in the telecommunications companies in the 1980s. In some way, these steps removed monopoly from the telecommunications market and introduced competition and liberalization through privatization. The author compared the state of research and development in the two different scenarios. Due to these changes business strategies too were restructured for coping with the new initiatives. Hudson (1991) analyzed the roles of ITU in the development and technical cooperation for the adoption of new technologies in telecommunications. In this work the author focuses the cases of Africa. Traditionally, Africa does not have advanced infrastructure for global communications. There are several reasons behind this such as economical difficulties and lack of political intent. Therefore, international organizations such as ITU have important roles to promote the development in telecommunications in these countries. In fact, ITU is showing increased focus for these developing countries. In many cases it has taken initiative to build networks and motivated for modern restructuring.

Bagley and Hunter (1992), studied different aspects of restructuring in commonly observed industries. According to their findings, restructuring is inevitable in every sector. It is one of the basic needs for the survival of a company. In their study, they analyzed the education system in the US. They suggested that technology plays a key role in the modern restructuring across all the sectors including primary and higher education. Stagliano (1994) presents the roles played by ITU in the regulation, technology

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

adoption and liberalization of the telecommunications industry. ITU as a global organization for the telecommunications standardization and expansion has taken several positive initiatives over the years. It also makes sure that fundamental telecommunications services are available in every country. It played the main role in the telecommunications revolution of 1980s and 1990s. It works as an advisory board for the member countries and explain them about the overall benefits of restructuring. Wellenius and Stern (1994) went through the implementation of reforms in the telecommunications sector for several countries. In their World Bank sponsored documentation they brought forward all the relevant factors of the reforms around the world. According to them the structural reforms for the ICT sectors started in the 1980s. All the developed countries and majority of the developing countries started the structural changes in telecommunications. Both, ICT and information technology (IT) sectors started to grow very fast in those countries. Reforms were implemented as a policy of the government in these countries. These reforms were facilitated by the joint collaboration of the World Bank, the International Telecommunication Union (ITU) and the Commonwealth Telecommunications Organization (CTO). In 1991, these organizations came together and discussed about the roadmap for the reforms in the ICT sector and became very successful. More than forty countries agreed for the reforms and that was a big change in the telecommunications policy changes. In this study, the authors have analyzed the practical aspects of the reforms of Latin America, Asia, Europe and Australia. They included the realities about the investment in ICT sectors, their regulation issues and final implementation in the countries which took part in the initiatives of the World Bank, ITU and CTO.

Levi-Faur (1998), studied the restructuring and globalization of telecommunications in Egypt. In his study he analyzed the case of Etisalat and went through the changes performed over several years. He found that radical changes have been carried on strategically to restructure its businesses across North Africa and the Middle East. He also compared these strategic changes with other sectors. He discovered that no such deeper and broader changes are observed in other technology sectors in the regions where Etisalat provides its services. This study also analyzed the economic impact of the restructuring on the national economy. The impact was clearly positive. The regulations in fact, work as an indirect control over the telecommunications companies. It is also true that the regulations helped in the broader restructuring of the telecommunications businesses. Based on the different regulations of the telecommunications sectors, this work shows that there are normally two types of effects. One is the regulation of the competition and the other is the regulation for the competition. Cogburn (1998) studied the globalization in telecommunications industry of South Africa. This work analyzed the telecommunications industry of South Africa of the 1980s and 1990s. The state of the industry during this time was very much unorganized. South Africa's political restructuring also took place during this time. It was expected that the changed politics would bring new positive aspects to the telecommunications sector. However, the author observed that the politics was playing a hindrance for the changes. In this work, the author proposed several restructuring for the telecom industry. He suggested it is a complex process and needs a changed mindset in the policy making. Graham (1999) studied the modern restructuring of cities around the world. In almost all the countries, cities are pushed for better infrastructure and better quality of life. Telecommunications is one of the prime sectors which play key roles in the modernization of the cities. In fact, ICT has the very basic necessities for several aspects of the city restructuring. Dependence of other sectors on ICT is termed as tele-reliance by the author. Due to the increasing demand on ICT, this sector itself undergoes several restructuring.

Lal, Pitt and Beloucif (2001) studied the European telecommunications market and short listed the major factors responsible for the recent changes. The authors observed that before the 1980s, telecom-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

munications companies used to be very much dormant and their operations used to be limited to only one country. However, the liberalization facilitated globalization and telecommunications became a market-oriented sector. The authors credited the US and the governments of Europe for this liberalization and globalization. European telecommunications markets led strategic changes in the ICT sectors and it was followed by other leading markets. The factors were identified from the European markets and highlighted for this study. These factors were utilized to model the emerging markets.

Chan-Olistad and Jamison (2001) studied the fierce competition in the telecommunications sector that was mainly started after the 1980s. In the developed countries and some select developing countries where several companies operate saw fierce competition among the rivals. This was the first time in the history of telecommunications that such tough completion came to the markets in several countries. The strategic changes were very much focused towards future growth and survival. The authors studied the qualitative aspects of the telecommunications markets considering the new strategic changes observed during the above mentions time period. They studied several strategic factors for these markets and also considered the political economy for the overall restructuring of the ICT sector. One of the most interesting factors they observed was that the companies try all kinds of solutions, including alliances with the rivals. It is remarkable that rivalry through alliances was found to be very much rewarding in the long term. Sakai (2002), studied extensively the global industrial restructuring. The main motivating factor is expansion for long term survival. Revenue increase for innovation is also essential for the company to stay active in the market. Revenues can be increased in several ways. One of them is internationalization. With time, restructuring is inevitable. Without it a company loses its competitive edge over the rivals and over time it moves towards its demise. Bartlett et al. (2002) studied several national telecommunications companies in twenty five different countries. The companies considered in their study were privatized to some extent through public share holdings. They studied the companies' financial and operational status both before and after the privatization process. They observed that post-privatization performances were better than the pre-privatization performances. They further fine tuned the studies to identify the improvement in the performances. They found that regulation and changes in the government policies had significant roles in the performance improvements. Public companies are directly affected by the governmental decisions and normally are slow in restructuring what is decided by the policy makers.

Jin (2005) studied the reforms and restructuring in the ICT sectors in the 1990s and the early twenty-first century. He observed several companies failed despite following the reforms. Then those companies started following different types of restructuring. In the most recent restructuring, the companies took several bold steps which were very much new to the sector. They started to focus on new markets where they did not have presence before failure. This is what the authors called neoliberal globalization. This neoliberal globalization was very much rewarding for several companies. In addition to the strategic changes of the existing companies new startups and spin-offs were the new entrants in the ICT market. Their presence disrupted the ICT market to a large extent. Some of those startups went on to become game changers in the sector. Considering their importance, some of the successful startups were acquired by the big companies of the sector. Similarly several mergers and acquisitions resulted from the fierce competition in the sector. Overall, the restructuring of telecommunications sector became vibrant. It was also found that a few companies could not stand firm in front of the tough competition and failed. In a few cases the companies were finished forever. According to the author, all these effects are due to the neoliberal globalization across the major markets. Jin (2008) presents the extreme liberalization observed in the telecommunications industry in the early twenty-first century. He started the analysis from the late twentieth century. In the late 1980s, the telecommunications industry saw dramatic changes.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

New dimensions were established for its rapid expansion. Companies restructured their businesses in many different ways. Globalization was a preferred means of expansion during this period. Internet based services opened new opportunities for both the vendors and operators. Mergers and acquisitions in telecommunications became very common. Some of the mergers and acquisitions were in fact a kind of facilitation of globalization. Foreign direct investment (FDI) in telecommunications increased very fast since the 1990s. It is the effect of globalization on this industry.

Mohanty and Moreira (2014) stressed on the essence of sustainability in global telecommunications. In this study, the authors went through the basics of the current needs of sustainability. They analyzed sector-wise carbon emission at the global scale. They showed that telecommunications is one of the fastest growing sectors in the world. Due to this growth, energy consumption of this sector has grown up very fast. This sector is going to use around 10% of the total power in the next decade. This is huge amount of power, and due to this the carbon footprint from this sector is going to be really huge. In 2014, the telecommunications sector was responsible for almost 2% of the net global carbon emission and has an increasing trend. Green solutions are expected to be followed in the future. In fact, the authors have shown several energy efficient initiatives already in place in current practices in ICT. However, there is a need of deepen the use of green technologies in this sector. Cogburn (2017) studied the modern restructuring of ICT sectors around the world. The authors mention that a new world order has come into existence due to the major changes in the ICT sectors. It has given rise to a new knowledge world. These changes have not happened overnight. Rather continuous restructuring of the ICT sector over the last few decades has contributed to it. The authors have also highlighted the flip sides of these changes and show that several value systems have been degraded due these changes.

He et al. (2017) studied the internationalization of innovation by the global corporations. The authors started with the essence of innovation in the modern businesses. Then they pointed that innovation has become more important due to the globalization of the economy. Chinese firms have been studied in this work. Several Chinese companies have successfully globalized their ventures. They are also using the innovation as one of the driving forces for their growth and restructuring. Like the big global companies, these Chinese companies have also started their innovations bases at overseas destinations. These new initiatives provide positive business perceptions about the Chinese companies and they become popular at overseas destinations. This is one of the most effective ways of making the globalization a success.

Yu (2017) emphasized on the digital transformation for large scale restructuring and globalization. Globalization is a rapid process of fulfilling client demands at very far off places. In order to carry it on successfully digitalization is essential. The author has studied the digital transformation of Chinese economy. He showed that the telecommunications sector in China has changed its digital landscape. That is a really significant achievement for China and that helped the country to progress in its manufacturing and expansion of its economy. Czarnecki and Dietze (2017) analyzed the modern telecommunications industry for the reforms and restructuring points of views. The authors started with the notion that in order to restructure the telecom industry the strategists must understand it clearly. In this article, the authors presented several conceptual and strategic aspects which must be understood properly before applying any kind of restructuring. The value chain in the telecommunications market now has evolved into complex value networks. The restructurings must be done only after understanding the current status and how the new changes will fit into them. Otherwise, the outcomes may not be as expected.

Mohanty and Routray (2017) presented the recent trends of global telecommunications. These trends are mainly motivated by the demand from global population. Consumer electronics plays the main role of driving these demands straight to the customers. The resources such as bandwidth are scarce. There

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

are new bands being introduced for the emerging services. Recent trends show the global bandwidth demand is growing faster than the previous years. Globally, mobile communication is very popular with the total number of subscriptions is about to exceed the global population. However, some parts of the developing world are still not fully connected. In the next decade, it may cover these untouched territories in Africa and elsewhere. Hong (2017) analyzed the post-2008 restructuring in China's online businesses. They started the Internet Plus policy according to which their digital economy got priority over the traditional business platforms. It has developed world class vendor companies such as Huawei and ZTE. It seems that China's plans for a digital restructuring for the future dominance over the online businesses are getting pace. Agur (2018) studied the telecommunications restructuring of independent India. He started his study from 1947 the year in which India achieved its independence and started its own infrastructure. The author has divided the whole period from 1947 until 2018 into three parts: 1947 until 1984, 1984 until 1991 and finally from 1991 until 2018. In the first period from 1947 until 1984 the restructuring was very much slow and dependent on the government policies. In the second period, several initiatives were taken by the government to bring changes in the ICT sector but they were not successful immediately. In the third period, India witnessed the biggest changes in its ICT sector. The liberalization introduced by the government in 1991 brought fruits. The emergence of the private sector in telecommunications was remarkable. These changes were the main driving forces of India's modern telecommunications market which is now very much competitive. Restructuring and globalization over the years have made Indian ICT sector very much matured, forward looking and globally recognized.

Li (2018) presented several positive and revolutionary changes in the global telecommunications sector. Due to the advances in new technologies the Internet of Things (IoT) has arrived. This is termed as the fourth revolution industrialization known as Industry 4.0. In this article, the author has predicted similar changes in the telecommunications sector which is named as Telecommunications 4.0. In this study it has been shown that the analog communication was started more than 100 years back and it was the telecommunications 1.0. With the digital communication the second version came into the industry and the Internet brought the third version. In the current fourth version, with technologies like IoT and 5G many new changes are about to come in the global telecommunications sector. Several new dimensions will be added to the ICT services. There will be several new challenges for the companies in the new landscape. Sapolsky et al. (2018) presented a detailed study of telecommunications revolution in the past, present and also predicted the future trends. It shows the global restructuring of the telecommunications sector over the last several decades. In the past the telecommunications used to be a public service and was controlled by the governments. Regulations were changed due to the competition and this sector too witnessed the LPG transformations. The new technologies in the sector forced several restructuring which were pivotal in the overall changes. Gao (2018) studied the effects of the 2008 world economic recession on the emerging industries including the telecommunications sector. Due to the financial crises in 2008, the global value chain was restructured to cope with the future challenges. As a strategic move global industry relocation was carried out in several sectors. Based on the global supply and demand industry relocations happened to high demand markets. In fact, before the relocations the companies assessed the markets using different measurement tools. It is well known that the global relocation follows the Pareto Principle. Similarly other tools were used for strategic relocation of industries in the post 2008 era.

Lewis (2018) studied the Internet based businesses in China. There are several new opportunities in the online markets in China. Initially, China did not allow the multi-national online giants in China. That is very much according to the Chinese communist principle of maintaining secrecy. However, later they

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

allowed partial openness to the international companies. The controversy with Google China reopened the Chinese policy of hiding information from the public. It was a boon for the domestic Internet-based companies of China. Now several big companies exist in China those do Internet-based businesses. China has even bigger plans for the future. It is clearly visible from the current restructuring in those companies. The recent plans such as Belt and Road Initiatives and Internet Plus clearly show China's ambition to be a superpower in this sector. China engages with ASEAN countries with a special focus in this direction.

METHODOLOGY

In this study, we analyze several telecommunications companies from their beginning till 2018. Several of the old companies have become obsolete now. Some of the companies have been merged with their successful rivals (Mohanty, 2012). We started the analysis from the beginning of the Telegraph era which started in 1831. However, major restructuring in telecommunications was started in the 1980s. Both restructuring and globalization became strategies for long term goals in the 1980s and since then they play key roles in telecommunications planning (Czarnecki & Dietze, 2017). We also analyzed the chronological restructuring and strategic changes in the telecommunications sector. We present all these significant chronological changes in this chapter. We classified the major reasons for restructuring, and found that changing telecommunications technology is the main reason for the restructuring. Technological changes in telecommunications have disrupted the global markets in several ways time and again (Mohanty & Routray, 2017). Especially the mobile communications since the 1990s have changed the global markets and human lives to a large extent (Mohanty & Routray, 2017). We emphasized these disruptions and studied the restructuring of telecommunications companies due to the impact of the mobile technologies. We also studied the future impacts of ICT on the society. For the future research directions we analyzed the technology foresight papers on ICT. Of course we focused the future research directions only for the next decade.

STRATEGIC CHANGES IN TELECOMMUNICATIONS

Telecommunications is one of the largest technology sectors in the world. It has big roles in the day to day lives of people. Revenue wise, it is one of the largest contributing sectors to the global gross domestic product (GDP). It is estimated to be around 5% of the global GDP is from the ICT sector (Mohanty, 2012). This sector is also considered as the backbone of the modern business. All the online commercial activities are dependent on this sector. Due to its importance, its up-gradation is always a priority for government as well as for private companies. Restructuring is always considered a strategic move. However, depending on the contexts it has different goals. For some companies restructuring is required to expand their markets, for some it is essential to survive in the market, for some sustainability is not possible without restructuring. Depending on the contexts, companies restructure their businesses to remain active in the market. In fact modern strategic changes in the telecommunications sector were started in the 1980s, in both Europe and North America. The privatization of British Telecom (BT) and other European telecommunications operators were the beginning of the modern restructuring in a large scale (From & Eliassen, 2007). Similar restructuring was kicked off in the USA through the division of AT&T.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Strategic changes in telecommunications are quite contrasting in the developed countries when compared with the developing countries. Strategically, there are several changes in the telecommunications market of the developed countries. Some of the companies in these developed countries have grown rapidly. Now several of them lead the global communication in the technology and management frontiers. However, some of them have struggled badly to keep their positions intact. Majority of the companies have expanded their coverage areas of services. However, a few of them have done the reverse (Mohanty, 2012). Overall these moves and restructuring are strategy driven to remain competitive in the market. Several big companies have also changed their marketing and cultural aspects of their strategies to compete better. Restructuring in brand building and advertisement too have changed over the last couple of decades in the developed countries. In contrast to the companies in the developed countries, the telecom markets in the developing countries are very much young and unsaturated. The growth rates in several developing countries are in the double digits (Mohanty, 2012). However, large markets in the developing countries are quite versatile with a variety of service providers, operators and customers. The tele-densities of rural and urban areas differ by large margin. That is an attraction for both the domestic and international operators. The growth potentials in the developing countries are still very attractive. However, in developed countries ICT sector is always looking for new innovations to expand the market.

RESTRUCTURING OF TELECOMMUNICATIONS SECTOR

Restructuring of telecommunications is the process or combination of processes to change the technological, management and market related aspects of the telecommunications industry to remain competitive. Restructuring is always a strategic step in the growth and sustainability of a business. Restructuring has several motivating factors. Strategic restructurings are well planned, based on the position of the company in the market. Planned restructuring is done over a period of several years and its main goal is to make the telecom services more attractive and competitive. Intense competition and the intention to provide better services than the competitors may force frequent restructurings (Mohanty, 2012). Some of the restructuring may not be planned. For instance, during the natural disasters, telecom infrastructures are badly affected. The post-disaster restructuring is essential to bring the services back.

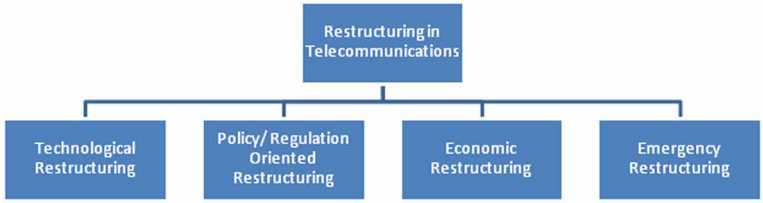
Restructuring in telecommunications can be classified in to several types (Ulset, 2007). Here we classify restructuring on the basis of their driving forces. Telecommunications is a technology driven sector. Thus new innovations in ICTs always bring new frontiers and dimensions for this sector. Technology driven restructuring is a continuous process and it happens gradually with every passing year. It is noteworthy that politics and economics also important roles in the restructuring of telecommunications sector. Politics is all about the policy making at the upper level for the approval of the services to the public. Economics is the price decider in the market. If there is only one service provider then the monopoly would keep the prices high, if there is no policy on the price control. On the other hand, competition among multiple service providers normally brings down the price which is very much customer oriented.

Types of Restructuring in Telecommunications

Restructuring is a gradual process. It is an absolute fact that a sector remains competitive as long as the timely restructurings are on course. For telecommunications sector, there are some key motivating factors for restructuring. Normally, the motivating factors are market driven. The three main factors for the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Restructuring in telecommunications



restructuring of telecommunication are: technology, telecommunications policy/ regulations, and the economics of the market. However, emergency related events also initiate restructuring. Based on these main factors, we classify telecommunications restructuring in to the following types.

Technological Restructuring

Technology is always the main driving force behind any kind of meaningful restructuring in telecommunications. Technology frames the form and scopes of restructuring. In general, any telecommunications system needs three basic resources: transmitted power, bandwidth and telecom infrastructure. Technology is associated with each of these resources. Transmitted power is needed for every communication and its efficient use is always a benefit for the operators. Therefore in every periodic restructuring, power efficiency is considered for the up-gradation of the telecommunications systems. Bandwidth is a very limited resource. It belongs to the government of the country, and normally, it is auctioned publicly for the allocation to different operators. Presence of many operators makes the spectrum expensive and the services may also become costly. However, it is also noteworthy that large numbers of operators bring healthy competition to the market. Infrastructure is the built environment and the equipment required for the telecommunications operations. Sustainability of the businesses is an essential aspect in the modern world (Mohanty & Moreira, 2014). It is possible only through appropriate restructuring in line with the innovations on resource conservation. Green communications and sustainability issues are really important for the long term success of a telecom company (Routray & Sharmila, 2017). Thus technological restructuring is always a strategic step to remain effective in the telecommunications business.

Policy Oriented Restructuring

In every country, policies are made by the governments. For the telecommunications sector too, the policies are made by the political class. From time to time, governments change the policies on the services, and tariffs of telecommunications sector. Power levels in communications, maximum permissible bandwidth per person, and infrastructural guidelines are prepared by the country's regulators and finally converted in to regulations for implementation by the governments. The governments auction the resources such as the available bandwidth to the existing operators. Governments also set the policies on the data rates and other performance related aspects. All these proposed changes from the governments are mandatorily implemented by the telecom operators of the country. These are the policy related restructuring. These restructurings are binding and the operators cannot opt out of it.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Economic Restructuring

Economics is the real force behind several restructuring. Economics decides the price through the supply and demand in the market. In case of monopolistic market, the operators can dictate their own terms in the market. This type of monopoly was observed during the pre-liberalization era. However, the presence of multiple operators makes the business very competitive. All the aspects such as tariffs, quality of services, and service maintenances are subject to the competition in the market. All these aspects demand restructuring in telecommunications business to stay relevant in the market. Thus economic restructuring is associated with the market dynamics which is decided by the competition in the market.

Emergency Related Restructuring

Telecom networks are vulnerable to the natural disasters and also suffer from aging related malfunction. An active network cannot be kept out of service for a long time. The malfunctions have to be repaired on time as an emergency. In fact, a normal repairing may not be considered as restructuring. In case of restructuring, the network deployment techniques are altered from the previous ones to improve the robustness of the networks. The main aim is to avoid such damages when a similar disaster strikes. These types of rebuilding services come under the emergency restructuring. Depending on the scale of the disaster, this restructuring can be minor or major. For instance, providing better protection to optical fibers along a coast line for a few kilometers is a minor restructuring. However, rebuilding a network with robust techniques in one or more states after a hurricane or cyclone is a major restructuring. In terms of revenue, a major restructuring is an expensive move. However, emergency restructurings are essential to bring the services back and to resume the day to day operations. A delay in these restructuring may result in revenue loss and customers may switch to the rivals.

Telecommunications Restructuring Until 1950

Telecommunications was started as telegraph in the 1830s. It was based on Morse code and telegraph cables. Initially, telegraph connected only the big cities. Due to the increasing demand, telegraph was extended to the medium and small cities. The restructuring in the 1850s was based on the customer demands. Railways were being built during that time and telegraph companies used the railway tracks to lay the cables along the railway tracks. Even some railway operators started laying their own cables for telegraph and leased them to the telegraph operators. At that time the competition was not very intense as the initial cost for investment in the infrastructure was very high. Later in 1876, telephone was invented by Graham-bell and it needed new kind of cables. The price of voice telecommunications was higher than the telegraph. Co-existence of telephone and telegraph motivated for restructuring around 1900s. That is how, the strategic planning and competition in the telecommunications market in the US gathered pace. Later similar restructuring was followed in Europe and other continents. However, the private companies were very few in number. Most of the telephone and telegraph services were being provided by the public sector companies under the government. In the first decade of the twentieth century, wireless communication was started in the form of Radio. It was very much popular for the long distance broadcasting. Typically, the governments provided the public broadcasting services such as news and public announcements through the radio. It played important roles during the First World War. Commercialization of radio services started during the 1920s, and it became a popular source of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

entertainment. During the 1920s, television came into the public arena. However, it was very much expensive during the first several years. Silicon-based electronics was started in the late 1940s. It paved ways for economical components for radio and television. This was a big change and television became popular in the 1940s. Both radio and television were very much dependent on the wireless communications. The technological restructuring of the telecommunications sector during the 1920s and 1930s were slow. However, Second World War brought many new inventions in the telecommunications technologies. Transcontinental communications between Europe and North America was mainly through the undersea cables.

Telecommunications Restructuring From 1951 Until 1980

After the Second World War, massive restructuring in all the sectors started in the 1950s. Leaders all around the world focused on political, social and economic stability. Moreover, economic stability was the main priority due to the resources and revenues lost during the war years. Economic development started with the aim of increasing the productivity and to provide employment for the people. Telecommunications sector got a priority due to its importance in the war planning and information management. Infrastructure for telecommunications expanded through the deployment of new networks. Telecommunications companies got bigger and better in the services. However, in most of the countries, telecommunications used to be under the control of the governments (Bell, 1990). Privatization was not very popular and thus the expansion plans and tariff related decisions used to come from the government. Gradually over the years, the telecom companies monopolized due to the absence of competition.

Despite the monopoly of the government-controlled companies, several new initiatives were started during this era. The technological restructuring through research and development used to be funded through the government. Optical communication was developed during the 1960s and 1970s and changed the global telecommunications to a large extent (Routray, 2014). Similarly, digital signal processing and satellite communications too were developed during these years. Satellite communications were the main basis for the international voice and video communication. The price for these services used to be quite high due to the complexities associated with the processes. However, the arrival of optical communications changed that scenario. All the continents were connected with each other through the high capacity optical fibers and the services become economical. Diplomatic differences during the cold war era motivated for better encryption techniques for communications. It became possible though different encryption standards such as data encryption standard (DES).

Telecommunications Restructuring From 1981 Until 1990

In this decade, many surprising changes happened in the telecom sector across the world. Liberalization and privatization started in all the economic sectors. Monopoly of the large companies started diminishing. American Telegraph and Telephone (AT&T) used to be the largest company in the world and it had monopoly over the US telecommunications market. This was found to be against fair competition in the market for the small, medium and private companies. A lawsuit was filed against AT&T and the court in the US ordered for its disintegration. So, the giant AT&T was divided into 19 companies known as baby bells. This is how a huge restructuring came to the sector. New companies found an opportunity to compete. Several new telecom operators and vendors were started after the division of AT&T. Similarly,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in Europe privatization in telecommunications was started and several countries followed it (From & Eliassen, 2007). Among them the privatization of BT is the most notable.

Mobile communications were started in 1980s. It induced technological restructuring in several companies. Digital mobile communications started in Europe which was later named as 2G. This was a joint venture of several countries in Europe and the company formed to look after these technologies were named as GSM. This technology became very popular within a few years.

Telecommunications Restructuring From 1991 Until 2000

This decade saw the real growth of ICT in terms of infrastructure and popularity. World Wide Web (WWW) was introduced in 1989. It was the floodgate for telecommunications proliferation. The Internet became popular globally. Online businesses were started over the Internet. ICT started to be a part of part of all important activities of human lives and businesses. The GSM-based mobile communication was started in the 1980s, but its real deployment started in the 1990s. It was the first technology disruption in telecommunications sector. Therefore, the role of the traditional wire line-based telecommunications started losing its importance and in its place people got the mobile services. Mobile services were costly at the beginning. However, due to the large scale competition, the prices came down and it was affordable to the general public. The 2G services helped both individuals and businesses in a whole new fashion. Due to this disruption, land line subscriptions started decreasing and in its place people took new mobile connections.

From the rapid growth of 2G, the operators and vendors were motivated for advancement of the mobile technologies. In fact, their main goal was to provide Internet connectivity through the mobile handsets. Several telecommunications companies came together to form a common mobile research and standardization forum known as Third Generation Partnership Programme (3GPP). They also laid a long term evolution (LTE) goal together. This 3GPP alliance played key roles in the future mobile developments. 2G was not good enough to send anything other than voice. Therefore, the 2G protocols were enhanced through several new packet radio protocols which facilitated the text messaging. The Short Message Service (SMS) was the new dimension of 2G and the new version was called 2.5G (Routray & Sharmila, 2016a). Similar to 2.5G several incremental versions of 2G came to the mobile services. The Internet service provision also started in the 2.9G. Mobile communications induced massive restructuring in telecommunications sector. In fact, it became a disruptive technology and further liberalized the ICT markets.

Telecommunications Restructuring From 2001 Until 2010

The first decade of this century was remarkable for the cellular communications and the restructuring around the mobile communication technologies. The 2G revolution continued into the Twenty-first century and in the developed countries mobile subscriptions approached close to 100%. Technological restructuring continued further and the next generation of mobile communication, i.e., 3G was rolled out. 3G provided enhanced services when compared to the 2G ones. In addition to that it started providing new services such as video and other streaming services. The telecom vendors too found new opportunities in the network building as well as advanced handset design. In both areas the revenues soared significantly which created gigantic mobile operators like Vodafone and Verizon.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Technological restructuring in 2000s was very much relentless. The 3G services were slow in the streaming and other high speed services. This was a bottleneck for the LTE service networks. Contemporary technologies such as WiMAX and 802.11g/n were better than 3G in these aspects. Therefore, the 3GPP started new initiatives for the next advanced version which was named as fourth generation of mobile communications (4G). In 4G, the speed, latency, spectral efficiency and overall throughput were enhanced with respect to 3G. Therefore, it was suitable for streaming and other real time applications. The final version of 4G was finalized in 2009. The rolling out of this advanced version started from the second half of 2009 in the developed countries and a few developing countries. However, the widespread deployment happened only after four to five years.

Telecommunications Restructuring From 2011 Onwards

In the current decade, we see fierce competition among the telecommunications companies in every segment of their businesses. Operators take bold steps to keep the markets with them. Vendors are equally competitive in keeping their revenues intact. Restructuring in the recent days are multi-faceted. The telecommunications value chains between the vendors and operators are observed for each vendor operator pair. For large companies having collaboration with other operators and vendors these value chains turn into value networks.

The current decade is dominated by the widespread technological restructuring across the world. Several new technologies disrupted the markets and changed the traditional framework of telecommunications. In this decade, several value added services were witnessed over the mobile communication platforms. However, the biggest addition was the Internet of things (IoT). It has expanded the domain of the ICT to several new paradigms. Smart cities and smart grids are the outcomes of the IoTs. Through IoTs several new business potentials have been observed over the ICT infrastructure (Ramnath et al., 2017). IoTs are basically sensor driven technologies which can perform computing, communication, storage, actuation of associated components and some domain specific tasks. A connected living environment can be possible through the IoTs. IoT became an integral part of all cellular communication networks. It brought several value added services to the cellular communication businesses (Sharma et al., 2017).

In 2015, the 4G services were substituted by 4.5G which were better than the 4G services. In fact, it was regarded as the hybrid of 4G and 5G services. 4.5G also gave a lot of confidence to the 5G developers in terms of the service performances. Voice communication over the cellular networks found a new technology called Voice over LTE (VoLTE). This new technology provided high quality voice over the LTE networks. The core network capacities increased significantly. Optical fibers were deployed all around the world and it provided superfast connections across the world (Routray, 2014). Internet connectivity increased significantly and it brought dramatic changes in global businesses (Mohanty & Routray, 2017).

Big data became the new buzzword in the ICT in the recent years. With the fusion of computing and communication, several benefits were harnessed. However, the amount of data produced through this was huge. It cannot be processed using the traditional tools (Mohanty & Moreira, 2013). This is called the big data. The importance of big data is that it carries a lot of intelligence which is essential for several applications. Big data are analyzed using special tools known as big data analytics. ICT companies are one of the main generators of big data. The ICT companies are using data analytics to harness the intelligence which can be crucial for their growth and sustainability.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Artificial intelligence (AI) and machine learning are the new dimensions in the ICT platforms. These tools are used to carry out several smart functions. In order to facilitate these new dimensions several restructuring are being proposed for ICT. The Fifth Generation of mobile communication (5G) will have several advanced features which were not available in the previous mobile generations (Routray & Sharmila, 2016b). Some of the 5G new services would use AI. Mobile operating systems are developed to handle these new tasks. Several new versions of these operating systems have been tested for the use in 5G.

GLOBALIZATION OF TELECOMMUNICATIONS MARKET

Expansion of markets is a key motive for restructuring for any large company. It is also an essential strategy to improve the performances of a company. Liberalization and privatization provided a lot of freedom to the telecommunications companies. It also motivated the companies to look for opportunities beyond the national borders. Mainly the companies from the US and Europe started their offshore businesses in their friendly countries (Bruce, 1989). Telecommunications companies too started their international ventures through different means. The telecom equipment vendors easily found partners due to their expertise in making equipments and deploying networks.

Globalization of telecommunications companies can be viewed under two different categories: globalization of vendors and globalization of operators. Telecommunications vendor companies are the telecom equipment and network component builders and they normally deploy the networks. Telecommunications operators are the direct service providers. Therefore they directly deal with the end customers which can be individuals or businesses. They directly collect the revenues from their clients periodically through the post paid services. In case of prepaid services they collect the money in advance. However, the telecom vendors collect their revenue from the operators and it normally come I phases.

Globalization of the telecom vendors' market is as old as the telecommunications industry itself. For instance, telephone was invented in 1876 and Eriksson started manufacturing the telephone sets in 1878 and sold them not only in Sweden but throughout the world. Similarly, just after the invention of Radio, its commercial manufacturing was started by several companies and they sold them globally. Initially, the selling was though some middleman. However, gradually, the manufacturers globalized their manufacturing by opening their bases in several countries. This trend of globalization of telecommunications vendors is still there. However, it has become very much systematic with global marketing and globalization of the markets has created bases in multiple countries. For instance, Eriksson had only a few international bases in the 1970s. Now it has direct business presence in more than fifty countries. Similarly, other vendors such as Nokia networks, Huawei, Cisco, ZTE and Corning are having direct business presence in multiple countries. Without globalization large vendors cannot do good business as the requirements of a single country are not too large for their growth and progress. These days, only small and limited vendoring of some specific components can be done within the geographical limits of a country. Therefore, it is obvious for a vendor company to go for globalization.

Operators have a very much different business perspective. They are not like the vendors who are experts of network deployment. Rather, the operators can just invest for the network building and once it is ready they start the services and collect the tariffs. The competition for the operators is also more direct when compared with those of the vendors. For the operators, the end customer base is very important. Depending on the quality of service and the cost for the services, the operators may lose or retain

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

their customers. These two aspects are also important for an operator when they plan for globalization. Therefore, when an operator enters a new overseas market it must provide something new or something attractive so that they can grab the customers from the existing operators of that new market. Based on the innovative ideas and better technologies, operators go for globalization these days. For instance, the European operators such as Vodafone, Orange and T-mobile have several overseas operations based on their quality of service and advanced technologies. However, it is noteworthy that the competitors of these operators in the overseas countries get better every year (Pedersen et al., 2017). Therefore globalization of the operators is more complex than the globalization of the vendors.

FUTURE RESEARCH DIRECTIONS

Telecommunications is a vibrant technological sector which generates a lot of revenue. Researches on its restructuring and globalization are studied with much interest across the world. Future research directions of telecommunications restructuring too are widely analyzed by the consultants and scholars of the field. In the recent years and near future, there are several important areas in which the telecommunications restructuring researches will be focused. In the following paragraphs we have highlighted these research areas.

Fast and Enhanced Telecommunications Services

Every year new innovations come to the telecommunications sector. Their implementation leads to better services for the end customers. Currently, 5G development is under progress. Through its deployment several performance enhancement will be achieved. Data rates will be increased significantly, latency will be decreased, scalability will be enhanced by several folds, and energy efficiency will be increased (Routray & Sharmila, 2016). Overall, the 5G handsets will provide several new computing and communication facilities which never existed before. A major technological restructuring is going to happen through 5G deployment in the 2020s.

Managed Services for Better Network Management

In the past, the operators used to deploy the network. The revenue for this deployment used to come from their own investment or through the bank loans. It was a burden for the operators. However, this trend has been changed to a large extent. Now, the telecommunications vendors take that role. In several instances, we find that the vendors utilize their expertise to build the networks. Once the network is ready they provide it for use to different operators. The ownership is now largely with the vendors. Operators just rent the networks and pay the fees periodically. The research on the telecommunications value chains and value networks are very much popular these days (Pedersen et al., 2017). In the coming years these concepts would be further developed and would pave the way for more increased roles for the vendors.

Widespread Deployment of Internet of Things

IoT is a game changing technology. In the modern world it has several important roles in our surroundings. In the smart cities all the information will be collected, processed and disseminated by the IoTs.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Starting from security to taking care of day to day activities will be executed through the IoTs. In the coming decades, IoT will play key roles in almost all our activities.

Energy Efficiency and Green Technologies

In the recent years, energy efficiency of the telecommunications networks has an increased importance due to the wide spread use of ICT. The net power consumed by the ICT networks and devices is gigantic. Therefore, the current restructuring is very much focused towards energy efficiency. Every operator is now concerned by the high energy bills. Recent advances in the green technologies too have given a boost for its widespread adoption.

Artificial Intelligence and Machine Learning

Artificial intelligence (AI) and machine learning are now very much essential in the telecommunications networks and device management. There are several operations in which human estimation would take a long time and the accuracy may not be that good. In such cases, a machine can be trained to provide optimal results. Several learning theories have been used for machines. Optimal resource allocation and consumption are complex processes in large communication networks. These things can be optimized though AI. Research in this segment of ICT is very much popular and the technological restructuring will be oriented towards these new initiatives.

CONCLUSION

Telecommunications is an essential technology sector which has become an integral part of modern human lives. In the recent years, telecommunications has a role in every aspect of our social activities. It will remain as one of the most widely used technologies. Restructuring of telecommunications is an inevitable requirement. However, in the modern business world of tough competition, restructuring has become a continuous process. Without restructuring, telecommunications companies will lose their competitive edge over their rivals. Even the demise of a company is very much common these days without restructuring. There are four main areas of restructuring in telecommunications. Each of them play essential role in the growth and survival of a company. Globalization is a strategy to expand the market. In addition to the growth, it provides survivability to the companies in the difficult situations. Both restructuring and globalization are important for the telecommunications companies which are large and intend to survive for a long time. The future restructuring will be very much oriented along the managed services. Therefore, the vendors will play important roles in the future restructuring than their traditional roles seen in the past.

REFERENCES

Agur, C. (2018). Re-imagining the Indian state: External forces and the transformation of telecommunications policy, 1947–present. *Global Media and Communication*, *14*(1), 65–83. doi:10.1177/1742766518759794

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bagley, C., & Hunter, B. (1992). Restructuring, constructivism, and technology: Forging a new relationship. *Educational Technology*, *32*(7), 22–27.

Bell, T. E. (1990). From monopoly to competition: Long-term research is vulnerable. *IEEE Spectrum*, *27*(10), 46–50. doi:10.1109/6.58476

Bortolotti, B., D'Souza, J., Fantini, M., & Megginson, W. L. (2002). Privatization and the sources of performance improvement in the global telecommunications industry. *Telecommunications Policy*, *26*(5-6), 243–268. doi:10.1016/S0308-5961(02)00013-7

Bruce, R. R. (1989). Restructuring the telecom sector in developing countries: Some new options for policymakers. *IEEE Technology and Society Magazine*, *8*(4), 16–20. doi:10.1109/44.44528

Chan-Olmsted, S., & Jamison, M. (2001). Rivalry through alliances: Competitive strategy in the global telecommunications market. *European Management Journal*, *19*(3), 317–331. doi:10.1016/S0263-2373(01)00028-7

Cogburn, D. L. (1998). Globalization and state autonomy in the information age: Telecommunications sector restructuring in South Africa. *Journal of International Affairs*, *51*(2), 583–604.

Cogburn, D. L. (2017). From NWICO to Global eCommerce: Telecommunications Restructuring and the GII. In Transnational Advocacy Networks in the Information Society (pp. 53-92). Palgrave Macmillan.

Czarnecki, C., & Dietze, C. (2017). Understanding today's Telecommunications Industry. In *Reference Architecture for the Telecommunications Industry* (pp. 17–54). Cham: Springer. doi:10.1007/978-3-319-46757-3_2

From, J., & Eliassen, K. A. (Eds.). (2007). *The privatisation of European telecommunications*. Ashgate Publishing, Limited.

Gao, X. (2018). *Measuring the Generalized Global Industry Relocation*. Academic Press.

Graham, S. (1999). Global grids of glass: On global cities, telecommunications and planetary urban networks. *Urban Studies (Edinburgh, Scotland)*, *36*(5-6), 929–949. doi:10.1080/0042098993286

He, S., Fallon, G., Khan, Z., Lew, Y. K., Kim, K. H., & Wei, P. (2017). Towards a new wave in internationalization of innovation? The rise of China's innovative MNEs, strategic coupling, and global economic organization. *Canadian Journal of Administrative Sciences*, *34*(4), 343–355. doi:10.1002/cjas.1444

Hong, Y. (2017). Pivot to Internet Plus: Molding China's Digital Economy for Economic Restructuring? Hudson, H. E. (1991). Telecommunications in Africa the role of the ITU. *Telecommunications Policy*, *15*(4), 343–350.

Jin, D. Y. (2005). The telecom crisis and beyond: Restructuring of the global telecommunications system. *Gazette (Leiden, Netherlands)*, *67*(3), 289–304. doi:10.1177/0016549205052232

Jin, D. Y. (2008). Neoliberal restructuring of the global communication system: Mergers and acquisitions. *Media Culture & Society*, *30*(3), 357–373. doi:10.1177/0163443708088792

Lal, D., Pitt, D. C., & Beloucif, A. (2001). Restructuring in European telecommunications: Modelling the evolving market. *European Business Review*, *13*(3), 152–158. doi:10.1108/09555340110391266

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Levi-Faur, D. (1998). The Competition State as a Neomercantilist State: Understanding the restructuring of national and global telecommunications. *Journal of Socio-Economics*, *27*(6), 665–685. doi:10.1016/S1053-5357(99)80002-X

Lewis, D. (2017). China's Global Internet Ambitions: Finding Roots in ASEAN. *Institute of Chinese Studies: Occasional Paper, 14*.

Li, Z. (2018). Telecommunication 4.0: Opportunities and Challenges. In *Telecommunication 4.0* (pp. 107–133). Singapore: Springer. doi:10.1007/978-981-10-6301-5_6

Mohanty, S. (2012). *Strategic changes in the telecommunications sector: Europe vs. India* (Master's thesis). Universidade de Aveiro.

Mohanty, S., & Moreira, A. C. (2014). Sustainability in global telecommunications. *IEEE Potentials*, *33*(5), 29–34. doi:10.1109/MPOT.2013.2292540

Mohanty, S., Moreira, A. C., & Nobre, H. (2013). Marketing Challenges for the Emerging Services of Big Data Technologies and Solutions. *International Conference on Big Data Management and Cloud Computing*.

Mohanty, S., & Routray, S. K. (2017). CE-Driven Trends in Global Communications: Strategic sectors for economic growth and development. *IEEE Consumer Electronics Magazine*, *6*(1), 61–65. doi:10.1109/MCE.2016.2614420

Pedersen, T., Devinney, T. M., Tihanyi, L., & Camuffo, A. (Eds.). (2017). *Breaking up the global value chain: opportunities and consequences*. Emerald Group Publishing. doi:10.1108/S1571-5027201730

Ramnath, S., Javali, A., Narang, B., Mishra, P., & Routray, S. K. (2017). IoT based localization and tracking. In *IoT and Application (ICIOT), 2017 International Conference on* (pp. 1-4). IEEE. 10.1109/ICIOTA.2017.8073629

Routray, S. K. (2014). The changing trends of optical communication. *IEEE Potentials*, *33*(1), 28–33. doi:10.1109/MPOT.2013.2279908

Routray, S. K., & Sharmila, K. P. (2016a). 4.5 G: A milestone along the road to 5G. In *Information Communication and Embedded Systems (ICICES), 2016 International Conference on* (pp. 1-6). IEEE.

Routray, S. K., & Sharmila, K. P. (2016b). Green initiatives in 5G. In *Advances in Electrical, Electronics, Information, Communication and Bio-Informatics (AEEICB), 2016 2nd International Conference on* (pp. 617-621). IEEE.

Routray, S. K., & Sharmila, K. P. (2017). Green initiatives in IoT. In *Advances in Electrical, Electronics, Information, Communication and Bio-Informatics (AEEICB), 2017 Third International Conference on* (pp. 454-457). IEEE. 10.1109/AEEICB.2017.7972353

Sakai, K. (2002). *Global Industrial Restructuring*. OECD Online Library.

Sapolsky, H. M., Crane, R. J., Neuman, W. R., & Noam, E. M. (2018). *The Telecommunications Revolution: Past, Present and Future*. London: Routledge. doi:10.4324/9781351115704

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sharma, L., Javali, A., Nyamangoudar, R., Priya, R., Mishra, P., & Routray, S. K. (2017). An update on location based services: Current state and future prospects. In *Computing Methodologies and Communication (ICCMC), 2017 International Conference on* (pp. 220-224). IEEE.

Stagliano, D. (1994). The ITU's role in the restructuring revolution. *IEEE Communications Magazine*, *32*(11), 48–49. doi:10.1109/35.330226

Ulset, S. (2007). Restructuring diversified telecom operators. *Telecommunications Policy*, *31*(3-4), 209–229. doi:10.1016/j.telpol.2007.01.006

Wellenius, B., & Stern, P. A. (Eds.). (1994). *Implementing reforms in the telecommunications sector: Lessons from experience*. The World Bank. doi:10.1596/0-8213-2606-6

Yu, H. (2017). Networking China: The Digital Transformation of the Chinese Economy. *The China Quarterly, University of Illinois Press*, *231*, 817–819.

ADDITIONAL READING

Ardalan, K. (2017). Driving force of globalization: A multi-paradigmatic look. *Research in International Business and Finance*, *41*, 480–492. doi:10.1016/j.ribaf.2017.05.005

Larson, J. F., & Park, J. (2014). From developmental to network state: Government restructuring and ICT-led innovation in Korea. *Telecommunications Policy*, *38*(4), 344–359. doi:10.1016/j.telpol.2013.10.001

Mohanty, S., & Biswal, S. (2016). Modinomics: The Practical Perspectives (A hype or reality). In *International Conference on Taking India to Greater Heights*, Bangalore, India.

Mohanty, S., Biswal, S., Polonia, D., & Moreira, A. C. (2016). Irrelevant borders: Perspectives of Globalization. In International Conference on Redrawing the boundaries of International relations: going beyond state power, Cuttack, India.

Rodríguez-Ruiz, Ó. (2015). Unions' response to corporate restructuring in Telefónica: Locked into collective bargaining? *Employee Relations*, *37*(1), 83–101. doi:10.1108/ER-03-2014-0029

Williamson, J. G. (1998). Globalization, labor markets and policy backlash in the past. *The Journal of Economic Perspectives*, *12*(4), 51–72. doi:10.1257/jep.12.4.51

Witte, E. (2018). A history of recent German telecommunications policy. In *The Telecommunications Revolution* (pp. 98–101). London, UK: Routledge. doi:10.4324/9781351115704-11

KEY TERMS AND DEFINITIONS

Emerging Segments of Telecommunications Market: These are the new and value-added business segments of telecommunications market. These new segments are strategically important for revenue generation.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Globalization in Telecommunications: It is the process of international expansion of businesses and services of a telecommunication company beyond its original base. It is an important strategic action to remain competitive in the global market.

Managed Service: Managed service is the new paradigm in which the network is built and owned by the vendors, and operators just rent them for their services.

Restructuring: Restructuring is the process or combination of processes to remain effective and competitive in the market.

Restructuring in Telecommunications Industry: It is the market-oriented modernization of telecommunication industry which is essential to remain effective in the market. Without restructuring, the company may lose its markets to its rivals.

Strategic Changes in Telecommunications: It is the combination of all key strategic changes in the telecommunications operators and vendors markets across the world.

Telecommunications Industry: Telecommunication industry comprises of all types of information and communication related companies, businesses and its overall customer base. It is one of the largest modern industrial sectors contributing a significant revenue generation.

Telecommunication Management: This is the overall management of all aspects of telecommunications including revenue, technology, manpower, and infrastructure.

This research was previously published in the Handbook of Research on Corporate Restructuring and Globalization; pages 52-72, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 63
The Significance of Trust to the Adoption of E-Working Practices Within Local Government

Hazel Beadle
University of Chichester, Bognor Regis, UK

ABSTRACT

Drawing upon an in-depth study of one local authority based in the United Kingdom, this article examines the significance of trust to local government workers who are beginning to make increasing use of e-technologies through e-working practices. The article identifies trust to be of particular significance but that the examined context is not supportive of that trust being developed. It notes differences in the perceptions surrounding trust development, that consideration of trust is not just limited to the relationship between management and their workers, and that there is a fear that trust is at risk of abuse. In the face of e-work serving to raise the profile of trust as a significant factor for concern, the associated technologies are suggested to have the potential to offer a solution to some of the issues arising.

INTRODUCTION

When considering the increasing use of e-technologies, electronically facilitated technology-based provision, focus tends to be placed on the associated hardware and software. Receiving less attention are the perceptions of those who are called upon to use those resources; the workforce. Since it is the workforce who execute organisational information technology strategies (Iyamu, 2014), and change associated with technology is acknowledged to cause uncertainty (Meier et al., 2013), this is surprising. One effect of this decreased focus is the development of a mythologised environment and a risk of management being based on assumptions (Van den Broek & Keating, 2011).

DOI: 10.4018/978-1-7998-7297-9.ch063

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

This paper is drawn from an unpublished doctoral research study investigating the increasing use of e-working in one local authority organisation based in the United Kingdom (UK). The study's context is significant in that there is little material about worker use of e-technologies within local government in the UK, much less studies in that context which focus on the perceptions of workers.

E-working is a term readily used in practice but which has received limited explanation within the literature. It is, therefore, a term which has contributed to the perpetuation of what Barley (1990) terms 'a maze of analytic abstractions'. An analysis of the related literature, undertaken as part of the aforementioned doctoral study identified e-working to be

...a mechanism for executing work tasks utilising technology in the form of electronic media. Since these tasks are so broad ranging, what the work tasks associated with e-working amount to is largely immaterial. Technological media is subject to development. This developmental factor, seen in the literature as having impeded the provision of technology related definitions, is central to the reality of working with technology. Embracement of development contributes to terminological longevity. It also heightens awareness of innovative practice; including ways of culturing and sustaining the relationship between the worker and the technology made available to them. Thus, in brief, e-working is...both a way of being a worker as well as a way, or mechanism, for carrying out the work task.

In this paper it is in relation to trust, noted to be a 'complex, multi-faceted, and context dependant concept' (Corritore et al., 2012), that the e-working focus is examined. Making use of the aforementioned conceptualisation of e-working, the focus of this paper is how trust is perceived to be relevant to local government workers who are making increasing use of e-technologies.

LITERATURE REVIEW

The literature is considered under three headings. After this brief introduction where the trust term is explored, attention turns to the context of the study; local government. This is followed by two sections examining factors significant to the perception of trust in the e-environment; the potential for liberation arising from use of, and communication in the presence of, e-technologies.

Trust is a term which is regard to be 'intuitively understood' despite being context specific (Mouzas et al., 2007). Indeed, there is suggestion that 'the domain of trust is rarely specified and its conceptual dimensions are used with imprecision and ambiguity' as a consequence of the concept being associated with inherently personalised factors such as beliefs and expectations (Mouzas et al., 2007). In the context of this paper, the issue of trust is contained to an organisational context; deemed to be a popular area of the trust debate (Vidotto et al., 2008; Kramer and Lewicki, 2010).

There are two strands of organisation-related trust debate apparent within the literature. Firstly, there is the debate relating to the repairing of trust, specifically where the perception of trust has been compromised and, secondly, there is the debate relating to how an existing level of trust can be sustained (Kramer and Lewicki, 2010; Caldwell et al., 2008). Both hinge on the perception that the presence of trust is inherently positive and something that is worth striving to achieve (Goel et al., 2005). Operationally the effect of trust is related to the links which can be drawn between how the worker feels, for example how trusted they consider themselves to be, and how they behave - the reaction to the perception of trust

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(Perrone et al., 2003; Dynes et al., 2013). Inevitably context plays a role in that perception and it is the context of the local government organisation, which is central to this study.

The Local Government Context

Although there is a sizable body of literature about local government per se, the volume of material about the use of e-technologies in local government in the UK, much less the implications for the respective workforce of increasing the use of those technologies, is limited. This is surprising because the use of technology in local government more broadly has received significant governmental focus. Writing a decade ago King & Cotterill (2007), for example, emphasised how transformation of local authorities had taken a central role in the UK government's political programmes over the preceding two decades, with technology playing a key role.

Beyond the United Kingdom, it is seen that whilst some technology-related local public administration studies have been undertaken within Europe, particularly Italy (e.g. Della Rocca, 2000; Arduini et al., 2010), the Scandinavian countries (e.g. Baldersheim & Øgård, 2008; Van Veenstra et al., 2012) and, noting Reinsalu's (2006) work, within and related to the State of Estonia; the greatest breadth of research has taken place within the United States of America (e.g. McNeal et al., 2008; Wohlers, 2009). However, even this material demonstrates little focus on the experience of the worker and thus a gap in that literature is evident.

With some blurring in the use of the 'technology' and 'e-technology' terms evident, potentially reflecting how contextualised application of technology becomes developed and embedded into operational practice, as well as the role played by the internet (Ho, 2007), the literature identifies the 'transformational' potential of using e-technologies in the local government setting. Writing beyond the focal UK setting Ho and Ho (2006) identify, for example, technology to be used for the improving, or transforming, of services which the public receive. This amounts to far more than the simple use of personal computers for handling routine business tasks (Ho, 2007).

Inevitably the extent to which transformation has occurred is influenced by the initial reticence to adopt technology (Asgarkhani, 2005). It is this reticence which contributed to perceptions of local government languishing behind its private sector comparators. In the early 1980s King (1982) suggested that whilst sophisticated application of information technology is plausible 'there is no *a priori* reason to expect that they will come to pass in the near future'. In other words, highlighting that change could happen but that it was unlikely to occur in the short-term. In part this appeared to be the consequence of a 'sitting out change' approach in order to make a more informed assessment once those e-technologies had been used elsewhere. This is not an untypical approach for UK local authorities to take.

Two decades later some writers (e.g. Worthington & Dollery, 2000; Wohlers, 2009) highlighted there to be increasing adoption of e-technologies in the local government context, with the change in approach credited to technological progression during the intervening time period. Local government was suggested to have awoken to a need 'to stay current with ever-changing technological applications' (Norris & Jae Moon, 2005), with factors such as the central government drive to 'achieve 100% electronic service delivery capability' (Paris, 2005), reduced public funding and raised efficiency targets all having a significant influence. Indeed, the context of the examined case study reflected the factors highlighted through the literature and were directly mentioned in the corporate explanation for the increased focus on e-working. Also noted was that the literature places limited emphasis on whether use of e-technologies

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is the best means for achieving operational efficiencies within local government, suggesting that the adoption of e-technologies within local government is as a one-way route.

Some of the initial reticence associated with implementing technological solutions in local government appears to have been a consequence of what Della Rocca (2000) terms the 'public administration paradox'. The paradox is identified in the mismatch between a belief in the continuous value of historical operational practices, and the emphasis placed on meeting contemporary service requirements. Indeed, this mismatch might well account for operational processes having been purposefully targeted; for example, through the central government driven reform agenda (Worthington & Dollery, 2000) wherein emphasis was placed on significant organisational change being brought into play as opposed to a simple 'repackaging' of the existing product.

Worker responsiveness, however, is influenced by the context in which their work is conducted (Stachova et al., 2015); the organisation's culture. Whilst the literature provides a wealth of material in relation to organisational culture generally, specific focus on culture within local authorities is limited. Indeed Sandford (2006) highlights that "almost nowhere in local government or scrutiny literature is there any focused discussion or analysis of what local government 'culture' actually is… No literature exists on this subject". It can be questioned whether this is the consequence of, as Orr & Vince (2009) highlight, there being no such thing as a single local government culture or whether it is the result of that culture being a 'fluid 'blooming buzzing confusion' of traditions, beliefs and assumptions' (Sandford, 2006).

In contrast to the limited detail provided about the nature of the culture within the local government organisation, the literature (e.g. Hayes & Macleod, 2008; Silver & Clark, 2013) flags up local authorities as having an increasing interest in the culture experienced within the society that they serve. Indeed, this 'outward looking' focus serves to emphasise the absence of attention on the internal, and therefore the worker-orientated, implications of the local authority culture; the context within which any perception of trust may flourish or flounder. It is within this context which the local government worker encounters e-technologies.

Liberation Through Use

Leadbeater's (2003) work highlights how, as a consequence of the application of e-technologies, information and responsibilities have generally moved to 'front line employees'. Identified is an underpinning focus on technology facilitating individuals to take responsibility for their work and, if responsibility equates to finding a mechanism for fulfilling requirements, then it is difficult to refute that there is potential for local government workers to feel 'liberated' through their use of e-technologies. This perception is argued to be pivotal to a perception of trust (Perrone et al., 2003). However, there are other factors, consequent to the presence of e-technologies, which also impact upon the working environment and, therefore, any perception of liberation.

One of these factors is the issue of flexible specialisation. Leadbeater (2002) alludes to this when writing about the 'mix and match' potential of technology. Underpinning the flexible approach is a moulding of the use of e-technologies according to prevailing organisational circumstances (Dawson, 2003; Garman, 2005); an approach which is allied to the moulding of the use of technology more broadly (Bouzaabia et al., 2016). Thus, if there is a desire to effect worker liberation through the use of e-technology, then this desire might be accommodated.

It is acknowledged that management operates through people as opposed to functioning as disembodied practice (Leadbeater, 2003; Fleming et al., 2004). In exercising that management role there is

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

potential to incorporate limiting measures, whether or not this potential is consciously recognised (Rosen & Baroudi, 1992; Sewell & Wilkinson, 1992). Thus it might well be through a process of 'deemphasizing managerial control' (Fuller & Smith, 1991) that individuals gain a perception of being empowered, or trusted, to undertake their work role.

However, despite the potential to perceive trust there are factors which risk undermining that perception. One of these factors is the potential for hidden constraint and the panoptican-like systems which receive attention in the Foucault-related literature. Foucault's writing about panoptican-like systems of control and domination relate to the risk of observation and the impact that that risk has on compliance (Foucault, 1977). There is suggestion that an omnipresent perspective facilitates fairness on the grounds that everyone can be observed (Townley, 1993; Felstead et al., 2005), with the risk of observation positively influencing the likelihood of required behaviours being exhibited and, as a consequence, reducing the need for corrective action (Sewell & Wilkinson, 1992). A similar theme is echoed in the work of other writers (e.g. Warner & Witzel, 2004; Valsecchi, 2006) and is one which inevitably has an impact upon individual perceptions of self-determination (Sewell & Barker, 2006).

With this risk hanging over the worker, it can be questioned whether the technologically-assigned (self) management role largely amounts to managing feelings of uncertainty. Leadbeater (1999) highlights that those using e-technologies are 'living on their wits', enigmatically capturing the need to maintain confidence, competence and motivational self-belief in a working environment where the nuancing effects of e-technologies are accelerating.

Thus, whilst the use of technology has the potential to prove liberating, or empowering, what that perception amounts to may not be immediately comparable with other uses of the term. It can, for instance, be questioned whether trust is a composite feature, or simply an illusion.

Communication

One area where e-technologies play a key role is in facilitating communication within the organisation, acknowledging that communication is more than the simple exchange of words (Dawson, 2003; Fairhurst & Putnam, 2004). Indeed, communication is acknowledged to be comprised of four domains; business, management, corporate and organisational (Kalla, 2005); with, for the purpose of this paper, focus placed on an amalgam of the latter three elements since these robustly embrace the within-organisation perspective. Despite acknowledgement of the influence of the management role in system adoption (Ho and Ho, 2006), somewhat ironically the significance of internal communication is argued to have come to the fore as a consequence of "…a drastic reduction of trust employees have in [that] management…" the consequence of detachment fuelled by the use of e-technologies (Tkalac Verčič et al., 2012).

Barley (1990) highlights that where e-technologies are adopted within organisations, that a piecemeal approach is often used; an approach which allows learning, for example in relation to communications processes, to occur (Dawson, 2003). One of those areas of learning relates to the satisfying of socialisation needs through electronic means (Layder, 2006; Liu et al., 2013). Socialisation plays a role in ensuring compliance through the provision of a 'framework' for behaviour (McBride, 1986; Stanworth & Stanworth, 1991), offering a parallel to the aforementioned panoptical approach.

The literature is silent on how workers handle e-socialisation capabilities where the organisational preference lacks clarity. The way ideas are conveyed inevitably influences the understanding that arises (Leonardi & Jackson, 2004; Hogler et al., 2008). Organisational procedural documentation provides an example, with its tendency towards a 'pigeonholing' approach in assuming that all workers can be satis-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

factorily handled the same way; that trust, for example, is consistently perceived by workers exposed to the same operating processes. Whilst this approach amounts to 'gross categorisation' (Alvesson, 2000; Fairhurst & Putnam, 2004), the removal of procedural direction can cause anxiety.

Also contributing to the communications approach is the structure of the organisation. The task of briefing workers is influenced by the way in which the organisation is constructed (Ogbonna & Harris, 2005), with that structure influenced, in turn, by the organisation's culture. The contribution to the briefing process of organisational size is also acknowledged, with Marks & Huzzard (2010) proposing that one of the benefits of the pursuit of an optimal organisational size is the opportunity to sift out workers failing to embrace the changes associated with introducing e-technologies.

Recent writing (e.g. Eikeland, 2015) suggests that there is a need for greater understanding of the trust concept. The volume of literature about the use of e-technologies in local government in the UK, much less the implications for the workforce of the increasing the use of e-technologies, has been identified to be limited. This study contributes towards a filling of the gap in understanding relating to these issues. Specifically, this paper examines the significance of trust to local government workers who are beginning to make increasing use of e-working practices.

METHOD

The study made use of a single local authority case study. The selected case was a local authority which at the point of examination had only recently decided to actively embrace e-working practices. Qualitative data was gathered through the use of single semi-structured interviews which explored understanding of the e-working term; the expectations and understanding associated with changing working practices; and the accommodation of worker and worker body needs. These themes were derived from an analysis of the literature which had resulted in the devising of the aforementioned definition of e-working.

The underpinning trajectory was to elicit an understanding of the perspectives held at the point when, within the organisation, increasing use was being made of e-working. Each of the 21 interviews lasted up to one hour and took place over a period of 6 months commencing in 2012.

The e-working participants included those who had links to the trade union as well as those who held management roles. Whilst all workers were invited to participate, a diversity of participants was sought mindful of Currie & Brown's (2003) identification of the value of case studies 'incorporat[ing] plurivocal understandings' and, furthermore, realising that change management involves workers at all levels (Pettigrew, 1985).

The data was gathered, transcribed and analysed by the writer in her role as a supervised part time PhD student, with a process of thematic content analysis used to draw meaning from the data collected. Smaller categories were subsequently merged to provide larger themed units, as illustrated in the following section.

FINDINGS AND DISCUSSION

Five themed sections, each derived from the data and with a trust-associated undercurrent, are presented. In turn the themes relate to the changing of the organisational culture; generation of enthusiasm; the potential for monitoring; the rise of e-socialisation and empowerment.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Changing the Organisational Culture

Almost without exception participants suggested the organisation's culture needed to change in order that it might benefit from the potential of e-technologies, as applied through increasing use of e-working. This was not regarded as a challenge that would be easy to fulfil but one, in the words of Participant 5, an e-worker in a technical department, where "…the positives outweigh the negatives so you are going to have to live with a few issues…"

E-working, and in particular the flexibility of working practices which the associated technology can facilitate, was identified to require the organisation to embrace mechanisms of work which, in the words of Participant 3, it had 'shied away from in the past'. That this risked causing discomfort was acknowledged. Furthermore, there was a suggested mismatch of expectations between those who had worked in local government for any length of time and recently recruited workers who were suggested to be more familiar with the impact of e-technologies on the worker role. This should, perhaps, not be surprising for, as Participant 11 highlighted, "a judgement is made about the required skill set at the time of recruitment…"

Trust was, akin to the perception portrayed by Goel et al. (2005), regarded as a positive feature. However, there was invariably caution attached. Participants, including those without managerial roles as illustrated by the following example, questioned whether trust was being abused where individuals were facilitated to carry out their duties outside of their traditional working environment:

Sometimes I'll be wondering what my colleagues are doing. I'll be wondering whether they are working or whether they are doing something at home. I don't know. It is not something for me to worry about but I wonder what they're doing. [Participant 4].

Asked how organisational trust was being generated, responses took one of two routes. The majority perspective suggested that trust was something which would inherently arise albeit this would take time and entail some turnover within the existing cohort of workers. Here there was an identified absence of urgency and little desire to actively seize the potential highlighted in the literature (e.g. Marks & Huzzard, 2010) to *actively* sift out workers who failed to respond to the potential of technological change. Participant 11 described this in terms of

...going in the right direction. They want this to be a significant change, a cultural change for this organisation. It is going to take time because that's how the mechanisms of local government work.

The second perspective suggested that trust could be cultured through 'stock' resolutions such as being instructed to think differently; 'to trust'. The organisation's Human Resources Department, for example, had identified some online training and, consequent to engaging with this provision, argued that changed behaviours would automatically result.

Generating Enthusiasm

The rigidity with which the management role had been traditionally fulfilled within the organisation, with that rigidity impacting upon the ability to exhibit trust, was regularly raised by participants. Management practices largely amounted to adhering to written procedures which precluded variation or uncertainty.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Three participants, all managers, proposed that a 'Dickensian label' would serve as a useful descriptor for the organisation's historical style of management.

How this historical style contrasted with requirements in the presence of e-technologies was illustrated by Participant 5, who identified that their manager had demonstrated the required approach:

[They] don't have to be on my back all the time. [They] don't need to know what I'm doing all the time. [They] don't need to check the results of my work or anything like that. They just need to be [available] to support me...and to ensure that my focus or the overview of where I am going is in the right direction.

Participant 2, one of the managers who were spoken about as providing an example of the required approach, highlighted that a further change was evident in the blurring of the distinction between working and non-working lives. In doing so he acknowledged that the associated decrease in clarity had the potential to cause discomfort; in part because the work role risked having an unfamiliar impact upon those surrounding the individual.

Participant 10, a manager in an administrative department, highlighted that the decreased clarity also impacted upon managerial expectations. He provided an example which highlighted the need to acknowledge limitations in worker availability despite the increased flexibility offered through e-working:

If they say 'I can only work till 3 but I am e-working remotely' then you don't expect to phone them at 4 and say 'Well I know you technically finished at 3 but I still want to contact you, I still want your help' [Participant 10].

Some enthusiasm was generated by managers being facilitated through the use of e-technologies to become more immersed in their professional (as opposed to managerial) discipline. It was the removal of the day-to-day emphasis on the controlling stance, the consequence of needing to trust workers to satisfactorily complete their roles, together with how this contrasted with historical working arrangements, which was suggested to be significant.

The Potential for Monitoring

The potential for technology to be used to monitor the workforce was acknowledged. Participant 10 described monitoring to be 'a side effect of technology's presence'; a view aligning with the literature (e.g. Dawson, 1988).

However, a number of those in managerial roles indicated that they believed a lack of obtrusiveness equated to worker ignorance of the monitoring potential. Some managers gained pleasure from this perception. Indeed, one manager recounted joking with a peer about the extent of their monitoring capabilities.

It was not clear why some managers perceived there to be a lack of an awareness of the monitoring potential. However some managers did indicate that they found the presence of monitoring capabilities to be unsettling and that they sought to manage the associated anxiety. Participant 9, a manager in an administrative department, suggested that by failing to identify an awareness of monitoring that it 'save[d] putting ideas into people's heads'.

If monitoring is perceived to undermine trust, and trust is pivotal to effective use of e-technologies through e-working, then an attempt to conceal the potential to engage in monitoring activities might be argued to be appropriate. Furthermore, if concealment is not achievable then the practice of justifying

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

monitoring activities could prove to be a substitute position. Whilst both perspectives were exhibited in the data, a number of participants mentioned organisational policies and the right to 'observe' workers which was embraced by that documentation. As highlighted by Participant 1, "It is always there. There is a communications policy so it is always there with regard to internet access and so on being monitored". There was also mention of monitoring being used to check on the safety of workers. In relation to use of Global Positioning System (GPS) tracking Participant 3, for example, suggested this was supportive in that it enabled 'an alert in case anything happens'. However this supportive perspective was off-set by comments regarding the ability to use GPS solely for the purpose of checking whether work was being actively undertaken.

Thus a tension was identified between the potential for e-facilitated monitoring and the uses to which that monitoring capability can be put. If all sides to the employment relationship are operating within a framework of trust then, as Participant 2 explained, "staff shouldn't care about, shouldn't even think about whether they are being monitored". However, in the studied local authority, this framework of trust appeared to be absent and thus the impact of the *potential* to monitor was regarded to be significant.

The Rise of E-Socialisation

Participants used a variety of terms when discussing communications, potentially reflective of the domains identified within the literature (Kalla, 2005). However, 'being in touch' and 'social' were the most popular. Despite gaps in understanding how e-technologies functioned, there was indication that socialisation had the effect of generating feelings of inclusion and that the technology associated with e-working might facilitate new ways of fulfilling work-related social needs; needs which were highlighted to be of particular significance if working remotely.

However significantly influencing participant embracement of the e-facilitated approaches was the effect resulting from a number of operational mechanisms converging. Policy provision was one influence, with an expectation that 'protocol policies' would be adopted for e-socialisation being regularly raised. It was suggested that the perception of needing such a framework, as well as the time period associated with policy generation, undermined the potential to generate trust. One of the difficulties appeared to be an inability to effectively communicate changed approaches. As Participant 21 highlighted:

We have got something called Yammer, if you have heard of that but there was no launch of it or any instruction that you could use it to communicate between staff. I got an invite from [name] and thought 'why has she invited me to this? What is it? I clicked on it and accepted and looked at it. It was obviously a way to communicate but there was no distinction as to which tool the organisation wants us to be using for what.

There were participants who suggested that they would only use the e-socialisation provision with which they felt comfortable and that in the absence of a trust culture, that this comfort was limited. Facebook and Twitter were named as examples of platforms which were increasingly used within the organisation but which were regarded to have generated discomfort amongst the workforce. Yammer was, as the following quote from Participant 21 illustrates, generating a similar effect:

Some people are just posting on this Yammer stuff the crap that they would put on Facebook socially, so what is the barrier? It makes me sound really up tight and it would be nice to have something that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

would be relaxed without worrying that the Chief Exec might be reading your comments, but people are putting some weird things on.

Whilst, therefore, there was evidence of efforts to respond to worker socialisation needs, the effectiveness of using e-technologies for that purpose appeared to be being hindered by perceptions of trust and the extent to which the new ways of working differed from the familiarity offered by the historical processes. Thus the perception of e-socialisation in the context of the studied environment was identified as being one of limitations and the result was a leaning towards perpetuation of the status quo.

Empowerment

The literature suggests that whether an individual perceives they are, or are not, empowered, depends upon both their control over the work location (Feldman & Gainey, 1997; Edwards & Collinson, 2002) and their perception of task ownership (Klein, 1989; Rubery & Grimshaw, 2001). This latter element includes the deemphasising of managerial control (Fuller & Smith, 1991). Thus the existence of empowerment is determined by the individual worker.

The study identified it was those holding management roles who made particular use of the 'empower' term. However, this did not mean that empowerment was part of the reality for their staff. Indeed Participant 8 was seen to acknowledge this optimistic focus in their use of the "I would hope that they're more empowered" phraseology.

Trust has already been highlighted to have not historically been a feature of the local authority working environment. Generation of trust was not indicated to require the removal of management per se, but efforts to generate trust were highlighted to be associated with managers adopting more facilitative (empowering) approaches. Despite this need being identified, several participants mentioned managers requiring sight of completed task lists when, using the capabilities of e-technology, work was undertaken out of their sight. However Participant 2, an e-worker and manager, highlighted how one of his own e-workers had provided without request a detailed listing of the work undertaken. He recalled having berated the individual for feeling they needed to prove they were working but then acknowledged that this was an approach that he had also used: "Because in my mind I am thinking I've got to let that person know I'm working". Suggestion that proof is required indicates the absence of trust.

Empowerment might arise from an absence of formal instruction, allowing the individual to feel they are able to make their own decisions regarding the execution of their role. This might, therefore, be perceived as being the benchmark which workers may be desirous of achieving. However such an approach was repeatedly described, by those identifying themselves as having the potential to undertake e-working, as being 'let loose'. The inference was that far from being empowered to make decisions, these individuals felt unsupported.

Also inducing anxiety was the risk of the level of fear being sustained. It would be an incorrect reflection of the data to suggest that there were no managers who were identified as exhibiting trust, but certainly there was evidence to indicate that managers who were desirous of being trusted were encountering difficulties. Participant 2, a manager, highlighted:

It's the culture of the organisation. It's about trust. It is exactly about that trust. They didn't believe that I trusted them if that makes sense because they've only ever known the traditional style of management and things like that. [The trust associated with e-working] was a completely different mindset to get across.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In summary, the potential surrounding the adoption of e-working practices to highlight the absence of trust in local government workers to fulfil their job roles was noted, despite general consensus that the presence of trust was both positive and desirable. There was an absence of consensus with regard to how that trust might be generated in the presence of increasing use of e-working, with the influence of an historically favoured regulated approach playing a significant role. Indeed e-technologies, for example in the capacity for monitoring workers, were identified as having the potential to be used in such a manner that there was active undermining of any perception of trust.

The prospect of trusting workers to carry out their duties as e-workers, minded that this encapsulates the way of being a worker (one part of the aforementioned e-working conceptualisation) was acknowledged to offer benefits to those in managerial roles as well as those who reported to those managers. Those in managerial roles were, for example, highlighted in the presence of increasing use of e-working practices as having the opportunity to place increased focus on their primary professional discipline. However, despite the desire expressed by some managers to benefit from this revised position, workers appeared to pick up on a more cautious managerial perspective. Thus, despite evidence of small pockets of changed operating processes, the potential to generate a sizable body of trust within the organisation was negated.

CONCLUSION

The focus of this paper has been to examine the significance of trust to local government workers who are beginning to make increasing use of e-working practices. That the study has identified trust to be of particular significance is not surprising in the light of the focus placed on the perception within the literature more broadly (e.g. Vidotto et al., 2008; Kramer and Lewicki, 2010). However this paper offers value by identifying this significance through a study conducted in a local government context, a largely neglected area of focus, where trust was identified to be desired but where the context was not supportive of that trust being developed. Differences in the perceptions surrounding how trust might be developed appear to be problematic. Since trust has been identified to be perceived as being central to the increasing use of e-working, actions suggesting there to be an absence of urgency with regard to the development of that trust inherently have a stalling impact. Of influence here is the fear that trust, if developed, might be abused. From an operational perspective, the study has noted the need to focus on intra-organisational cultural change, the subject of current research activity.

Acknowledging, as Sandford (2006) highlights, the 'fluid 'blooming buzzing confusion' of traditions, beliefs and assumptions' which constitute the local authority culture, the study has highlighted that the trust is not limited to the relationship between management and their workers, but also with workers trusting their peers. Thus this paper contributes to unpacking a little further, specifically within the context of the local government organisation, the magnitude of and factors requiring examination in the effecting of cultural change.

Finally, whilst e-working is identified as serving to raise the profile of trust as a significant factor for concern, the associated technologies are identified to offer a solution to some of the issues arising. Technology's facilitation of socialisation is identified, for example, to have the capacity to generate perceptions of inclusion and that inclusion has a positive and perpetuating effect, for example through its influence on a worker's self-regulation of behaviour.

Inevitably this research has limitations. First, the study was exploratory and whilst it purposefully sought the perceptions of the participants, those perceptions are subject to change. Whilst participants

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

were self-nominating and all of the local authority's workers were invited to participate, it is inevitable that the viewpoints held by some employees were not captured. The effect on the findings of a failure to capture these perspectives can only be surmised. The study explored one local authority organisation, with the choice of organisation influenced by that organisation being in the process of increasing its use of e-working processes. Since other local authority organisations in the UK have already embraced e-working arrangements, the extent to which learning from the study can be used at a practical level in other organisations is limited. However, the relevance of trust where e-working has become embedded is an avenue for future research activity.

REFERENCES

Alvesson, M., & Karreman, D. (2000). Varieties of discourse: On the study of organizations through discourse analysis. *Human Relations*, *53*(9), 1125–1149. doi:10.1177/0018726700539002

Arduini, D., Belotti, F., Dennis, M., Giungato, G., & Zanfei, A. (2010). Technology adoption and innovation in public services – the case of e-government in Italy. *Information Economics and Policy*, *22*(3), 257–275. doi:10.1016/j.infoecopol.2009.12.007

Asgarkhani, M. (2005). Digital government and its effectiveness in public management reform. *Public Management Review*, *7*(3), 465–487. doi:10.1080/14719030500181227

Baldersheim, H., & Øgård, M. (2008). Innovation in e-government: Analysis of municipal web pages in the Nordic countries. *Democracy in the Information Age*, *13*(3/4), 125–137.

Barley, S. (1990). The Alignment of Technology and Structure through Roles and Networks. *Administrative Science Quarterly*, *35*(1), 61–103. doi:10.2307/2393551 PMID:10106582

Bouzaabia, O., Bouzaabia, R., & Capatina, A. (2016). Determinants of internet use by senior generation: A cross cultural study. *International Journal of Technology and Human Behaviour*, *12*(1).

Caldwell, C., Hayes, L., Bernal, P., & Karri, R. (2008). Ethical Stewardship - Implications for Leadership and Trust. *Journal of Business Ethics*, *78*(1), 153–164. doi:10.100710551-006-9320-1

Corritore, C., Wiedenbeck, S., Kracher, B., & Marble, R. (2012). Online trust and health information websites. *International Journal of Technology and Human Behaviour*, *8*(4), 92–115. doi:10.4018/jthi.2012100106

Currie, G., & Brown, A. (2003). A narratological approach to understanding processes of organizing in a UK hospital. *Human Relations*, *56*(5), 563–586. doi:10.1177/0018726703056005003

Dawson, P. (1988). Information Technology and the Control Function of Supervision. In D. Knights & H. Willmott (Eds.), *New Technology and the Labour Process* (pp. 118–142). Basingstoke: Macmillan. doi:10.1007/978-1-349-19242-7_6

Dawson, P. (2003). *Understanding Organizational Change: The Contemporary Experience of People at Work*. London: Sage.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Della Rocca, G. (2000). The public administration paradox: An organisation with a low degree of institutionalisation. *Scandinavian Journal of Management*, *16*(4), 375–389. doi:10.1016/S0956-5221(00)00013-0

Dynes, M., Hadley, C., Stephenson, R., & Sibley, L. (2013). Measuring trust among frontline health workers in rural Ethiopia. *Human Organization*, *72*(3), 230–241. doi:10.17730/humo.72.3.y2kk32w73442w6q1

Edwards, P., & Collinson, M. (2002). Empowerment and managerial labour strategies: Pragmatism regained. *Work and Occupations*, *29*(3), 272–299. doi:10.1177/0730888402029003002

Eikeland, T. (2015). Emergent trust and work life relationships: How to approach the relational moment of trust. *Nordic Journal of Working Life Studies*, *5*(3), 59–77. doi:10.19154/njwls.v5i3.4807

Fairhurst, G., & Putnam, L. (2004). Organizations as discursive constructions. *Communication Theory*, *14*(1), 5–26. doi:10.1111/j.1468-2885.2004.tb00301.x

Feldman, D., & Gainey, T. (1997). Patterns of telecommuting and their consequences: Framing the research agenda. *Human Resource Management Review*, *7*(4), 369–388. doi:10.1016/S1053-4822(97)90025-5

Felstead, A., Jewson, N., & Walters, S. (2005). *Changing places of work*. Basingstoke: Palgrave Macmillan.

Fleming, P., Harley, B., & Sewell, G. (2004). A little knowledge is a dangerous thing: Getting below the surface of the growth of 'knowledge work' in Australia. *Work, Employment and Society*, *18*(4), 725–747. doi:10.1177/0950017004047951

Foucault, M. (1977). *Discipline and Punish: The birth of the Prison*. London: Penguin.

Fuller, L., & Smith, V. (1991). Consumers' Reports: Management by Customers in a Changing Economy. *Work, Employment and Society*, *5*(1). doi:10.1177/0950017091005001002

Garman, A. (2005). Review of Understanding Organizational Change: The Contemporary Experience of People at Work. *Personnel Psychology*, *58*(2), 537–540.

Goel, S., Bell, G., & Pierce, J. (2005). The perils of Pollyanna: Development of the Over-Trust Construct. *Journal of Business Ethics*, *58*(1), 203–218. doi:10.100710551-005-1415-6

Hayes, D., & Macleod, N. (2008). Putting down routes: An examination of local government cultural policy shaping the development of heritage trails. *Managing Leisure*, *13*(2), 57–73. doi:10.1080/13606710801933420

Ho, K. (2007). The e-Government development, IT strategies and portals of Hong Kong SAR Government. *International Journal of Cases on Electronic Commerce*, *3*(2), 53–74. doi:10.4018/jcec.2007040105

Ho, S., & Ho, K. (2006). Success of Electronic Government Information Portal. *Journal of E-Government*, *3*(2), 53–74. doi:10.1300/J399v03n02_04

Hogler, R., Gross, M., Hartman, J., & Cunliffe, A. (2008). Meaning in Organizational Communication: Why Metaphor is the Cake, not the Icing. *Management Communication Quarterly*, *21*(3), 393–412. doi:10.1177/0893318907309929

Iyamu, T. (2014). The interplay between human and structure in IT strategy. *International Journal of Technology and Human Behaviour*, *10*(1), 83–100. doi:10.4018/ijthi.2014010106

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kalla, H. (2005). Integrated internal communications: A multidisciplinary perspective. *Corporate Communications*, *10*(4), 302–314. doi:10.1108/13563280510630106

King, J. (1982). Local government use of information technology: The next decade. *Public Administration Review*, *42*(1), 25–36. doi:10.2307/976089

King, S., & Cotterill, S. (2007). Transformational government? The role of information technology in delivering citizen-centric local public services. *Local Government Studies*, *33*(3), 333–354. doi:10.1080/03003930701289430

Klein, J. (1989). The Human Costs of Manufacturing Reform. *Harvard Business Review*, *67*(2), 60–66.

Kramer, R., & Lewicki, R. (2010). Repairing and enhancing trust: Approaches to reducing organisational trust deficits. *The Academy of Management Annals*, *4*(1), 245–277. doi:10.1080/19416520.2010.487403

Layder, D. (2006). *Understanding social theory* (2nd ed.). London: Sage. doi:10.4135/9781446279052

Leadbeater, C. (1999). *Living on thin air*. London: Penguin.

Leadbeater, C. (2002). *Up the down escalator*. London: Penguin.

Leadbeater, C. (2003). Who will own the knowledge economy? *The Political Quarterly*, *69*(4), 375–385. doi:10.1111/1467-923X.00173

Leonardi, P., & Jackson, M. (2004). Technological determinism and discursive closure in organizational mergers. *Journal of Organizational Change Management*, *17*(6), 615–631. doi:10.1108/09534810410564587

Liu, F., Lo, H., Su, C., Lou, D., & Lee, W. (2013). High performance reversible data hiding for mobile applications and human interaction. *International Journal of Technology and Human Behaviour*, *9*(4), 41–57. doi:10.4018/ijthi.2013100103

Marks, A., & Huzzard, T. (2010). Employability and the ICT worker: A study of employees in Scottish small businesses. *New Technology, Work and Employment*, *25*(2), 167–171. doi:10.1111/j.1468-005X.2010.00246.x

McBride, T. (1986). White-collar Proletariat. *Journal of Social History*, *19*(4), 727–728. doi:10.1353/jsh/19.4.727

McNeal, R., Hale, K., & Dotterweich, L. (2008). Citizen-Government Interaction and the Internet: Expectations and Accomplishments in Contact, Quality and Trust. *Journal of Information Technology & Politics*, *5*(2), 213–229. doi:10.1080/19331680802298298

Meier, R., Ben, E., & Schuppan, T. (2013). ICT-enabled public sector organisational transformation: Factors constituting resistance to change. *The International Journal of Government and Democracy in the Information Age*, *18*(4), 315–329.

Mouzas, S., Henneberg, S., & Naude, P. (2007). Trust and reliance in business relationships. *European Journal of Marketing*, *41*(9/10), 1016–1032. doi:10.1108/03090560710773327

Norris, D., & Jae Moon, M. (2005). Advancing e-Government at Grassroots: Tortoise or Hare? *Public Administration Review*, *65*(1), 64–75. doi:10.1111/j.1540-6210.2005.00431.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ogbonna, E., & Harris, L. (2005). The adoption and use of information technology: A longitudinal study of a mature family firm. *New Technology, Work and Employment*, *20*(1), 2–18. doi:10.1111/j.1468-005X.2005.00140.x

Orr, K., & Vince, R. (2009). Traditions of local government. *Public Administration*, *87*(3), 655–677. doi:10.1111/j.1467-9299.2009.01770.x

Paris, M. (2005). Local e-Government and Devolution: Electronic Service Delivery in Northern Ireland. *Local Government Studies*, *31*(3), 307–319. doi:10.1080/03003930500095137

Perrone, V., Zaheer, A., & McEvily, B. (2003). Free to be trusted? Organizational constraints on trust in boundary spanners. *Organization Science*, *14*(4), 422–439. doi:10.1287/orsc.14.4.422.17487

Pettigrew, A. (1985). *The Awakening Giant: Continuity and Change in ICI*. Oxford: Blackwell.

Reinsalu, K. (2006). Is Estonian local e-government responsive to citizens' needs? The case study of Tartu. *Information Polity*, *11*(3-4), 255–272.

Rosen, M., & Baroudi, J. (1992). Computer-based Technology and The Emergence of New Forms of Managerial Control. In A. Sturdy, D. Knights, & H. Willmott (Eds.), *Skill and Consent: Contemporary Studies in the Labour Process* (pp. 213–234). London: Routledge.

Rubery, J., & Grimshaw, D. (2001). ICTs and employment: The problem of job quality. *International Labour Review*, *140*(2), 165–192. doi:10.1111/j.1564-913X.2001.tb00219.x

Sandford, M. (2006). Westminster Executive meets local government 'culture': Overview and scrutiny in three English county councils. *Environment and Planning. C, Government & Policy*, *24*(6), 929–946. doi:10.1068/c0442

Sewell, G., & Barker, J. (2006). Coercion versus care: Using irony to make sense of organizational surveillance. *Academy of Management Review*, *31*(4), 934–961. doi:10.5465/AMR.2006.22527466

Sewell, G., & Wilkinson, B. (1992). Someone to watch over me – Surveillance, discipline and just-in-time labor process. *Sociology*, *26*(2), 271–289. doi:10.1177/0038038592026002009

Silver, D., & Clark, T. (2013). Buzz as an urban resource. *Canadian Journal of Sociology*, *38*(1), 1–31.

Stachova, K., Stacho, Z., & Bartakova, G. (2015). Influencing organisational culture by means of employee remuneration. *Business: Theory and Practice*, *16*(3), 264–270.

Stanworth, J., & Stanworth, C. (1991). *Telework: The human resource implications*. London: Institute of Personnel Management.

Tkalac Verčič, A., Verčič, D., & Sriramesh, K. (2012). Internal communication: Definition, parameters, and the future. *Public Relations Review*, *38*(2), 223–230. doi:10.1016/j.pubrev.2011.12.019

Townley, B. (1993). Performance appraisal and the emergence of management. *Journal of Management Studies*, *30*(2), 221–238. doi:10.1111/j.1467-6486.1993.tb00302.x

Valsecchi, R. (2006). Visible moves and invisible bodies: The case of teleworking in an Italian call centre. *New Technology, Work and Employment*, *21*(2), 123–138. doi:10.1111/j.1468-005X.2006.00168.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Van den Broek, D., & Keating, E. (2011). Rights to a process for the masses or select privileges for the few? Telework policy and labour market inequality in Australia. *Policy Studies*, *32*(1), 21–33. doi:10.1080/01442872.2010.520559

Van Veenstra, A., Aagesen, G., Janssen, M., & Krogstie, J. (2012). Infrastructures for public service delivery: Aligning IT governance and architecture in infrastructure development. *e-Service Journal*, *8*(3), 73–97. doi:10.2979/eservicej.8.3.73

Vidotto, G., Vincentini, M., Argentero, P., & Bromiley, P. (2008). Assessment of Organisational Trust: Italian adaptation and factoral validity of the Organisational Trust Inventory. *Social Indicators Research*, *88*(3), 563–575. doi:10.100711205-007-9219-y

Warner, M., & Witzel, M. (2004). *Managing in virtual organizations*. London: Thomson.

Wohlers, T. (2009). The digital world of local government: A comparative analysis of the United States and Germany. *Journal of Information Technology & Politics*, *6*(2), 111–126. doi:10.1080/19331680902821593

Worthington, A., & Dollery, B. (2000). An empirical survey of frontier efficiency measurement techniques in local government. *Local Government Studies*, *26*(2), 23–52. doi:10.1080/03003930008433988

This research was previously published in the International Journal of Technology and Human Interaction (IJTHI), 14(4); pages 81-94, copyright year 2018 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 64
The Knowledge Management Culture:
An Exploratory Study in Academic Context

Marcello Chedid
https://orcid.org/0000-0003-0435-6568
University of Aveiro, Portugal

Leonor Teixeira
https://orcid.org/0000-0002-7791-1932
University of Aveiro, Portugal

ABSTRACT

Knowledge management is defined by different authors as the process that enables the sharing, capture and application of knowledge from the individual to the group and further to organizational level. The organizational atomization observed in the academia imposes importance in paying attention to a culture that encourages knowledge management and also assigns equal importance to the cooperation and the work in team. However, due to the different levels of heterogeneity among and within these organizations there is not just one model that fits well. Through a literature review on the knowledge management in the academia, the purpose of this chapter is an exploratory study that identifies the main cultural challenges in the development and implementation of a knowledge management system in the academic context.

INTRODUCTION

Knowledge management (KM) has been mainly developed in the corporate knowledge perspective. Nevertheless, there are other environments within which KM should be studied, such academic context. Despite the wealth of knowledge and knowledge-intensive (KI) activities, in general, the academia do not have their knowledge properly organized and they have been paying little attention to their management, differing from the corporate sector (Ali, Gohneim, & Roubaie, 2014; Geuna & Muscio, 2009; Rowley,

DOI: 10.4018/978-1-7998-7297-9.ch064

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2000). Geng et al. (2005) indicate that the application of KM in this context is fairly recent and that the first publication is dated in 1997.

The social academic communities are constituted by universities, public research institutes, and public research laboratories (Perkmann & Walsh, 2007).

Several authors have the opinion that the development and implementation of knowledge management processes in the academia presents often some difficulty (Petrides & Nodine, 2003; Rowley, 2000; Tippins, 2003). Although its missions are closely related to the management of knowledge (Howell & Annansingh, 2013; Tian, Nakamori, & Wierzbicki, 2009), and the existence of some important facilitator elements (e.g., large experience and expertise in creating and developing knowledge, and the horizontal and academic structure organizational).

In a similar way to the other KI organizations, academia are exposed to marketplace pressures (Rowley, 2000), which makes as critical as in the corporate sector the use of mechanisms of KM (Howell & Annansingh, 2013; Kidwell, Vander Linde, & Johnson, 2000). However, academia faces some difficulties in establishing an organizational culture that focuses on KM and significantly boosts the sharing of scientific knowledge.

The academic environment has certain characteristics that dominate their culture and that need to be understood. According to Tippins (2003), the academic environment is characterized by a group of individual experts in different and diverse areas of knowledge. This environment of diversity propitiates the development of sub-cultures (Howell & Annansingh, 2013) transforming these communities in complex social organizations composed by diverse cultures, predominating the academic freedom and autonomy (Sporn, 1996), where close control can induce negative reactions (Starbuck, 1992).

Knowledge in academic context is created by different forms and is related to the experience and competence of their teachers and researchers, without any coordination or management in line with a specific strategy. Geuna and Muscio (2009, p. 99) add that "the characteristics of individual researchers have a stronger impact than the characteristics of their departments or universities". According to Tian et al. (2009), basically, in the creation process of new knowledge academics reach required knowledge from three dimensions (scientific, social, and creative) and can be supported from four knowledge sources (supervisor or professor adviser, colleagues, self-study, and outside scholars).

The created knowledge becomes explicit through articles, patents, books, conferences, classes, etc. In the meantime, part of this created knowledge is kept in the tacit form.

An effective KM in academic context is possible. However, the organizational atomization observed in the universities imposes importance in paying attention to a culture that encourages KM and also assigns equal importance to the cooperation and the teamwork (Bjørnson & Dingsøyr, 2008; Howell & Annansingh, 2013; Sporn, 1996).

Thus, in order to provide knowledge-intensive inputs to companies, government and to society (Schmitz, Teza, Dandolini, & Souza, 2014), as pointed out by Kidwell et al. (2000), the academia have to move from the old culture that considers, "What is in it for me?" to a new one "What is in it for our customer?".

From a critical analysis derived from the literature on the KM in the academia, the purpose of this chapter is an exploratory study that identifies the main cultural challenges in the development and implementation of knowledge management processes in the academic context. The chapter also aims to address some further research directions.

In this chapter the authors address the non-profit academies, since the for-profit institutions tend to reflect more similar characteristics to business organizations (Kezar, 2001).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

BACKGROUND: ABOUT KNOWLEDGE MANAGEMENT

The advancement of an economy based on knowledge has increased the visibility and importance of organizations that create and disseminate knowledge. Through knowledge, organizations can disrupt limitations, enhancing development and create new opportunities (Pekka-Economou & Hadjidema, 2011).

Even though knowledge and information are far from identical, the concept of knowledge has varied considerably, and is often used as something similar to information (Kakabadse, Kakabadse, & Kouzmin, 2003; Mårtensson, 2000) or is used interchangeably (Stenmark, 2001).

There is not a common knowledge definition accepted and, as such, knowledge is defined according to the context in which it is discussed (Gloet & Terziovski, 2004; Stenmark, 2001; Stoyanov, 2014). Rowley (2007) agrees that knowledge is an elusive concept which is difficult to define.

Regardless of the concept, knowledge always brings their respective truths and beliefs, judgments and expectations, methodologies, and know-how (Prieto, Revilla, & Rodríguez-Prado, 2009; Reimer & Karagiannis, 2006).

Knowledge-intensive (KI) can be applied to organizations in which knowledge has more importance than other inputs (Starbuck, 1992), work is mainly of intellectual nature (Alvesson, 2001), and consequently where knowledge workers is the major part of team work (Drucker, 1994; Tzortzaki & Mihiotis, 2014). Generally, KI organization has the capacity to solve complex problems through creative and innovative solutions (Wong, 2005). Social norms of openness and teamwork, where cooperation is fundamental, are key cultural characteristics in this type of organization (Starbuck, 1992). Alvesson (2001) adds that KI organization can also produce good results with the help of outstanding expertise.

The KM is crucial in organizing processes and can representing many gains for the KI organization. However, Rowley (2000) highlights that an effective KM process may require significant changes in culture and values, and in organizational structure.

Types of Knowledge

The different dimensions focused by the authors in different fields of study result in various classifications and distinctions of knowledge. Alavi and Leidner (Alavi & Leidner, 2001) summarize the various views of knowledge under different perspectives and present knowledge taxonomies. Johannessen's (2008) study offers a schematic depiction of different knowledge distinctions, and Kakabadse et al. (Kakabadse et al., 2003) answer the question "What is knowledge?" presenting a table of taxonomies that addresses types and forms of knowledge and level of embodiments.

However, the major part of authors adopt the classical division introduced by the Hungarian chemist and philosopher Polanyi (1966), and widely spread by Nonaka et al. (1996): knowledge can be explicit or tacit.

Explicit knowledge (EK) is a type of knowledge that can be easily codified, articulated, documented and archived, and usually, it is stored and expressed in the form of texts, data, scientific expressions, maps, manuals and books, websites, etc. (Alavi & Leidner, 2001; Iacono, Nito, Esposito, Martinez, & Moschera, 2014; Nonaka & Konno, 1998; Polanyi, 1966; Santoro & Bierly, 2006; Seidler-de Alwis & Hartmann, 2008).

Tacit knowledge (TK) is the basis of knowledge creation, it is complex and not codified, and presents some difficulties in its reproduction in document or database. Smith (2001) reports that 90 percent of the knowledge in any organization is TK and it is embedded and synthesized in peoples' heads.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In general, the literature mentions the existence of two dimensions of TK: (i) technical and (ii) cognitive (Alavi & Leidner, 2001; Nonaka & Konno, 1998). The technical dimension is often referred to as expertise, and consist of informal personal skills, and crafts that apply to a specific context. The cognitive dimension refers to mental models, beliefs, ideals, values and paradigms, which are deeply ingrained in people. Nonaka and Konno (1998) suggest that while difficult to articulate, this cognitive dimension of TK shapes the way each one person perceives the world.

Some authors even differentiated the knowledge between individual and organizacional (Birasnav & Rangnekar, 2010) assuming that the individual resides entirely in the mind of each person, while the organizational exists in explicit and tacit forms and may be resident in people, groups, documents, processes, policies, physical contexts or in data basis.

Knowledge Management

After the information management, a neutral and normative system in the organizations (Gloet & Terziovski, 2004), the KM emerges as a distinct area of study, establishing as a significant source of competitive advantage and as one of the most important resources in the capacity of progress of modern organizations (Mårtensson, 2000; Pekka-Economou & Hadjidema, 2011).

Prusak (2001) indicates that the first conference devoted to KM occurred in Boston in 1993. Strongly influenced by Nonaka and Takeuchi's book (Chen, 2006), the KM expanded rapidly in various fields such as psychology, management science, sociology, strategy, production engineering, etc. This wide diversity of areas transforms KM in a complex and multi-faceted concept (Alavi & Leidner, 2001), reflecting the wide range of definitions, leading in the absence of a standard and universally accepted definition (Chen, 2006; Kakabadse et al., 2003; Sadeghi & Salemi, 2013). In a recent article, Girard and Girard (2015) listed more than a hundred KM definitions from twenty-three distinct domains. It is important to note that, in general, such definitions bring with them the concepts of the domains in which they are applied.

Although the absence of consensus regarding the definition of KM, the Davenport et al.'s (1998) definition is one of the most cited in the literature: "KM is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the organization's objectives".

Knowledge management is based on three main pillars: (i) technology, (ii) people, and (iii) process (Kalkan, 2008; Prieto et al., 2009). Considering that a knowledge management system is not an automatic data processing system (Tuomi, 1999), the focus should not be on one element, and is certainly a combination of all three the best approach (Bjørnson & Dingsøyr, 2008).

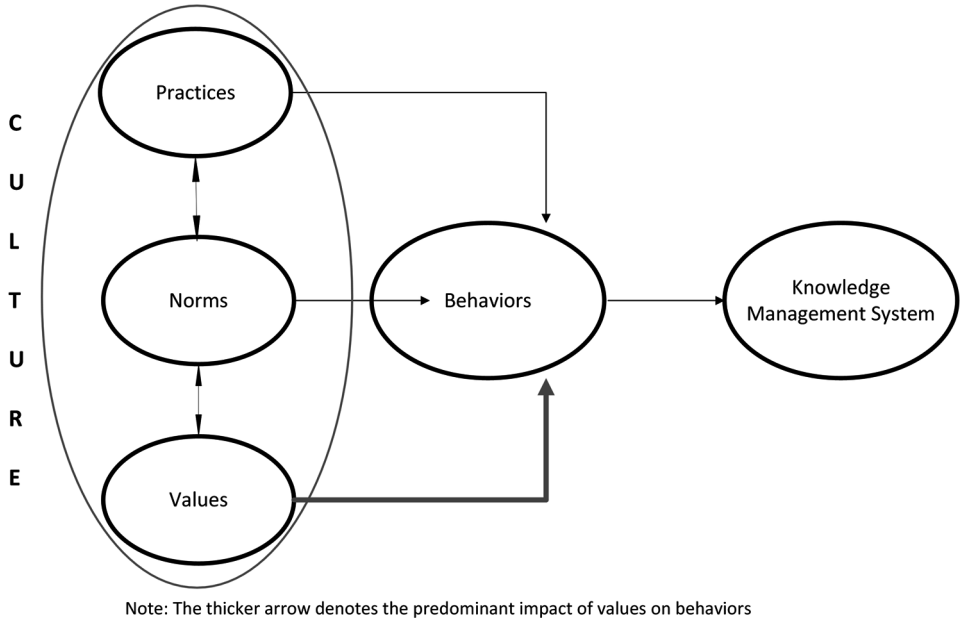
Knowledge Management Culture

The organizational culture of each organization affects the implementation and sustainability of KM. According to Davenport et al. (1998), in order to create a favorable environment for a successful KM, a discussion that considers its relation with the culture of the organization (Figure 1), is appropriate.

Organizational culture is created and maintained through different interactions between team members, teams, organizations, etc., and reflects the behavior that is characterized by the values, norms and practices commonly accepted by the members of the organization (De Long & Fahey, 2000; Jolaee, Md Nor, Khani, & Md Yusoff, 2014; Omerzel, Biloslavo, & Trnavcevic, 2011). De Long and Fahey (2000) alert that at the deepest level, culture consists of values that are often difficult to change, but in the meantime should never be underestimated.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Elements of culture
adapted from (De Long & Fahey, 2000)



Note: The thicker arrow denotes the predominant impact of values on behaviors

For De Long and Fahey (2000), organizational culture is recognized as a major barrier to leveraging knowledge. They identify four ways which organizational culture influences the behaviors in knowledge management process: (i) shapes assumptions about what knowledge is and which knowledge is worth managing; (ii) mediates the relationships between levels of knowledge; (iii) creates the context for social interaction; (iv) shapes the processes by which new knowledge is created, legitimated, and distributed in organizations.

THE CULTURE OF KNOWLEDGE MANAGEMENT IN THE ACADEMIC CONTEXT

The academic institutions are social communities constituted by universities, public research institutes, and public research laboratories (Perkmann & Walsh, 2007). Many of them are a conglomerate of autonomous subunits, composed by a group of individual experts, with loose links and a high degree of specialization in the disciplines, which are organized in different domains of knowledge (Sporn, 1996; Tippins, 2003). These individual experts are simultaneously developers, users, and bearers of knowledge (Omerzel et al., 2011).

Due to its missions closely related to the KM (Table 1), academic institutions have a cultural, social and technological structure highly favorable to the practices of KM (Howell & Annansingh, 2013; Tian et al., 2009), and a significant experience and expertise in creation, sharing and dissemination of knowledge, especially explicit knowledge (Rowley, 2000). The academia have been recognized as knowledge-intensive organizations (Ali et al., 2014; Fullwood, Rowley, & Delbridge, 2013; Howell & Annansingh, 2013).

However, in the Kerr's (1987) opinion, currently, academia face the greatest critical age as a result of the confrontation between accumulated heritage and modern imperatives of society. Different society

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. The Academia's missions

Missions		Knowledge Management Process
1º Mission	Education	Preservation and sharing of knowledge
2º Mission	Research	Knowledge creation
3º Mission	Service to society	Knowledge transfer to the different stakeholders

drivers of change (e.g., radical shift from an industrial to a knowledge society, market pressures from industry, lifelong learning, new technologies, etc.) and the pressure to reach different sources of funding in the research process, bring new challenges to the academia (Franco & Haase, 2015; Geuna & Muscio, 2009; Kerr, 1987; Kezar, 2001; Pekka-Economou & Hadjidema, 2011).

This context makes as critical as in the corporate sector the use of mechanisms of KM in the academia (Howell & Annansingh, 2013; Kidwell et al., 2000). Alexandropoulou et al. (2008) add that the possibility of consolidation of the three academic missions can be one of the main benefits of KM.

Several authors have the opinion that knowledge in the academic context is not so completely organized and the implementation of a KM is often difficult (Petrides & Nodine, 2003; Rowley, 2000; Tippins, 2003). Due to the distinct nature of academia, its organizational culture has been recognized as one of the main barriers in the implementation of KM (Dill, 1982; Rowley, 2000; Tan, 2016).

Although their members are involved in innovation processes and are considered as agents of change, several attempts to change the organizational culture in the academia have been frustrated as a result of unique features that are associated with the set of long history and traditions (Kezar, 2001; Poole & Iqbal, 2011).

Knowledge and Knowledge Management in the Academic Context

Throughout their history, the academia have played a crucial role in creating and disseminating knowledge. In continuation of their history, the third mission reinforces the importance of the academic knowledge and establishes strong incentives for development a more efficient way of transferring the knowledge from academia to the business world.

The academic knowledge includes professional knowledge, teaching skills, and research capabilities (Omerzel et al., 2011). In general, it is in the basis of technological development and in the products and processes in most industries (OECD, 1996). The academic knowledge has been acknowledged as a key resource for innovation, for promotion of technological change and for fostering of higher productivity and greater economic growth (Cohen, Nelson, & Walsh, 2002; Freitas, Geuna, & Rossi, 2013; Lee, 2000; Mansfield & Lee, 1996; Polt, Rammer, Gassler, Schibany, & Schartinger, 2001).

However, Mansfield (1995) notes that many of the innovations is based on academic research but it is not invented at academia. In many situations, academia just provides a source of knowledge and skills that makes innovation happen (Wallin, Isaksson, Larsson, & Elfström, 2014; Wright, 2008) .

Academic knowledge management is a set of processes that provides academia the most effective way to create and organize knowledge, share this knowledge and foster its application (Geng et al., 2005), which supports the achievement of the goals related to their missions.

Knowledge management in this context is particularly appropriate, and may have a significance equal to or even greater than in the corporate sector (Gill, 2009; Howell & Annansingh, 2013; Kidwell et al.,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2000; Petrides & Nodine, 2003). Tian et al. (2009, p. 84) consider that "knowledge as the cornerstone for scientific creation itself is the most important factor to effective KM implementation".

Despite the existence of important facilitator elements for implementing knowledge management processes in academic context, the practice is very recent and has still received scant attention and little research has been conducted on this topic (Fullwood et al., 2013; Geng et al., 2005; Geuna & Muscio, 2009; Tan, 2016; Tian, Nakamori, Xiang, & Futatsugi, 2006). In most cases corresponding to the individual initiatives, without any kind of coordination or management with specific purpose, or limited to some applications of information technology (Gill, 2009). D'Este and Patel (2007) reported that often, the experience and expertise of individual academics have a stronger impact than the characteristics of their departments or universities.

The nature of diversity across different disciplines often implies difficulties in identifying which knowledge is critical to manage, representing some constraints in development and implementation of academic knowledge management (Townley, 2003). However, on the other hand, KM processes offer a great opportunity for the creation and organization of interdisciplinary knowledge (Rowley, 2000; Tippins, 2003).

The corporate and academic knowledge creation processes presents a significant difference between them. The knowledge created within academia has mostly individual motivation and is related to the experience and expertise of its researchers (Tian et al., 2006), and some academics which wishing to ensure the academic freedom are reluctant to the knowledge management process (Townley, 2003). Unlike the corporate process, in which the knowledge creation is a mission of the group, and is embedded in work process, systems and infrastructure (Howell & Annansingh, 2013; Tian et al., 2009). Organizational culture will play a determining role in the knowledge sharing behavior among academic members (Howell & Annansingh, 2013; Mansor, Mustaffa, & Salleh, 2015).

Basically, according to Tian et al. (2009), in the creation process of new knowledge, academics required knowledge from three dimensions - scientific, social, and creative - and can be supported from four knowledge sources - supervisor or professor adviser, colleagues, self-study, and outside scholars (Figure 2). Probably due to the individual motivation in the knowledge creation process, academic members prioritize self-study as the principal knowledge source (Tian et al., 2009), assigning a secondary place to cooperation (Tian et al., 2006).

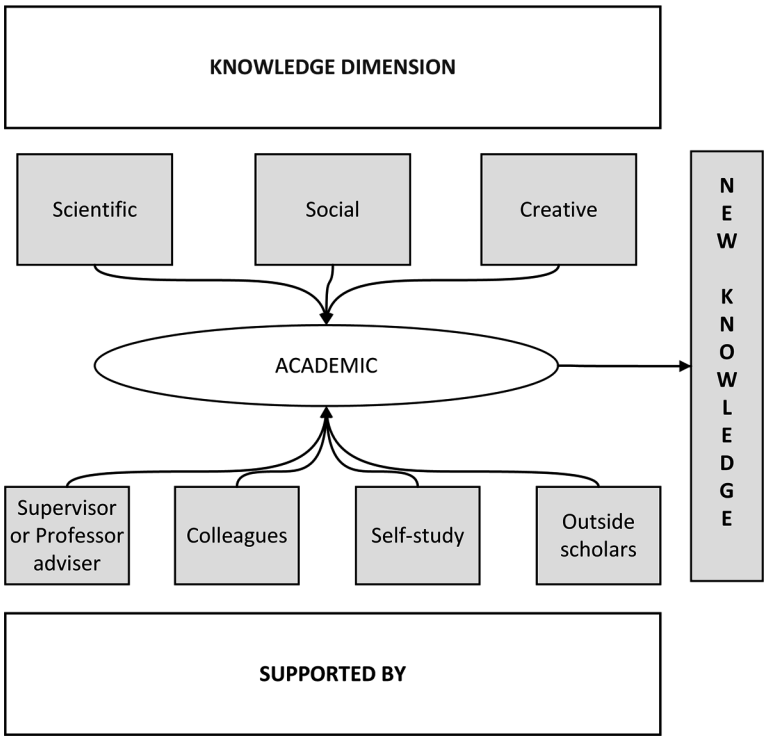
In general, the sharing of knowledge occurs through papers, books, researches, classes, conferences, etc. (Mansor et al., 2015). These mechanisms of sharing often privilege the EK, whereas for TK the option is informal communication or remain as grey literature (Freitas et al., 2013; Grimpe & Hussinger, 2008; Nilsson, Rickne, & Bengtsson, 2010). For this reason, perhaps, is assigned to informal communication relevant importance in the creation of scientific knowledge. Polt et al. (2001) argue that the involvement of academic members with industries (and vice versa) contributes to the sharing and creation of EK and TK.

The TK possessed by academic members constitutes the main part of academia's intellectual capital, and usually this knowledge is primarily shared externally where academics consider there are clear rewards (Howell & Annansingh, 2013) . Kezar (2001) alerts to the risk of substantial loss of TK in this decade when is expected a volume of about 40% of retirements within the academia. The exit of any academic member may correspond to loss of important knowledge for the academia.

In addition to considerable improvements in the sharing of explicit and tacit knowledges, which intensifies knowledge creation process, KM environment offers a varied number of benefits that ranges from knowledge refinement to greater collaborative opportunities.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Academic knowledge creation



Different authors indicate several other benefits that can be achieved through the implementation of KM. In their work, Kidwell et al. (2000) relate relevant number of applications of KM and respective potential benefits in the various activities of the academia: the research process, curriculum development, alumni services, administrative services, and strategic planning. Steyn (2004), in his study, also presents several benefits that may be reached with the application of KM.

The Table 2 summarizes the main potential benefits to be achieved with the implementation of KM described by several authors in the reviewed literature.

Organizational Culture in the Academic Context

Academia, as a complex social organization, have distinctive characteristics that dominate their culture, and that characterizes it as being different from other organizations. These characteristics highlight the complexity and fragmentation existing within the academia (Sporn, 1996), with their organization in different domains of knowledge, through systems such as scientific, pedagogical, research, and cooperation.

The various communities that constitute an academic institution assume a common culture with symbolic context based on the history and traditions, hindering the establishment of a culture with rational process of management and strategic vision (Dill, 1982).

Kerr (1987) observes that unlike other sectors, academia have not been subject to any greater challenge of technological change, and in his view, "the academics continues to operate largely as individual craftsmen" (p. 184). However, in Kezar's (2001) opinion, factors such as technological advances, distance education, and constraints of funds for research, will impact the culture over time.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Benefits of implementation of knowledge management

Benefit	Authors
Recognition of knowledge as organizational intellectual capital	(Rowley, 2000)
Improve the quality of teaching and research	(Gill, 2009; Kidwell et al., 2000; Steyn, 2004)
Closing gaps between senior and new academic members	(Gill, 2009; Kidwell et al., 2000; Steyn, 2004)
Locating experts ("yellow pages") – facilitating attempts to find experts on specific subjects	(Gill, 2009; Kidwell et al., 2000; Steyn, 2004)
Develop an environment where more experts would be more interest to work - recognition for its excellent research facilities, resources and programs, etc.	(Gill, 2009)
Document management, improving responsiveness by monitoring and including lessons learnt	(Gill, 2009; Kidwell et al., 2000; Steyn, 2004)

Sporn (1996) identifies in her study some characteristics that dominate the culture of academic institutions:

- **Goals Are Ambivalent:** Different objectives and standards, many of which cannot be measured very well;
- **Large Extent "People-Oriented":** Necessity in recognizing different stakeholders in order to fulfill their missions;
- **Problematic Standards for Goal Attainment:** It is hard to define segmented and routinized procedures, due to the need to develop and employ an array of standards in relation to the variety of outcomes (Bartell, 2003);
- **Difficulty in Establishing a Coordinated Initiative for Governing and Managing Due to the Involvement and Different Interests of Academic Members:** Close control can induce exits (Starbuck, 1992);
- **Academia Are Vulnerable to Its Environment:** Changes in political, economic, social, and technological conditions can strongly affect universities. These changes affect the academia more than the other institutions (Kerr, 1987).

Academia faces another problem related to the existence of diverse subcultures within the institution.

The organization based on different areas of knowledge associated with inviolable values, like freedom and autonomy, is propitious for the formation of different subcultures that overlaps the main culture (Howell & Annansingh, 2013; Sporn, 1996). These subcultures often exert strong influence on the way of action of each member the organization. According to Howell and Annansingh (2013), subculture is a set of meanings shared by a group which shapes the way that these members teach, engage in research or interact with colleagues and students.

In general, subcultures are related with the culture of the academic profession at large, and the culture of academic discipline (Dill, 1982; Fullwood et al., 2013; Poole & Iqbal, 2011). The current high degree of specialization in the disciplines lead to the exacerbation of existence of subcultures. This specialization, according to Dill (1982, p. 312), may result in "declining involvement in institutional requirements, and a lessening of social ties with disciplinary and institutional colleagues".

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sporn (1996) notes that the challenge is to integrate all activities of the subcultures so that they can be used on an institutional level. The encouragement to a higher level of social interactions can lead to the unification of the various subcultures of the different units around the academic culture (Bartell, 2003; Dill, 1982).

Knowledge Management Culture in the Academic Context

In their article Kidwell et al. (2000, p. 28) raises the question: "Are the concepts of knowledge management applicable to colleges and universities?". Although the existence of important facilitator elements for implementing KM in academic context, Kidwell et al. (2000) conclude that the existing examples are the exception rather than the rule. In general, academia have an individualistic culture (Fullwood et al., 2013) that do not maintain norms, values and practices, focusing on KM, or have a complex one (Rowley, 2000).

Academic culture presents some specific characteristics, which usually act as barriers or obstacles that difficult the development of a sustainable KM culture. In the Table 3, the authors summarize these unique characteristics described by several authors in the literature on the topic.

Knowledge management culture must be part of the institutional vision and mission and shall be in line with its goals and strategy. The cultural factors will strongly affect KM practices.

The adoption of a wide approach to the KM by the academia, can lead to effective cultural change that enables the development and implementation of KM. This approach requires understanding the unique characteristics of academia, incorporation of the main principles, and then proceeding the necessary cultural changes (Gill, 2009; Kezar, 2001). However, Rowley (2000, p. 331) alerts that "culture change is likely to be a slow and painful process".

Table 3. Factors that act as barriers or obstacles and affect knowledge management culture

Barriers and Obstacles	Authors
Decentralized nature of departments and disciplines. Loyalty to discipline rather than organization.	(Fullwood et al., 2013; Townley, 2003)
Inadequate management competencies to prepare the organization for KM. Lack of strategy, policies and work process. Lack of leadership.	(Howell & Annansingh, 2013; Petrides & Nodine, 2003; Tan, 2016; Tian et al., 2009)
Academia are knowledge-intensive institutions, however do not share and leverage their knowledge to realize their goals as corporate organizations.	(Howell & Annansingh, 2013; Petrides & Nodine, 2003; Tian et al., 2009)
Environment characterized by lack of effective environment of communication that enables the sharing of knowledge, with few areas of collective work, where the few existing meetings are administrative, and with closed, separated and unlinked groups. Lack of social interaction.	(Omerzel et al., 2011; Tan, 2016; Tippins, 2003)
Individualistic organizational model with absence of a knowledge sharing culture offers very little chance for collaboration and cooperation. Mechanisms of sharing such as conference and publications act more as competition than rather cooperation. Cooperation is a weak point.	(Howell & Annansingh, 2013; Tian et al., 2009)
The institutions do not clearly recognize or reward knowledge sharing. The majority of knowledge sharing is done externally, where there are clear rewards.	(Howell & Annansingh, 2013; Tan, 2016)
Knowledge is often not stored in the correct format to facilitate sharing. Many knowledge repositories often use different software, are poorly organized and the relationship between them is not well or clearly defined.	(Petrides & Nodine, 2003; Rowley, 2000)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Another important factor in the academia that affect the development and implementation of a sustainable culture of knowledge management that prioritizes the sharing of knowledge is related to the distinctive personal characteristics and behaviors of their members (Table 4).

Table 4. Academic characteristics and behaviors that affect knowledge management culture

Academic Characteristics and Behaviors	Authors
Most likely individualistic, independent, and autonomous. In general, they are not aware of valuable expertise within the academia that can contribute to their work, preferring acquire knowledge through others mechanisms, such as internet and personal networks.	(Alexandropoulou et al., 2008; Howell & Annansingh, 2013; Kim & Ju, 2008; Petrides & Nodine, 2003; Rowley, 2000; Starbuck, 1992)
Knowledge as private intellectual capital, and in some cases, the perception is that any attempt to exploit this capital would be against their work ethic. Knowledge is retained in individuals' heads or personal files. Lack of trust.	(Alexandropoulou et al., 2008; Kim & Ju, 2008; Omerzel et al., 2011; Tan, 2016; Tippins, 2003; Townley, 2003; Weber, Morelli, Atwood, & Proctor, 2006)
Knowledge creation more interesting than knowledge sharing, due to the fact of absence of system that protect their intellectual assets.	(Alexandropoulou et al., 2008; Kim & Ju, 2008)
Objective distance from the work of their peers, focusing on individual goals rather than working toward common goals.	(Kim & Ju, 2008; Tippins, 2003)
Typified by lack of flexibility, tending be conservative, and hesitant in accept maturing technologies or rapid changes. Slowness in adopting many principles taught in the classroom.	(Kezar, 2001; Kim & Ju, 2008; Tippins, 2003; Townley, 2003)
Perception of little benefits and rewards in sharing knowledge within the academia. Academics see their community as mainly existing outside the institution.	(Howell & Annansingh, 2013; Mansor et al., 2015; Tan, 2016)

Usually, academic members consider knowledge as their private property that is not freely shared (Omerzel et al., 2011; Tan, 2016; Tippins, 2003). Considering that knowledge increases in value and importance when shared (Tippins, 2003), this individualistic characteristic is not suitable with the knowledge sharing process. This shall become the main challenge of the implementation of a knowledge management culture in the academia.

In addition to the factors listed in Table 4, Tippins (2003) discusses the fact that academic members also tend not to share knowledge due to the individual different skill levels among them. They wonder about the absorptive capacity of certain types of knowledge by the others members.

Knowledge is dynamic and its evolution, or creation of a new one, depends on the sharing of knowledge and experience. In a context where there is not a culture that promotes and encourages KM, the process of sharing is not so easy, and consequently knowledge is often lost (Omerzel et al., 2011). That strengthens the hypothesis that Gill (2009) calls the "erosion" of knowledge. Howell and Annansingh (2013) highlight that often knowledge sharing in the academia involves breaking down barriers and knowledge silos.

The lack of social interaction in the academic context influences effectiveness of the creation of social networks. In Gill's (2009) opinion, networking is not just an activity related to knowledge sharing but also about leverage of knowledge. Some studies have shown that direct contact and oral communication processes may foster the acquisition of the major part of knowledge through face-to-face meetings or telephone conversations (Davenport & Prusak, 1998). Like in the corporate sector, academia should encourage and promote cooperation, collaboration and teamwork.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The environment of competition rather than cooperation is unfruitful, and often discourages or demotivates people. According to the studies, the environment of cooperation has not been recognized or emphasized enough (Tian et al., 2006). Thus, for a successful knowledge management process in academia, it should be strongly considered promoting a cooperative environment. Petrides and Nodine (2003, p. 18) are the opinion that "knowledge management is more likely to take root in communities that need to share knowledge to realize their goals".

FUTURE RESEARCH AND DIRECTIONS

After the review of relevant literature on knowledge management culture focusing on the academic context, the authors point the following further research opportunities:

- First of all, the authors would like to highlight that the majority of studies reviewed were focused on academics' views. It would be interesting other studies that focus on additional views.
- Organizational strategy and knowledge management culture are key factors to the development of initiatives that foster the knowledge sharing environment. Future case studies with empirical validation of models are needed to examine which elements in organizational strategy and knowledge management culture are suitable to the academia achieve their strategic goals.
- Most of knowledge in the academia is shared in the explicit form. However, apart from this EK there is evidence that the major part of TK is not registered or is not properly registered. There is scant evidence in the literature on how to deal with TK or the real necessity of its management. Since the academia missions are related to KM and their intensive TK nature, makes essential the development of research that address this question.
- Finally, due to the globalization process of academia, one area that needs further research is related to the development of KM models in the academic context that address aspects of the dispersion and / or concentration of knowledge, and check the impact of cultural differences between different academic members.

CONCLUSION

In this chapter, based on the critical analysis of literature, it was possible to perceive that the current context of increasing organizational atomization and external vulnerability, assigns an increasingly importance to the role of culture in the KM. Thus, the chapter's authors have the opinion that there is an urgent need for greater awareness on the part of the academia on the importance of establishing a culture that values knowledge and promotes the creation, sharing and application of knowledge in the most effective way.

Given the distinctive nature of the culture of academic institutions and their subcultures there is no single model that fits all situations. There is a need of changes and definition of strategies that can provide directions to the academia to choose, implement, and overcome resistance to a new culture of KM. The change and its implementation should be gradual and should contemplate the unique characteristics of the academia. The cultural change is a difficult element and lengthy process for the institutions like academia. According to Towley (2003, p. 11), "fundamental changes in organization, like KM, are evolutionary and take time to develop".

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Despite the type of approach, depending on the strategy to be defined by the institution, explicit knowledge already has over the years a strong trend of shares and coding actions. A greater effort should be conducted in the sharing of knowledge and in the identification of specific knowledge experts. However, motivating individuals to share knowledge is not an easy task, especially where the institution does not encourage and adopt this process as institutional culture. The authors of the chapter tend to agree with Gill's (2009, p. 609) opinion that "a successful organizational shift in culture definitely signals the success of a KM process".

REFERENCES

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *Management Information Systems Quarterly*, *25*(1), 107–136. doi:10.2307/3250961

Alexandropoulou, D. A., Angelis, V. A., & Mavri, M. (2008). A critical review of the impact of knowledge management on higher education. In *The Open Knowlege Society. A Computer Science and Information Systems Manifesto* (Vol. 19, pp. 416–421). Berlin: Springer Berlin Heidelberg. doi:10.1007/978-3-540-87783-7_52

Ali, O. F., Gohneim, A., & Al Roubaie, A. (2014). Knowledge sharing culture in Higher Education Institutions: Critical literature review. In *European, Mediterranean & Middle Eastern Conference on Information Systems 2014* (Vol. 2014, pp. 1–18).

Alvesson, M. (2001). Knowledge work: Ambiguity, image and identity. *Human Relations*, *54*(7), 863–886. doi:10.1177/0018726701547004

Bartell, M. (2003). Internationalization of universities: A university culture-based framework. *Higher Education*, *45*(1), 43–70. doi:10.1023/A:1021225514599

Birasnav, M., & Rangnekar, S. (2010). Knowledge management structure and human capital development in Indian manufacturing industries. *Business Process Management Journal*, *16*(1), 57–75. doi:10.1108/14637151011017949

Bjørnson, F. O., & Dingsøyr, T. (2008). Knowledge management in software engineering: A systematic review of studied concepts, findings and research methods used. *Information and Software Technology*, *50*(11), 1055–1068. doi:10.1016/j.infsof.2008.03.006

Chen, M.-Y., & Chen, A.-P. (2006). Knowledge management performance evaluation: A decade review from 1995 to 2004. *Journal of Information Science*, *32*(1), 17–38. doi:10.1177/0165551506059220

Cohen, W. M., Nelson, R. R., & Walsh, J. P. (2002). Links and impacts: The influence of public research on industrial r&d. *Management Science*, *48*(1), 1–23. doi:10.1287/mnsc.48.1.1.14273

Davenport, T. H., De Long, D. W., & Beers, M. C. (1998). Successful knowledge management projects. *MIT Sloan Management Review, 39*(2), 43–57.

Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Boston, MA: Harvard Business School Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

De Long, D. W., & Fahey, L. (2000). Diagnosing cultural barriers to knowledge management. *The Academy of Management Perspectives*, *14*(4), 113–127. doi:10.5465/AME.2000.3979820

DEste, P., & Patel, P. (2007). University–industry linkages in the UK: What are the factors underlying the variety of interactions with industry? *Research Policy*, *36*(9), 1295–1313. doi:10.1016/j.respol.2007.05.002

Dill, D. D. (1982). The management of academic culture: Notes on the management of meaning and social integration. *Higher Education*, *11*(3), 303–320. doi:10.1007/BF00155621

Drucker, P. F. (1994). The age of social transformation. *Atlantic Monthly*, *274*(5), 53–80.

Franco, M., & Haase, H. (2015). University–industry cooperation: Researchers motivations and interaction channels. *Journal of Engineering and Technology Management*, *36*, 41–51. doi:10.1016/j.jengtecman.2015.05.002

Freitas, I. M. B., Geuna, A., & Rossi, F. (2013). Finding the right partners: Institutional and personal modes of governance of university–industry interactions. *Research Policy*, *42*(1), 50–62. doi:10.1016/j.respol.2012.06.007

Fullwood, R., Rowley, J., & Delbridge, R. (2013). Knowledge sharing amongst academics in UK universities. *Journal of Knowledge Management*, *17*(1), 123–136. doi:10.1108/13673271311300831

Geng, Q., Townley, C., Huang, K., & Zhang, J. (2005). Comparative knowledge management: A pilot study of Chinese and American universities. *Journal of the American Society for Information Science and Technology*, *56*(10), 1031–1044. doi:10.1002/asi.20194

Geuna, A., & Muscio, A. (2009). The governance of university knowledge transfer: A critical review of the literature. *Minerva*, *47*(1), 93–114. doi:10.100711024-009-9118-2

Gill, A. (2009). Knowledge management initiatives at a small university. *International Journal of Educational Management*, *23*(7), 604–616. doi:10.1108/09513540910990834

Girard, J., & Girard, J. (2015). Defining knowledge management : Toward an applied compendium. *Online Journal of Applied Knowledge Management*, *3*(1), 1–20.

Gloet, M., & Terziovski, M. (2004). Exploring the relationship between knowledge management practices and innovation performance. *Journal of Manufacturing Technology Management*, *15*(5), 402–409. doi:10.1108/17410380410540390

Grimpe, C., & Hussinger, K. (2008). *Formal and informal technology transfer from academia to industry: Complementarity effects and innovation performance.* ZEW Discussion Paper nº 08-080. Mannheim.

Howell, K. E., & Annansingh, F. (2013). Knowledge generation and sharing in UK universities: A tale of two cultures? *International Journal of Information Management*, *33*(1), 32–39. doi:10.1016/j.ijinfomgt.2012.05.003

Iacono, M. P., De Nito, E., Esposito, V., Martinez, M., & Moschera, L. (2014). Investigating the relationship between coordination mechanisms and knowledge in a wine firm. *Knowledge and Process Management*, *21*(4), 280–291. doi:10.1002/kpm.1436

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Johannessen, J.-A. (2008). Organisational innovation as part of knowledge management. *International Journal of Information Management*, *28*(5), 403–412. doi:10.1016/j.ijinfomgt.2008.04.007

Jolaee, A., Md Nor, K., Khani, N., & Md Yusoff, R. (2014). Factors affecting knowledge sharing intention among academic staff. *International Journal of Educational Management*, *28*(4), 413–431. doi:10.1108/IJEM-03-2013-0041

Kakabadse, N. K., Kakabadse, A., & Kouzmin, A. (2003). Reviewing the knowledge management literature: Towards a taxonomy. *Journal of Knowledge Management*, *7*(4), 75–91. doi:10.1108/13673270310492967

Kalkan, V. D. (2008). An overall view of knowledge management challenges for global business. *Business Process Management Journal*, *14*(3), 390–400. doi:10.1108/14637150810876689

Kerr, C. (1987). A critical age in the university world : Accumulated heritage versus modern imperatives. *European Journal of Education*, *22*(2), 183–193. doi:10.2307/1503216

Kezar, A. J. (2001). Understanding and facilitating organizational change in the 21st century: Recent research and conceptualizations. *ASHE-ERIC Higher Education Report*, *28*(4), 1–162.

Kidwell, J. J., Vander Linde, K., & Johnson, S. L. (2000). Applying corporate knowledge management practices in higher education. *EDUCAUSE Quarterly*, *23*(4), 28–33.

Kim, S., & Ju, B. (2008). An analysis of faculty perceptions: Attitudes toward knowledge sharing and collaboration in an academic institution. *Library & Information Science Research*, *30*(4), 282–290. doi:10.1016/j.lisr.2008.04.003

Lee, Y. S. (2000). The sustainability of university-industry research collaboration: An empirical assessment. *The Journal of Technology Transfer*, *25*(2), 111–133. doi:10.1023/A:1007895322042

Mansfield, E. (1995). Academic research underlying industrial innovations: Sources, characteristics, and financing. *The Review of Economics and Statistics*, *77*(1), 55–65. doi:10.2307/2109992

Mansfield, E., & Lee, J.-Y. (1996). The modern university: Contributor to industrial innovation and recipient of industrial r&d support. *Research Policy*, *25*(7), 1047–1058. doi:10.1016/S0048-7333(96)00893-1

Mansor, Z. D., Mustaffa, M., & Salleh, L. M. (2015). Motivation and willingness to participate in knowledge sharing activities among academics in a public university. *Procedia Economics and Finance*, *31*(15), 286–293. doi:10.1016/S2212-5671(15)01188-0

Mårtensson, M. (2000). A critical review of knowledge management as a management tool. *Journal of Knowledge Management*, *4*(3), 204–216. doi:10.1108/13673270010350002

Nilsson, A. S., Rickne, A., & Bengtsson, L. (2010). Transfer of academic research: Uncovering the grey zone. *The Journal of Technology Transfer*, *35*(6), 617–636. doi:10.100710961-009-9124-4

Nonaka, I., & Konno, N. (1998). The concept of ba: Building a foundation for knowledge creation. *California Management Review*, *40*(3), 40–54. doi:10.2307/41165942

Nonaka, I., Takeuchi, H., & Umemoto, K. (1996). A theory of organizational knowledge creation. *International Journal of Technology Management*, *11*(7–8), 833–845.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

OECD. (1996). *The knowledge-based economy*. Paris: OECD.

Omerzel, D. G., Biloslavo, R., & Trnavcevic, A. (2011). Knowledge management and organisational culture in higher education institutions. *Journal for East European Management Studies*, *16*(2), 111–139.

Pekka-Economou, V., & Hadjidema, S. (2011). Innovative organizational forms that add value to both organizations and community: The case of knowledge management. *European Research Studies*, *14*(2), 81–95.

Perkmann, M., & Walsh, K. (2007). University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews*, *9*(4), 259–280. doi:10.1111/j.1468-2370.2007.00225.x

Petrides, L. A., & Nodine, T. R. (2003). Knowledge management in education: Defining the landscape. Institute for the Study of Knowledge Management in Education.

Polanyi, M. (1966). The logic of tacit inference. *Philosophy (London, England)*, *41*(155), 1–18. doi:10.1017/S0031819100066110

Polt, W., Rammer, C., Gassler, H., Schibany, A., & Schartinger, D. (2001). Benchmarking industry-science relations: The role of framework conditions. *Science & Public Policy*, *28*(4), 247–258. doi:10.3152/147154301781781453

Poole, G., & Iqbal, I. (2011). An exploration of the scholarly foundations of educational development. In J. C. Smart & M. B. Paulsen (Eds.), *Higher Education: Handbook of Theory and Research* (Vol. 26, pp. 317–354). Springer Netherlands. doi:10.1007/978-94-007-0702-3_8

Prieto, I. M., Revilla, E., & Rodríguez-Prado, B. (2009). Managing the knowledge paradox in product development. *Journal of Knowledge Management*, *13*(3), 157–170. doi:10.1108/13673270910962941

Prusak, L. (2001). Where did knowledge management come from? *IBM Systems Journal*, *40*(4), 1002–1007. doi:10.1147j.404.01002

Reimer, U., & Karagiannis, D. (2006). Practical aspects of knowledge management. In U. Reimer & D. Karagiannis (Eds.), *6th International Conference, PAKM 2006 Proceedings* (pp. 1–352). Springer-Verlag Berlin/Heidelberg.

Rowley, J. (2000). Is higher education ready for knowledge management? *International Journal of Educational Management*, *14*(7), 325–333. doi:10.1108/09513540010378978

Rowley, J. (2007). The wisdom hierarchy: Representations of the DIKW hierarchy. *Journal of Information Science*, *33*(2), 163–180. doi:10.1177/0165551506070706

Sadeghi, Z., & Salemi, J. (2013). Presenting a conceptual model for innovation development in organizations. *Life Science Journal*, *10*, 62–70.

Santoro, M. D., & Bierly, P. E. (2006). Facilitators of knowledge transfer in university-industry collaborations: A knowledge-based perspective. *IEEE Transactions on Engineering Management*, *53*(4), 495–507. doi:10.1109/TEM.2006.883707

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Schmitz, A., Teza, P., Dandolini, G. A., & De Souza, J. A. (2014). Universities as knowledge intensive business services: A systematic literature review and a case study of a research group. *International Journal of Engineering and Innovative Technology*, *3*(7), 40–47.

Seidler-de Alwis, R., & Hartmann, E. (2008). The use of tacit knowledge within innovative companies: Knowledge management in innovative enterprises. *Journal of Knowledge Management*, *12*(1), 133–147. doi:10.1108/13673270810852449

Smith, E. A. (2001). The role of tacit and explicit knowledge in the workplace. *Journal of Knowledge Management*, *5*(4), 311–321. doi:10.1108/13673270110411733

Sporn, B. (1996). Managing university culture: An analysis of the relationship between institutional culture and management approaches. *Higher Education*, *32*(1), 41–61. doi:10.1007/BF00139217

Starbuck, W. H. (1992). Learning by knowledge-intensive firms. *Journal of Management Studies*, *29*(6), 713–740. doi:10.1111/j.1467-6486.1992.tb00686.x

Stenmark, D. (2001). The relationship between information and knowledge. *Proceedings of IRIS*, *24*, 11–14.

Steyn, G. M. (2004). Harnessing the power of knowledge in higher education. *Education*, *124*(4), 615–631.

Stoyanov, I. (2014). Human capital and knowledge management in innovative organizations. *KSI Transactions on Knowledge Society*, *7*(4), 23–29.

Tan, C. N.-L. (2016). Enhancing knowledge sharing and research collaboration among academics: The role of knowledge management. *The Journal of Higher Education*, *71*(4), 525–556. doi:10.100710734-015-9922-6

Tian, J., Nakamori, Y., & Wierzbicki, A. P. (2009). Knowledge management and knowledge creation in academia: A study based on surveys in a Japanese research university. *Journal of Knowledge Management*, *13*(2), 76–92. doi:10.1108/13673270910942718

Tian, J., Nakamori, Y., Xiang, J., & Futatsugi, K. (2006). Knowledge management in academia: Survey, analysis and perspective. *International Journal of Management and Decision Making*, *7*(2/3), 275–294. doi:10.1504/IJMDM.2006.009149

Tippins, M. J. (2003). Implementing knowledge management in academia: Teaching the teachers. *International Journal of Educational Management*, *17*(7), 339–345. doi:10.1108/09513540310501021

Townley, C. (2003). Will the academy learn to manage knowledge? *EDUCAUSE Quarterly*, *26*(2), 8–11.

Tuomi, I. (1999). Data is more than knowledge: Implications of the reversed knowledge hierarchy for knowledge management and organizational memory. In *Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences. 1999. HICSS-32* (*Vol. 16*, p. 12). IEEE Comput. Soc. 10.1109/HICSS.1999.772795

Tzortzaki, A. M., & Mihiotis, A. (2014). A review of knowledge management theory and future directions. *Knowledge and Process Management*, *21*(1), 29–41. doi:10.1002/kpm.1429

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wallin, J., Isaksson, O., Larsson, A., & Elfström, B.-O. (2014). Bridging the gap between university and industry: Three mechanisms for innovation efficiency. *International Journal of Innovation and Technology Management*, *11*(1), 1–18. doi:10.1142/S0219877014400057

Weber, R. O., Morelli, M. L., Atwood, M. E., & Proctor, J. M. (2006). Designing a Knowledge Management Approach for the CAMRA Community of Science. In *6th International Conference, PAKM 2006 Proceedings* (pp. 315–325). Springer-Verlag Berlin/Heidelberg. 10.1007/11944935_28

Wong, K. Y. (2005). Critical success factors for implementing knowledge management in small and medium enterprises. *Industrial Management & Data Systems*, *105*(3), 261–279. doi:10.1108/02635570510590101

Wright, R. (2008). How to get the most from university relationships. *MIT Sloan Management Review*, *49*(3), 75–80.

KEY TERMS AND DEFINITIONS

Academia: A community constituted by universities and public research institutes or laboratories. The academia offer teaching, research, and service to the community in various areas of knowledge.

Academic Members: Researchers, teachers and student incorporated in an academic institution.

Codification Approach: A "people-to-document" approach, which knowledge is carefully codified and stored in databases where it can be accessed and used easily by anyone in the organization. Knowledge is extracted from the person who developed it, made independent of that person and reused for various purposes.

Knowledge-Intensive Organization: A kind of organization that it is characterized by a high proportion of highly qualified workers, due to access to and manipulation of large quantities of knowledge.

Knowledge Management Culture: A culture that is affected by the organizational culture, but refers to particular values, norms and practices pertaining to knowledge management processes.

Knowledge Sharing: Sharing and transfer are interchangeable in the literature, and commonly appear with the same sense. It is a key process related to the knowledge-intensive context. Knowledge sharing promotes the creation of new theories and ideas, and establishment of new research principles.

Organizational Culture: The pattern of shared practices, norms, and values of an organization that shapes its functioning and the behavior of their members.

Tacit Knowledge: Type of knowledge that is complex, not codified, and presents some difficulty in its reproduction in a document or in a database. It can be get from experience, perceptions and individual values and depends on the context in which is inserted.

This research was previously published in Enhancing Academic Research With Knowledge Management Principles; pages 1-24, copyright year 2017 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 65
ERP On-Premise or On-Demand

Fan Zhao
Department of Information Systems and Operations Management, Lutgert College of Business, Florida Gulf Coast University, Fort Myers, USA

Elias T. Kirche
Department of Information Systems and Operations Management, Lutgert College of Business, Florida Gulf Coast University, Fort Myers, USA

ABSTRACT

This article contends that vendors are now pushing into the small to mid-size organizational markets with simplified, less-risk, less-reward systems while consultants have project experience and have thorough contracts isolating their role. However, SMEs that adopted ERP on-premise solutions before are now facing a dilemma: continuing with ERP on-premise upgrades or switch to on-demand solutions. This article contains data surveyed from Chief Information Officers (CIO) of SMEs with respect to indicators of ERP adoptions. Cost, reduced demand for own IT resources, outage/accessibility and performance were found to be the most critical and important factors to assess ERP adoptions for SMEs.

INTRODUCTION

Enterprise Resource Planning (ERP) solutions have evolved from reorder point and materials management focused systems (MRP) based on mainframes to responsive and integrated resource planning systems based on client-server architectures and web platforms. Through data standardization and process integration, ERP systems have the potential to facilitate communications and co-ordination, enable the centralization of administrative activities, reduce information systems (IS) maintenance costs and increase the ability to deploy new IS functionality (Gattiker & Goodhue, 2000). ERP systems are adopted for strategic, technical, and operational reasons including: providing an integrated "enterprise" wide application with real-time data access available across the entire organization, simplifying and standardizing systems and business processes, and replacing legacy systems. When they are properly implemented, ERP systems are able to bring operational, managerial, strategic, information technology (IT) infrastructure and operational benefits to their customers (Shang & Seddon, 2000). Motivations which have become more dominant

DOI: 10.4018/978-1-7998-7297-9.ch065

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

include pressure to keep up with competitors on a global scale, mergers and acquisitions and the need for restructuring, and combining and integrating business processes. ERP systems have spread rapidly among organizations and according to Allied Market Research (2015), ERP market size is expected to reach $441.69 billion by 2020.

During the last decade many small and medium-sized enterprises (SMEs) have tried to adjust their business operations to cope with dramatic changes in the market. SMEs are trying to adopt better solutions to improve the effectiveness and efficiency of their business processes. Benefits from ERP systems are obvious. Gattiker and Goodhue (2000) describe the ERP benefits in following aspects: (1) improving the integration of information flow between sub-units; (2) centralizing the administrative activities, such as accounts payable and payroll; (3) reducing costs of system maintenance; (4) increasing the ability to deploy new IS functionality; (5) enabling transformation from inefficient business processes to accepted best practices. In this case, an ERP system seems to be one of the best solutions to SMEs (Olson & Satre, 2007). Since the majority of large companies have already implemented ERP systems, today ERP vendors are shifting their focus towards SMEs. Several reasons have encouraged the interest of ERP vendors towards SMEs. These include saturation of the market as the majority of large enterprises have implemented ERP software, the pressure for supply chain integration between large small enterprises, the high amount of SMEs compared to the number of large enterprises, and the technologies development alongside the availability of relatively inexpensive hardware.

In recent years, after many SMEs adopted various ERP packages from different ERP vendors, a new approach is available for ERP adoption called cloud computing, which supports an on-demand delivery of computing, storage, applications and collaborations over the internet. A recent International Data Corporation (Mahowald & Sullivan, 2012) report shows global revenue in cloud software market reached $22.9 billion and will grow to $67.3 billion in 2016. This projection includes revenue generated by the shift from on-premise to on-demand providers as well as by the planning activities and service architecture requirements behind the shift. Cloud computing can be adopted as one of the following services (Bhardwaj, Jain, & Jain, 2010; Kim, Kim, Lee, & Lee, 2009; Linthicum, 2010; Velte, Velte, & Elsenpeter, 2010; Wang & He, 2014):

- **Software as a service (SaaS):** Providing software subscription services;
- **Storage as a service:** Providing remote storage resource services;
- **Database as a service:** Providing remotely hosted database services;
- **Information as a service:** Providing remotely hosted information services;
- **Process as a service:** Providing business processes based on remote resources;
- **Application as a service:** Also known as SaaS;
- **Testing as a service:** Providing testing services for local or remote systems;
- **Platform as a service (PaaS):** Providing a complete platform to support application development, interface development, database development, storage, information and testing;
- **Infrastructure as a service (IaaS):** Providing a service to access computing resources remotely;
- **Security as a service:** Providing core security services remotely over the internet;
- **Integration as a service:** Providing a complete integration stack service.

Typically, a cloud ERP model refers to a traditional ERP solution which is hosted off-site. This model has the possibility to access real-time data without complex and costly remote-access technology. As a comparison, the SaaS model has a smaller technology footprint which is best suited for organizations

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

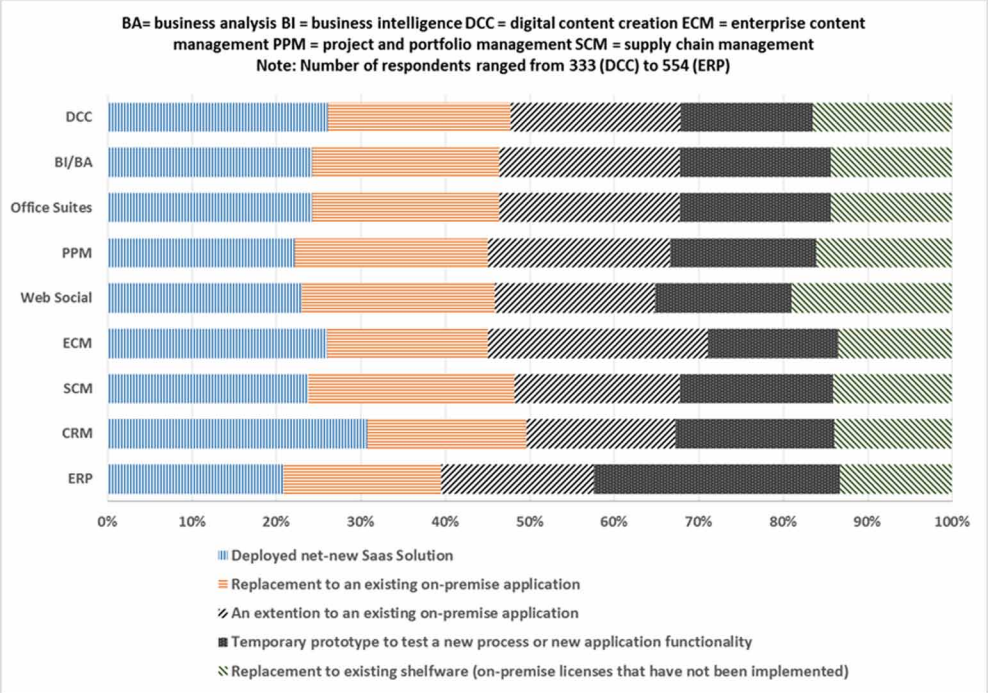
with minimal technology infrastructure in terms of complexity, size and network reach. Additionally, a cloud ERP provider can host a SaaS model within its own infrastructure as an alternative to locating the system on-premise of the purchasing organization. There are three distinct ways to implement a cloud ERP model, and the reader can refer to Beaubouef (2011) for additional information:

- **Software as a service:** A subscription model for small customers who share hardware;
- **Hosted ERP:** A typical solution for large customers who have separate hardware and instances;
- **Hybrid ERP:** A combination solution that maintains on-premise software as well as a degree of on-demand services.

Clearly, SMEs which adopted ERP on-premise packages earlier are facing a new challenge now: when a new version of the on-premise ERP arrives, are the companies implementing the ERP upgrade on existing infrastructure or switching to on-demand ERP? If on-demand is the choice, then what is the model to adopt? A survey of the market (Figure 1) in Anderson et al. (2012) shows that an increasing number of companies are considering on-demand services for different applications with SaaS.

This shift in technology is not only impacting buying decisions but also many large vendors of ERP related gears that are restructuring their labor force to adjust to a more software-centric business environment (Gallagher, 2016). Despite this important change, there is virtually no empirical research that has been done to evaluate and compare the two ERP adoption models for SMEs. To address this gap, this study investigates the benefits of the on-premise and on-demand ERP solutions for SMEs, summarizes factors influencing CIOs and IT managers in the adoption decision, and classifies critical factors in a framework to guide the decision process.

Figure 1. How SaaS is developed by application (adapted from Anderson, Britz, & Bell, 2012)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

LITERATURE REVIEW ON ERP DEPLOYMENT

The primary purpose of ERP upgrades is to take advantage of new technologies and business strategies to ensure that the organization keeps up with the latest business development trends and in the elimination of non-value-added activities (Zhou & Ji, 2015). Therefore, the decision to upgrade ERP is usually not driven by code deterioration or anticipated reduction in maintenance costs alone. According to Swanton (2004), 55% of upgrades were voluntary business improvements triggered by the need for new functionality, expansion or consolidation of systems; 24% of upgrades were triggered by technology stack changes; 15% of upgrades were forced by de-support of the running version of software to avoid vendor support termination; and 6% of upgrades were triggered by bug fixes or statutory changes. Nevertheless, the decision to upgrade to add functionality to the system most often comes at a very high cost (Montgomery, 2004). Swanton (2004) indicated that the cost of each upgrade includes 50% of the original software license fee and 20% of the original implementation cost per user, which means over 6 million dollars for a 5,000-user system. Contributing to the cost, typical ERP upgrade requires eight to nine months of effort with a team equivalent of one full-time employee per 35 business users.

The ERP-adopting organization does not have to develop and rewrite the ERP system itself but it rather replaces (or upgrades) the old version with a readily available new version from the ERP vendor. However, a lack of experience may cause the cost and length of the upgrade project to approach or even exceed those of the original ERP implementation effort. Typically, every three years a major ERP upgrade and several small upgrades are needed to keep the system running smoothly. Therefore, organizations will spend a significant amount of money on each ERP upgrade project notwithstanding the reason for it.

Another choice for ERP deployment is through cloud computing which can support an on-demand delivery of ERP over the internet with substantial benefits for SMEs. However, a cloud computing model should be carefully evaluated since not all deployments have the same response on business requirements. Cloud services are provided through four deployment models (Mell & Grance, 2011):

- **Private Cloud:** One which the platform for cloud computing is implemented on a cloud-based secure environment that is provisioned for exclusive use by a single organization. It can be owned and maintained by the company or by a third-party firm. It may be deployed on or off premises. As a result, private cloud is best for businesses with dynamic or unpredictable computing needs that require direct control over their environments;
- **Public Cloud:** Is a type of cloud hosting in which the cloud services are delivered over a network which is open for public usage. This model is a true representation of cloud hosting by which the service provider renders services and infrastructure to various clients. It exists on the premises of the cloud provider. Public cloud services may be free or offered on a pay-per-usage model. The main benefits of using a public cloud service are the scalability to meet needs, the ease and affordability of set-up because hardware, application and bandwidth costs are covered by the provider, and the low to no waste of resources because you pay for what you use;
- **Community Cloud:** Is a type of cloud hosting in which the cloud infrastructure is mutually shared between many organisations that belong to a particular community, i.e. banks and trading firms. It may be owned, maintained, and operated by one or more of the organizations in the community, a third party, or some configuration of them. It may be deployed on or off premises. The goal of a community cloud is to have participating organizations realize the benefits of a public cloud but with the added level of privacy and security usually associated with a private cloud;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Hybrid Cloud:** The cloud infrastructure is an arrangement of distinct cloud infrastructures (private, community, or public) that remain unique entities, but are linked by standardized or private technology that enables data and application portability. Hybrid cloud gives businesses greater flexibility and more data deployment options. For example, resources that are non-critical like development and test workloads can be housed in the public cloud that belongs to a third-party provider. While the workloads that are critical or sensitive must be housed internally.

Consequently, the SME interested in adopting on-demand ERP solution will have to evaluate the functionality of the system provided by the deployment models above. Specifically, for SMEs, Wang & He (2014) indicated that there are three different cloud-based services available. General purpose cloud-based services provide a large variety of services for a wide range of industries, such as video-conferencing and data storage. Industry-oriented cloud-based services are designed toward some special business requirements in targeted industry, such as cloud manufacturing systems (Tao, Laili, Sun, & Zhang, 2013). The last type of services, named fully customized cloud-based services, focuses on specific needs of SMEs by offering tailored services such as a factory's online ordering service. ERP cloud services can be offered through the first two types of services. However, it is challenging to provide a totally customized ERP system for SMEs in the cloud because the implementation cost will be high, maintenance will also be expensive, and there will be many issues toward system upgrade.

Besides complete ERP systems, ERP functions or modules can also be deployed through cloud services. License fee and/or maintenance fees will be charged based on the use of the software such as per number of users and ERP functions/modules adopted. Companies will no long need to purchase the software and keep IT staff, which will make the initial deployment of EPR much less expensive. Additionally, according to Gheorghe & Lupasc (2012), cloud ERP solution will save about 30% project time after analyzing the critical path of both classic and cloud ERP solutions. Table 1 summarizes the extracted benefits of cloud computing ERP systems from the literature.

Table 1. Benefits of on-demand ERP solutions

Benefits of On-Demand ERP	Reference
Short implementation cycles	Gheorghe & Lupsac, 2012; Karabek, Kleinert, & Pohl, 2011; Purohit, Jaiswal, & Pandey, 2012; Weng & Hung, 2014
Low entry costs	Bhardwaj et al., 2010; Karabek et al., 2011; Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011; Peng & Gala, 2014; Purohit et al., 2012; Truong, 2015; Weng & Hung, 2014
Reduced demand for own IT resources	Bhardwaj et al., 2010; Karabek et al., 2011
Elasticity/Flexibility of services	Karabek et al., 2011; Marston et al., 2011; Peng & Gala, 2014; Rittinghouse & Ransome, 2009; Truong, 2015
Scalability	Furht & Escalante, 2010; Marston et al., 2011
Focus on core business	Karabek et al., 2011

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Based on the delivery model, cloud services can be categorized as SaaS, PaaS, IaaS, and others as indicated in previous section. Because of the relatively small scale of SMEs' production or services, they generally tend to adopt SaaS ERP solutions, rather than PaaS and IaaS (Wang & von Laszewiski, 2010). With SaaS, an organization switches all the IT responsibilities to the cloud service provider. The SaaS model provides an integrated solution consisting of servers, bandwidth and software packages that customers need.

In this study, we focus on SaaS as the main cloud service for SMEs, and in the remainder of the study only this form of on-demand for ERP are considered when comparing with the traditional on-premise deployment. Given the many choices for ERP adoption (Laukkanen, Sarpola, & Hallikainen, 2007; Raihana, 2012) we summarize the following three ERP solutions related to SaaS:

- **On-Premise Software:** The organization purchases, implements and runs the ERP package on servers and computers on the premises of the organization;
- **Cloud-Hosted:** The organization purchases the ERP package and adopts the hardware management model from a cloud service provider who allows the organization to implement and run the ERP system at a remote facility (cloud);
- **Cloud-Software as a Service (SaaS):** The organization doesn't purchase any software and hardware. Both parts are licensed on a subscription basis. Typically, the service provide is the ERP software publisher.

However, we widen the studies of Laukkanen et al. (2007) and Raihana (2012) by advancing that there are four ERP deployment options which SMEs can choose when they face the ERP upgrade decision: 1. Keep updating On-Premises; 2. Switch the ERP hosting services to a Cloud service provider; 3. Adopting SaaS for a majority of ERP functions while keeping part of the functions as on-premises; and 4. Completely adopting SaaS from a Cloud service provider for the ERP system. We provide a guideline for the adoption process by formaly comparing the benefits for each deployment option in Table 2.

Additionally, there are several challenging issues that adopters of on-demand ERP should be concerned with such as cost, security and performance of the system among others (Zardari & Jung, 2016). However, although companies can adopt on-demand ERP solutions at a much lower initial cost and lower total cost of ownership comparing with the traditional ERP solutions, the ongoing monthly or annual payments may be higher for on-demand adopters on account of the subscription payment methods can be complex and incremental as the company growths in size and/or revenues (Panorama Consulting Group, 2009). Table 3 summarizes the extracted challenging factors of cloud computing ERP systems from the literature.

As an increasing number of SMEs, which first implemented on-premise ERP solutions, are now considering on-demand solutions as one of the options for future system upgrades, we seek to provide a comprehensive understanding of two ERP solutions; on-premise and on-demand, by collecting CIOs' perspectives and experiences with their organizations' ERP adoptions. In order to provide a classification framework for the survey results, we ranked and compared the response weights with the study of Kilic, Zaim, & Delen (2014, 2015) who identified the following three main criterions during ERP system selection process:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Comparison of four ERP deployment options for SMEs

	On-Premises ERP	Cloud-Hosted ERP	Hybrid-Hosted ERP	SaaS ERP
IT Requirements	More Intense: require a full IT department	Moderate	Less Intense	Minimum
Initial Investment	Largest Investment including software, hardware, and all other related costs	Moderate Investment	Less Investment	Lowest cost (only license related fees and client computers)
Software License	Organize owns the package	Organize owns the package	Rent the majority parts of the package	Rent all the whole ERP package
Upgrades Requirements	Have to pay for all upgrades	Have to pay for all upgrades	Only pays the upgrades hosted by organization itself	ERP will be automatically upgraded to the latest version
ERP Package Customization options	Unlimited	Unlimited	Very Limited for the hosted part and almost unlimited for the part on premises with compatibility	Very Limited
Add-on functions after initial implementation	Unlimited with compatibility	Unlimited with compatibility	Very Limited for the hosted part and almost unlimited for the part on premises with compatibility	Very Limited
Data Access	User-Based security	User-Based security	User-Based security for hosted part; Restricted Corporate-wide for the part on Premises	Restricted Corporate-wide
Data security	Define customized security policies on premises	Totally depend on security policies from the service provider	Totally depend on security policies from the service provider for the hosted part; with freedom for the part on premises	Totally depend on security policies from the service provider
Extra Data Storage request after initial implementation	Buy and add hardware	Request more space from the service provider by paying extra fees	Request more space from the service provider by paying extra fees	Request more space from the service provider by paying extra fees
ERP vendor/service switching barriers	Very high	Very high	Low with hosted part and high for part on premises	Lowest

- **Business Criteria:** Considering all the factors from business operations perspective. There are several sub-criteria in this group, such as vision, brand image, references, adequacy of advisors and developers, after sales service, and know-how sharing policy;
- **Technical Criteria:** Considering all technology related factors, such as functionality, reliability, compatibility, accessibility, security, usability, and cross-module integration;
- **Financial Criteria:** Considering cost related factors, such as ERP package purchasing cost (subscription fee, in cloud SaaS) including software license, hardware, and network costs, implementation cost including customization, consultancy and training costs, and maintenance cost including service and technical support costs

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In that study, the authors ranked the importance of factors in the selection of ERP systems indicating that business criteria have the lowest importance weights with the financial criteria ranking the highest in the selection process. In our study, we adopted this process theory approach to classify all the identified factors influencing the ERP selection decisions.

RESEARCH METHODOLOGY

The survey instrument was designed and evaluated by a group of experts for content validity. Six experts from two universities and four organizations were asked to read the survey and decide whether in their opinion it measured what its name suggested. The survey items measured the factors reflecting the benefits and challenges of on-demand ERP solutions identified from the literature. The survey questionnaires were improved according to comments from the experts. The final survey was returned to the experts and approved before mailed out to companies.

The survey questionnaire was sent to CIO/IT managers in 272 SMEs who are currently using on-premise ERP solutions. Company size is measured by the number of employees (Chow & Holden, 1997). In this study, an SME is one with fewer than 500 employees. A total 63 survey responses were obtained after removing 7 incomplete questionnaires. The distribution of the respondents was as follows: gender (male: 76%, female: 24%), deployed EPR systems are from a wide range of vendors such as SAP, Microsoft, Syspro, NetSuite, etc. The number of employees range from 36 to 483 (64% small companies and 36% mid-size companies). A wide variety of industries were represented in the responses as shown in Table 4.

Table 3. Challenging Factors of On-demand ERP solutions

Challenging factors of on-demand ERP	Reference
Outage/Accessibility	Kim, 2009; Panorama Consulting Group, 2009; Purohit et al., 2012; Truong, 2015; Weng & Hung, 2014
Security	Kim, 2009; Peng & Gala, 2014; Purohit et al., 2012; Saeed, Juell-Skielse, & Uppstrom, 2011; Weng & Hung, 2014; Truong, 2015; Zardari & Jung, 2016
Performance	Kim, 2009; Purohit et al., 2012
Integration	Kim, 2009; Panorama Consulting Group, 2009; Peng & Gala, 2014; Truong, 2015
Cost	Kim, 2009; Panorama Consulting Group, 2009; Seethamraju, 2015; Truong, 2015; Weng & Hung, 2014
Control of the system	Panorama Consulting Group, 2009; Peng & Gala, 2014
Flexibility of customization	Panorama Consulting Group, 2009; Purohit et al., 2012; Seethamraju, 2015

RESULTS AND DISCUSSION

The survey focused on the benefits and the challenging factors involved with ERP adoptions decisions when considering on-premise and on-demand solutions. For each item, a brief description and a 5-level rating scale ranging from extremely critical and important for ERP adoption evaluation to neither critical nor important for ERP adoption evaluation were provided. We computed the simple average for all items

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Industry summary

Industry Sector	Number of Companies
Manufacturing	18
Information technology	19
Retail	5
Health Services	16
Insurance	5
Total	**63**

loading in each of the factor for all responses regardless of the industry type. The numerical anchors for the 5-level rating scale are indicated in Table 5.

According to the average ratings in Table 5, the results indicate that there are top four factors identified by CIOs facing to the options of on-premise or on-demand solutions which are extremely critical and important in ERP adoptions for SMEs: Cost, Reduced demand for own IT resources, Outage/Accessibility and Performance. The second group, which is critical and important, includes five factors: Control of the system, Elasticity/Flexibility of services, Short implementation cycles, Security and Scalability. The rest of the factors, Integration, Flexibility of customization, and Focus on core business, received lower ratings from CIOs.

To provide a framework for the decision process, we ranked and classified the factors in line with the ERP selection criterion process model (Kilic et al., 2014, 2015), which is presented in Figure 2. The results indicate that the business criteria which is most often analyzed in the initial stages of the adoption process contains the lowest ranking values of concerns by CIOs. Thus, companies should start the decision process with an evaluation of the brand value and recognition, references, adequacy of advisors and developers, after sales service, and know-how sharing policy, before moving into higher priorities

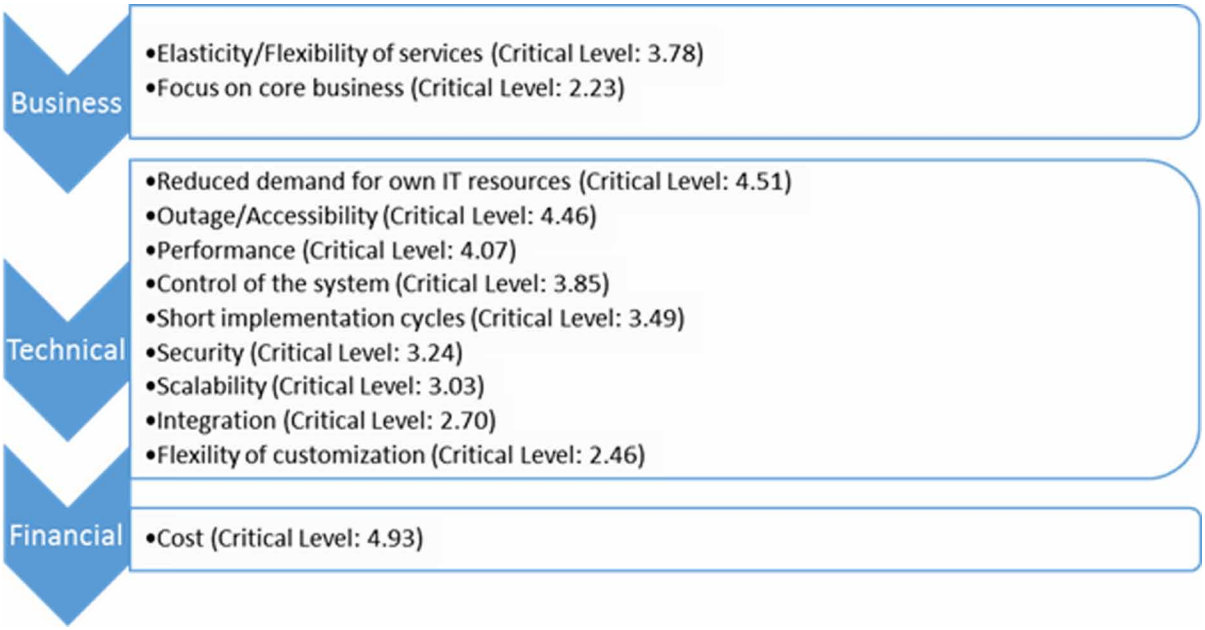
Table 5. Survey averages by factor

Factor	Average (1 – 5 Scale)
Cost (including purchasing, implementation, and maintenance)	4.93
Reduced demand for own IT resources	4.51
Outage/Accessibility	4.46
Performance	4.07
Control of the system	3.85
Elasticity/Flexibility of services	3.78
Short implementation cycles	3.49
Security	3.24
Scalability	3.03
Integration	2.70
Flexibility of customization	2.46
Focus on core business	2.23

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

factors. Typical concerns in this category relates to the flexibility of services to best fit company strategies and priorities which may change overtime. Therefore, the ability of the selected option to adapt to new strategies and the growing needs for technology is the focus in this phase. Also in this stage, the strategy should be reviewed in terms of how well it supports non-core and core operations details such as day-to-day functions for the technology platform, website integration, marketing solutions, portfolio management, payment processing and order management capabilities. It is worth understanding the low-ranking value of this stage in light of the need for companies to focus on core functions in order to remain competitive. In this research, we do not address first time adoption of ERP packages in SMEs and, specifically, the question posed to CIOs relates to whether it is critical that the ERP selection handles strictly core business processes when considering replacement systems. In this situation, the CIO already knows that the functionalities affecting core processes will only be improved from an upgrade perspective and therefore the focus on core business processes is not a high-ranking concern in the adoption decision. Additionally, and particularly for SMEs, ERP packages are adopted to relieve organizations from the tedious day-to-day processes and overhead (Karabek et al, 2011) such as payroll and accounts payable processing, sales order tracking and other routine tasks, which would allow them to focus on core competency most likely requiring specialized systems. This also implies that, from a perspective of switching to a cloud system, ERP systems do not provide significant advantages to SMEs on core processes. Thus, the low ranking can be explained by the CIO's experience with competing systems, including cloud platforms, and an ERP market which offers broad systems with little differentiation in terms of functional capabilities (Markus, Petrie, & Axline, 2000).

Figure 2. Classification of key factors influencing ERP upgrade



The second category, technical, is the second stage in the review and adoption process, and generally represents the functionality, reliability of the system, compatibility and cross-module integration.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

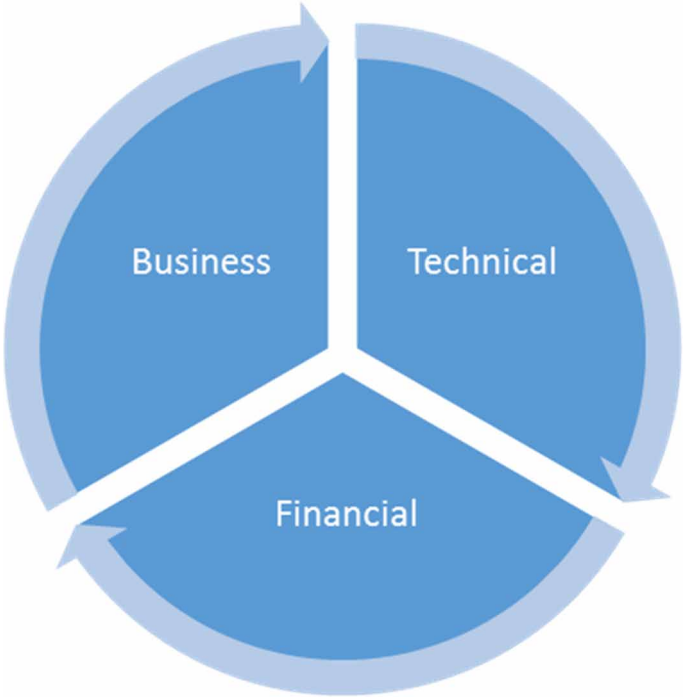
It is a lengthy evaluation process and represents a mid-range of critical requirements for SME adoption of ERP solutions. It addresses the functionality of the ERP solution for example by the ability of running report on a periodic basis and supporting applications to enable data visibility across suppliers and customers. The technology solution should represent the firm's strong commitment in fulfilling its mission and goals and must be balanced in addressing requirements to reduce costs (next category) and response time, increase customer service levels, provide strong process controls, and to reduce risks associated with system outage, data control and security, which is often one of the major benefits of an on-premise solution. However, on-demand solution allows smaller firms with limited IT staff to benefit from economies of scale and efficiencies of this model, and services are accessed via the internet and are often available to users from the office as well as on mobile devices. Other important factors for SMEs is the ability of on-demand solutions to positively address scalability, short implementation cycle and reduction on the use of existing IT resources, which all carry moderate weights in the solution decision.

The cost benefit is a major driver for the adoption of a particular ERP solution and it may include costs associated with moving from existing on-premise IT assets to usage-based pricing schemes for the on-demand solution. This factor received the highest weight in the survey representing the most critical category for the solution decision. It also represents the final stage in the adoption process in line with the proposed framework. The cost category takes into consideration purchasing costs, implementation cost and service and support costs among other financial concerns. Of critical importance for SMEs under this factor are the low entry cost due to the usage-based pricing approach, the lower overhead for IT maintenance and upgrades, and the ability to plan and expand according to budget estimates for the on-demand option. Instead of licensing server software, most commonly a firm would simply need a web browser and appropriate bandwidth since the application and database is hosted in the cloud. Therefore, the lack of little upfront investment is very attractive to many SMEs and it may represent the best of both ERP solutions: the efficiency and cost effectiveness of cloud solutions together with the flexible service and reliability of an on-premise system. However, the SME must be concerned with the migration phase will impact user's perception and acceptance of the technology with consequential impact on productivity. While a migration to such a standardized modular on-demand solution is difficult and costly the long-term benefits may outweigh these short-term considerations.

In the ERP selection criterion process model by Kilic et al. (2014, 2015), financial category was identified as the third step during the general ERP selection process. However, according to the results of our survey, we find that cost in the financial category is the first and the most important key factor when SMEs start to consider the ERP migration. Therefore, our results underlie the fact that most SMEs would conduct budget planning at the early stage of the ERP migration projects rather than consider it after summarizing all the business and technical issues. In fact, most firms would start evaluation of a solution within certain budget restrictions, delineated by existing expenditures or by future allocation of specific resources conducted during the firm's annual planning activities. When evaluating options, frequently there are configuration issues, security and confidentiality, networking, hardware, costs and other concerns that may meet business, technical and financial requirements at different levels of fulfillment, and the company must continuously cycle through the three phases in search for the best fit solution. Consequently, the existing model does not properly reflect the actual process flow in SMEs. Therefore, we propose a modification, shown in Figure 3, in which the continuous model from business to financial categories is replaced with a segmented cycle model for the ERP selection projects in SMEs. Implementing this model would enable SMEs to have a flexible approach closely matching their adoption process. They can start from the financial step if cost is their priority concern for the project.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Modified ERP selection criterion process model



However, if budget considerations are less critical, the company can start considering business critical factors first, cycle through technical and then the financial considerations, which may not be the last phase if the solution does not satisfy all the initial requirements in the three phases. This process will continuously cycle through all phases searching for the best fit solution.

In this study we recommend that SMEs, when making adoption decisions, not only implement the circular classification framework from Figure 3 but also use it in conjunction with the guidelines in Table 2 for comparison of the different ERP deployments options to reach the best fit solution. For example, when a company is in an environment of low budget but experiencing high growth, it is best to select the SaaS ERP option because the initial investment is the lowest and the company can focus on critical business issues. This option also has the lowest switching barriers if the vendor cannot provide efficient or required scalability to support its growth. In case the SME is more concerned with technical issues such as data security, the on-premise deployment would be an appropriate decision because it will keep more control of their business processes and data. When competitive advantages and budget considerations are critical, the company may want to avoid hybrid hosted ERP and SaaS ERP options because both have limited customization options. Additionally, the company must be taken into account that the significance of the ERP selection criteria will change over time.

Four changes may impact the ranking of different factors influencing the choice of an ERP type over time (Garrison, Wakefield, & Kim, 2015; Tsai, Lee, Chen, & Hsu, 2009; Tsai, Lee, Shen, & Lin, 2012): user experiences changes, technology changes, user requirements changes, and economical changes.

Tsai et al. (2009) argue that organizations might have increased their ERP related knowledge and experiences over time after their first ERP implementations. In their comprehensive study on over 200 organizations, over three years, the importance ranking of ERP package selection changed dramatically.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

For example, Ease of Use and Maintenance was ranked #7 in the list of 20 factors and became to #1 three years later.

Technology changes continuously influence the organization's choices of ERP packages. Fifteen years ago, the majority of the organizations considered the on-premise ERP option. However, with the emergence of cloud computing technology, more and more organizations are now switching to cloud ERP. Therefore, when organizations source ERP packages, some of the factors in consideration that used to be critical and important, such as system integration, have now become less important; and some new factors, such as outage and accessibility, have become more critical and important.

User requirements is in some cases perceived as means of driving ERP evolution (Kilic et al., 2014). In the selections of ERP package, organization's requirements are one of the key factors influencing ERP technology. For instance, ERP modules and cloud version ERPs have been developed because of the adoption requirements from many SMEs. Also, data warehouse and data analytics modules have been developed because of the analysis requirements from ERP users. Similarly, ERP mobile portals and applications have been developed because of mobility usage requirements.

Organizations may also consider economical changes during their ERP selections. According to Kremers and Dissel (2000), both ERP vendors and users were impacted by the financial crises. Because of the economic crises, organizations hesitated to invest in switching to ERP from their legacy systems or upgrading their current ERP packages after the initial implementation. Chiang et al. (2010) found that SaaS became one of the first options in ERP selections as a consequence of the economic crisis in 2009. Organizations believe that SaaS will help them recover during the economic crisis and any factors in ERP selection related to cost need be emphasized while the importance of other factors should be reduced.

CONCLUSION

There are several interesting results summarized from data. First, besides the three factors (cost, reduced demand for own IT resources, and performance) that are commonly regarded as critical success factors in ERP selection, outage and accessibility are rated as one of the highest factors. It is obvious that system outage is closely correlated with on-demand adoptions. After the outage issue of Microsoft Azure, CIOs realized the importance of system accessibility for on-demand solutions. Second, security was emphasized by several researchers in their studies of cloud computing (Kim, 2009; Saeed et al., 2011; Truong, 2015; Zadari & Jung, 2016). However, according to our data, CIOs only rated security in the second importance group. Third, most of the small companies prefer adopting on-demand solutions while mid-size companies hesitate to switch from current system to on-demand ERP.

The results of this study provide organizations with valuable knowledge that might prompt them to make significant changes in their current ERP related processes and in the acquisition of enterprise packaged software, which could result in substantial benefits. Our research helps both researchers and practitioners understand how ERP adoption choices impact SME's strategies and concerns. To researchers, this study shows the tradeoffs between on-premise and on-demand ERP adoptions and offers opportunities to expand the model in future research. To practitioners, this study identifies critical issues related to ERP adoption in SMEs, allowing CIOs and other IT managers to evaluate strategies and concerns thoroughly before making final decisions. Additionally, we proposed a new framework which cycles through phases in the adoption process extending a sequential process in the literature, and provided guidelines to be used with the framework to help SMEs search for a best fit solution between

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

on-premise and on-demand options. ERP vendors will also benefit from the insights from CIOs and on the challenges perceived by SMEs for future ERP developments and marketing.

One limitation we found in this study is that our proposed framework may reduce the relative importance of the weights found in the survey. However, the critical factors are still components in the framework which represents a more logical process for ERP selection and adoption. In our future work, we will investigate the reduction on the level of importance of key factors by SMEs which adopted the proposed model for ERP selection decisions.

REFERENCES

Allied Market Research. (2015). World ERP software market - opportunities and forecasts. Retrieved from https://www.alliedmarketresearch.com/ERP-market

Anderson, E., Britz, B., & Bell, W. (2012, Sept. 28). User survey analysis: Using cloud services for mission-critical applications. Retrieved Feb. 3, 2013, from http://www.gartner.com/id=2182216

Beaubouef, B. (2011). Cloud ERP - new dog, same fleas. Retrieved Feb. 5, 2013, from http://gbeaubouef.wordpress.com/2011/05/22/cloud-erp/

Bhardwaj, S., Jain, L., & Jain, S. (2010). Cloud computing: A study of infrastructure as a service (IaaS). *International Journal of Engineering and Information Technology*, *2*(1), 60–63.

Chiang, Y., Wang, T., & Hsu, S. (2010). Applying incomplete linguistic preference relations to a selection of ERP system suppliers. In Proceedings of *Computers & Society '10* (pp. 6087–6090).

Chow, S., & Holden, R. (1997). Toward an understanding of loyalty: The moderating role of trust. *Journal of Managerial Issues*, *9*(3), 275–298.

Furht, B., & Escalante, A. (2010). *Handbook of cloud computing*. New York: Springer Science and Business Media. doi:10.1007/978-1-4419-6524-0

Gallagher, D. (2016, August 18). Cisco: Life by a thousand cuts. *The Wall Street Journal: Market Watch*.

Garrison, G., Wakefield, R., & Kim, S. (2015). The effects of IT capabilities and delivery model on cloud computing success and firm performance for cloud supported processes and operations. *International Journal of Information Management*, *35*(4), 377–393. doi:10.1016/j.ijinfomgt.2015.03.001

Gattiker, T., & Goodhue, D. (2000). Understanding the plant level costs and benefits of ERP: Will the ugly duckling always turn into a swan. In *Proceedings of the 33rd Hawaii International Conference on System Science*, Hawaii. 10.1109/HICSS.2000.926907

Gheorghe, G., & Lupasc, I. (2012). Crises solutions for SMEs case study: ERP cloud Vs. classic solution. In *Proceedings of the International Conference on Risk in Contemporary Economy*, Galati, Romania (pp. 149-156).

Karabek, M., Kleinert, J., & Pohl, A. (2011). Cloud services for SMEs - evolution or revolution? *Business and Innovation*, (1), 26-33.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kilic, H., Zaim, S., & Delen, D. (2014). Development of a hybrid methodology for ERP system selection: The case of Turkish Airlines. *Decision Support Systems*, *66*, 82–92. doi:10.1016/j.dss.2014.06.011

Kilic, H., Zaim, S., & Delen, D. (2015). Selecting "The Best" ERP system for SMEs using a combination of ANP and PROMETHEE methods. *Expert Systems with Applications*, *42*(5), 2343–2352. doi:10.1016/j.eswa.2014.10.034

Kim, W. (2009). Cloud computing: Today and tomorrow. *Journal of Object Technology*, January/February.

Kim, W., Kim, S., Lee, E., & Lee, S. (2009). Adoption issues for cloud computing. In *Proceedings of the 7th International Conference on Advances in Mobile Computing and Multimedia* (pp. 2-5). New York: ACM.

Kremers, M., & Dissel, H. (2000). ERP system migrations. *Communications of the ACM*, *43*(4), 53–56. doi:10.1145/332051.332072

Laukkanen, S., Sarpola, S., & Hallikainen, P. (2007). Enterprise size matters: Objectives and constraints of ERP adoption. *Journal of Enterprise Information Management*, *20*(3), 319–334. doi:10.1108/17410390710740763

Linthicum, D. (2010). *Cloud computing and SOA convergence in Your Enterprise*. Boston, MA: Addison Wesley.

Mahowald, R., & Sullivan, C. (2012). Worldwide saas and cloud software 2012-2016 forecast and 2011 vendor shares. International Data Corporation (IDC). Retrieved from http://www.idc.com/getdoc.jsp?containerId=236184#.USTXoh3kseB

Markus, M. L., Petrie, D., & Axline, S. (2000). Bucking the trends: What the future may hold for ERP packages. *Information Systems Frontiers*, *2*(2), 181–193. doi:10.1023/A:1026548107263

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud computing - The business perspective. *Decision Support Systems*, *51*(1), 176–189. doi:10.1016/j.dss.2010.12.006

Mell, P. & Grance, T. (2011). The NIST definition of cloud computing. *National Institute of Standards and Technology*.

Montgomery, N. (2004). Build your business case for upgrades by adding functionality. *Computer Weekly*, 2(10).

Olson, K., & Satre, P. (2007). ERP for SMEs - is proprietary software an alternative? *Business Process Management*, *13*(3), 379–389. doi:10.1108/14637150710752290

Panorama Consulting Group. (2009, March 12). SaaS ERP vs. on-premise ERP software: Six key differentiators. Retrieved Feb. 20, 2013, from http://searchcloudapplications.techtarget.com/news/1350684/SaaS-ERP-vs-on-premise-ERP-software-Six-key-differentiators

Peng, G. C. A., & Gala, C. (2014). Cloud ERP: A new dilemma to modern organisations? *Journal of Computer Information Systems*, *54*(4), 22–30. doi:10.1080/08874417.2014.11645719

Purohit, G., Jaiswal, M., & Pandey, M. (2012). Challenges involved in implementation of ERP on demand solution: Cloud computing. *International Journal of Computer Science Issues*, *9*(4), 481–489.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Raihana, G. F. H. (2012). Cloud ERP–a solution model. *International Journal of Computer Science and Information Technology & Security*, *2*(1), 76–79.

Rittinghouse, J., & Ransome, J. (2009). *Cloud computing: Implementation, management, and security*. CRC Press. doi:10.1201/9781439806814

Saeed, I., Juell-Skielse, G., & Uppstrom, E. (2011). Cloud enterprise resource planning adotions: Motives & barriers. In *Proceedings of the International Conference on Research and Practical Issues of Enterprise Information Systems*.

Seethamraju, R. (2015). Adoption of software as a service (SaaS) enterprise resource planning (ERP) systems in small and medium sized enterprises (SMEs). *Information Systems Frontiers*, *17*(3), 475–492. doi:10.100710796-014-9506-5

Shang, S., & Seddon, P. (2000). A comprehensive framework for classifying the benefits of ERP systems. *Proceedings of the Americas Conference on Information Systems*. Long Beach, CA.

Swanton, B. (2004, September 21). Build ERP upgrade costs into the business change program – not the IT budget. *Computer Weekly*, 28–28.

Tao, F., Laili, Y., Su, L., & Zhang, L. (2013). FC-PACO-RM: A parallel method for service composition optimal-selection in cloud manufacturing system. *IEEE Transactions on Industrial Informatics*, *9*(4), 2023–2033. doi:10.1109/TII.2012.2232936

Truong, D. (2015). Efficiency and risk management models for cloud-based solutions in supply chain management. *International Journal of Business Analytics*, *2*(2), 14–30. doi:10.4018/IJBAN.2015040102

Tsai, W., Lee, P., Chen, S., Hsu, W., & Lin, T. W. (2009). A study of the selection criteria for enterprise resource planning systems. *International Journal of Business and Systems Research*, *3*(4), 456–480. doi:10.1504/IJBSR.2009.027200

Tsai, W., Lee, P., Shen, Y., & Lin, H. (2012). A comprehensive study of the relationship between enterprise resource planning selection criteria and enterprise resource planning system success. *Information & Management*, *49*(1), 36–46. doi:10.1016/j.im.2011.09.007

Velte, A., Velte, T., & Elsenpeter, R. (2007). *Cloud computing a practical approach*. NY, NY: McGraw-Hill.

Wang, G. K., & He, W. (2014). Service strategies of small cloud service providers: A case study of a small cloude service provider and its clients in Taiwan. *International Journal of Information Management*, *34*(3), 406–415. doi:10.1016/j.ijinfomgt.2014.01.007

Wang, L., von Laszewski, G., Younge, A., He, X., Kunze, M., Tao, J., & Fu, C. (2010). Cloud computing: A perspective study. *New Generation Computing*, *28*(2), 137–146. doi:10.100700354-008-0081-5

Weng, F., & Hung, M. (2014). Competition and challenge on adopting cloud ERP. *International Journal of Innovation, Management and Technology*, *5*(4), 309–313.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Zardari, M. A., & Jung, L. T. (2016). Classification of file data based on confidentiality in cloud computing using K-NN classifier. *International Journal of Business Analytics*, *3*(2), 61–78. doi:10.4018/IJBAN.2016040104

Zhou, S. B., & Ji, F. X. (2015). Impact of lean supply chain management on operational performance: A study of small manufacturing companies. *International Journal of Business Analytics*, *2*(3), 1–19. doi:10.4018/IJBAN.2015070101

This research was previously published in the International Journal of Business Analytics (IJBAN), 5(2); pages 1-16, copyright year 2018 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 66
Online Organization: A Flexible, Agile and Adaptable Organizational Instrument

Carlos Páscoa
Portuguese Air Force Academy, Pêro Pinheiro, Portugal

Ana Telha
Portuguese Air Force Academy, Pêro Pinheiro, Portugal

Tiago Santos
Portuguese Air Force Academy, Pêro Pinheiro, Portugal

ABSTRACT

Competitiveness has forced organizations to improve and adapt faster allowing the most capable individuals to fulfil organizational positions. Despite the need to overcome difficulties in resource management, the Portuguese Air Force still uses a method centered in hierarchical structure and career progress. Competencies within job positions are not yet typified, meaning that the individual that occupies a certain job position may not be the most capable. To solve this problem, this article studies an online organization model that represents the concepts of organizational entities, job positions, resource management and human resource management through competency management. The model describes each concept individually and the relationships between components. If validated and implemented, the model will allow an improvement in human resource management effectiveness, and efficiency.

INTRODUCTION

Change is the law of life and those who look only to the past or present are certain to miss the future. (John F. Kennedy)

Tribolet and Magalhães (2007) affirm that the challenges that an organization faces at each moment in history determine its survival, according to its capacity to respond, adapt and change.

DOI: 10.4018/978-1-7998-7297-9.ch066

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In the current organizational context, technological, political, economic, social and cultural changes are an unavoidable reality (Ceitil, 2010). Likewise, increasing competitiveness among organizations contributes to the need for organizational change, ensuring the organization's survival.

According to Quintas (2016), "Transversal competence consists of an observable behavior associated with every individual belonging to the Organization, intrinsic or developed in various organizational contexts and useful to the Portuguese Air Force (PtAF). "Such competences assume an extremely important role for the rotation between organizational positions, allowing the organization to engage the most capable individual to perform a given Organizational Position…" (Quintas, 2016; Telha et al., 2016).

It is crucial to effectively manage people in accordance with their competencies in order to continuously improve its organizational performance. Therefore, dematerialized repositories for people and organization must co-exist.

IMPORTANCE OF THE STUDY

The problem can be stated as: within the PtAF, there is no dematerialized system that represents and manages individuals by competencies. The problem can be characterized through the following topics:

- A methodology for defining military attributes has not been defined;
- No profiles are defined for an Organizational Position (OP), which include the requirements in terms of skills and professional profile.

Associated with the problem found the following research question was developed:

- Is there a need to create a dematerialized model for the management of human and material resources in PtAF?

OBJECTIVE, SCOPE AND RESEARCH METHODOLOGY

This paper intends to create a PtAF Online Organization model (OOm), as opposed to the role that can be implemented in the organization, allowing a better management of human resources based on skills as well as material resources.

The scope of this work is within the PtAF organization, applying to it all relevant concepts of Organizational Engineering, as well as the revised literature, in order to create a model that fits correctly.

The methodology proposed by Quivy & Campenhoudt (2005) was adopted in this research. According to the authors the scientific process is divided into three acts: "Rupture", "Construction" and "Verification". Each act is divided into several stages (Quivy & Campenhoudt, 2005).

Rupture is intended to allow the researcher not to be inspired by "immediate appearances or partial positions", thus avoiding being caught by prior knowledge. The construction allows the creation of an "organized conceptual system." Finally, verification allows the propositions validation (Quivy & Campenhoudt, 2005).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Research Hypotheses

The fundamental question, guideline for this research, is the following:

- **Research Question (RQ):** How should a model for a dematerialized Online Organization be built for the PtAF?

In order to better answer the question of departure, it has been broken down into the following derived questions:

- **Derived Question Q1:** How is it advantageous for the PtAF to create an OOm?
- **Hypothesis H1:** The OOm allows better management of human resources, optimizing personnel placements in organizational positions, applying the concept of human resources management by competencies and ensuring the choice of the most competent person.
- **Derived Question Q2:** Are there systems in the PtAF that allow the management of human and material resources in an integrated and dematerialized way?
- **Hypothesis H2a:** There are systems that manage resources independently.
- **Hypothesis H2b:** The information is stored in digital and paper format.

LITERATURE REVIEW

The bibliographic review is based on contextualization of the concepts studied. The Model Development section explains the contribution of each concept.

Organizational Engineering

Organizational Engineering is a concept that dates back to the 1990s and is defined as a set of knowledge, principles and practices that govern the implementation, design and operation of an organization (Liles & Presley, 1996).

This concept arises from the need to increase the performance of organizations due to their increasing competitiveness (Eriksson & Penker, 2000).

Organizational Engineering establishes the use of methods to increase the effectiveness, communication and coordination of the most diverse types of organizations. By focusing on how information is structured, it can improve the organization's results without changing individuals (OEI, 2016).

Organizational Self-Awareness

The Merriam-Webster Dictionary (2016) defines self-conscious as "conscious of one's own acts or states as belonging to or originating in oneself: aware of oneself as an individual". An organization's self-awareness is the ability to be aware of itself as a whole, a sum of the individual consciousnesses of its components (Tribolet, 2007).

Interactions among individuals in the same organization are of great importance in maintaining organizational awareness, for although the sum of individual consciousnesses does not materialize in the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

collective consciousness of the organization, the fact that there are close interactions between individuals allows for the creation of a dense network of constant updating of each one, thus synchronizing the mental representation they have of the organization, or in other words, the organizational consciousness (Tribolet & Magalhães, 2007).

Therefore, Organizational Self-awareness (OSA) should be seen as a phenomenon both individual and collective, which is supported by continuous communication between individuals in the organization. Knowledge and awareness capacities are key factors for the development of OSA (Vicente, 2007).

Ontology

Several authors have defined "Ontology" in different ways according to the context in which it is applied. Uschold & Gruninger, (1996), defined ontology as the term used to refer to the shared understanding of a certain domain of interest. Perez and Benjamins (1999), in the context of Artificial Intelligence, reached a different definition as something that defines basic concepts and relations that compose the vocabulary of a certain area, as well as the rules to combine concepts and relationships, and define vocabulary extensions. However, the most widely used definition is Gruber's (1995), who states that ontology is an explicit specification of a conceptualization.

The formality of ontology can range from highly informal, semi-informal, semi-formal, and strictly formal. This degree of formality affects the language used in the definition and construction of the ontology, which evolves from a natural language into highly informal ontologies, into a careful, meticulous language and concepts defined through formal semantics, in strictly formal ontologies (Uschold & Gruninger, 1996).

Enterprise Architecture

The International Standard ISO / IEC / IEEE 42010 (Institute of Electrical and Electronics Engineers, 2011) defines architecture as the fundamental organization of a system, incorporated in its components, in its relations and relations with the environment, and the guiding principle the design and evolution of the system. Therefore, architecture allows an integrated view of the system being designed or studied (Lankhorst, 2013).

By applying the concept of architecture to an organization as a whole, one obtains the concept of EA, a set of principles, methods and models that are used in function of the design of the organizational structure, as well as its business processes, information systems and infrastructures (Lankhorst, 2013).

The Enterprise Architecture (EA) brings a holistic view of the organization (Lankhorst, 2013), but in order to facilitate the description of the organization as a complex system, it is divided into several levels: Organizational, Process, Information and Application Architectures. All these levels serve the EA in order to align the organization's strategy with its infrastructure and information technologies.

Information Architecture

Information Architecture (IA) is the level of EA that is most relevant to this work and will be explained in more depth.

To better explain the concept of IA, it is necessary to first define "information" and "Data". "Data", can be defined as facts in their raw, unaltered, disorganized state, only representative of events occurring

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in the organization (Laudon & Laudon, 2016). Data that have already been submitted and processed to bring value and meaning and that are somehow useful for the organization, is called information (Laudon & Laudon, 2016).

The concept of Information Architecture is defined in different ways by several authors. Hoogervorst (2009) defines IA as a consistent and coherent set of principles and standards that guide the way information is used and handled. Rosenfeld et al (2015) present IA in four premises:

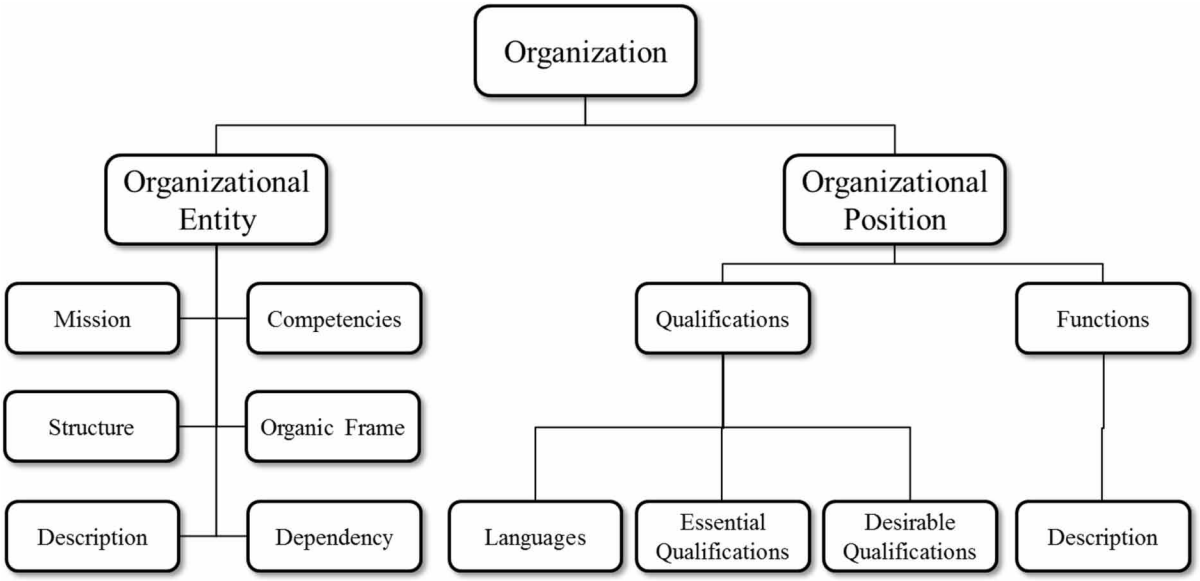
- The structural design of shared information environments;
- A synthesis of organization, recording, search and navigation systems within digital, physical and cross-channel systems;
- The art and science of shaping information to support its use, ease of access and understanding;
- An emerging field and community focused on transposing the principles of design and architecture into the digital environment.

Páscoa (2012) considers IA as the structuring of the informational entities of the organization, defining which are necessary for the business processes and how they relate to each other. It then functions as a repository of all useful information for the organization allowing the creation of the necessary information software.

Organizational Concepts

In an organization, the concepts of Organizational Entity (OE) and Organizational Position must be well defined. Both concepts have a preponderant role in the organization and the human resources management must be carried out in order to better adapt to the needs of the organization. Figure 1 represents organizational concepts.

Figure 1. PtAF organizational characterization (Telha at al, 2014; Monteiro, 2014)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

An OE consists of high-level bodies that make up the organization, and which are filled by individuals in the organization (Páscoa et al, 2011; Telha et al, 2014; Monteiro, 2014). An OE has attributes:

- Name
- Structure
- Mission: Mission to be performed
- Competences: Set OE competencies within the organization
- Organic Framework: Total of the personnel belonging to the OE
- Dependency: Identification of hierarchical dependence
- Organizational Position

The Organizational Position (OP) is one of the attributes of the OE. The OP can be defined as a certain position or function within the organization, performed by people (Páscoa et al, 2011). Its attributes are:

- Designation: OP's Description;
- Functions: A set of responsibilities and activities that are assigned to the OP, with the expectation that they will be fulfilled;
- Qualifications: They are divided into Languages, referring to the languages to which the individual's proficiency in a given degree is required; Essential Qualifications, those that are essential for the execution of the OP; and Desirable Qualifications, which are the qualifications that it is desirable for an individual to possess to fulfill the OP.

Andrade (2015) developed a representation of the attributes of an Organizational Position for the PtAF. Such a representation is slightly different from that presented above. Table 1 shows that it is possible to characterize two types of attributes, essential and secondary (Andrade, 2015; Telha et al, 2015). Of the first group are:

- Subunit: Organizational Entity in which the OP is inserted
- Position: OP Description
- Rank
- Specialty
- Qualifications: requirements that the individual must possess to perform the OP
- Functions: responsibilities assigned to the OP

The secondary attributes are:

- OP Number / Code
- Observations: useful information for choosing the individual to occupy the OP

By dividing the attributes into essential and secondary, it is possible to elaborate a second representation (see Table 2) of the attributes of an OP in the business processes of the PtAF, that is, those that actually influence the characterization of the OP in the organization (Andrade, 2015; Telha et al, 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. PtAF Organizational Position representation (Andrade, 2015)

Organizational Position		
Essential attributes	Subunit	
	Post	
	Rank	
	Specialty	
	Qualifications	
	Functions	
Secondary attributes	Post Number/Code	Post ID
		Order of Battle
		Normal
	Remarks	

Table 2. Organizational Position representation in business processes (Andrade, 2015)

Organizational Position	
Attributes to represent	Post
	Rank
	Qualifications
	Functions
	Hierarchy

According to Andrade (2015), only the position, rank, qualifications, functions and hierarchy are attributes that characterize the OP. All others are not used or have no influence on the characterization of the OP. Andrade added the Hierarchy attribute to its representation, considering relevant an attribute that defines the hierarchical dependencies of a OP, either above or below its hierarchical position.

Competencies

McClelland (1973) strongly marked the study of skills with his article on the method of intelligence testing for a given job position arguing that intelligence tests are quite fallible since only the intelligence of the individual in question is tested in a given context, and not their competence to perform the function in question. He further argues that the degree of intelligence is not directly linked to an individual's professional success, and then argues that competence tests are far more reliable than intelligence tests.

Camara et al (2010) define competence as "the set of qualities and professional behaviors that mobilize the technical knowledge and allow acting in the solution of problems, stimulating superior professional performances, aligned with the strategic orientation of the Company."

Ribeiro (2015) and Telha et al (2015a), in the PtAF context, proposed a definition: "Competence consists of the abilities, values, behaviors, abilities and qualifications of an individual, inherent in himself or obtained through training, personal experience or professional experience, and that is useful to the organization…" and a set of attributes that allow a generalized characterization of any competence:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Name – competency name
- Description – competency description
- Theme – competency area of interest
- Code – competency unique ID
- Validity – competency validity

It is important to emphasize the need to define the competences associated to a certain OP, by elaborating a competency profile. This competency profile is made up of the generic competences, or transversal competences (TC), and the specific competences (CE) (Camara et al, 2010).

Work has also been developed within the Air Force on these more unique types of competencies. Telha et al (2016) and Quintas (2016) propose that transversal competence "…consists of an observable behavior associated with every individual belonging to the Organization, intrinsic or developed in various organizational contexts and useful to the Air Force." These competencies play a significant role in the selection of candidates and recruitment, and in the rotation of personnel between organizational positions. The model proposed consists of a group of skills grouped into six groups: Individual Excellence, Military Skills, Strategic Skills, Operational Skills, Results and Courage (Telha et al, 2016).

Telha et al (2016) and Quintas (2016) also defined levels of proficiency in order to describe in more detail each of the transversal competences listed. Five levels are defined that define transversal competences: "level 0 - does not have, level 1 - basic, level 2 - intermediate, level 3 - advanced, level 4 - expert" (Telha et al, 2016; Quintas, 2016).

Regarding the specific competences, they were defined for PtAF as follows: "Specific Competence is an observable characteristic, owned by an individual of the organization, which is essential for the fulfillment of the technical function attributed to him, and which can be developed experience or professional training…" (Bonifácio, 2017). In line with transversal competences, proficiency levels were also defined for specific competences, in the same way. These skills and proficiency levels were defined for all the PtAF specialties, grouped in the areas of support, maintenance and operations (Bonifacio, 2017).

Competencies Management

Competence Management is an object of study with considerable importance when studying the areas of knowledge management and human resource management in an organization (Mentzas & Draganidis, 2006). According to Houtzagers (1999), cited by Mentzas & Draganidis (2006), competence and capacity management is strongly linked to organizations' efforts to improve and increase their competitive advantage, innovation and efficiency.

Competency-based management has proven to be a valuable tool in increasing an organization's productivity and performance. Draganidis et al (2006) present the main advantages that lead an organization to adopt a competency-based management system such as the following:

- Identification of the skills, knowledge, behaviors and skills required to meet staff selection requirements, in accordance with the organization's strategies and priorities;
- Ability to focus individual and collective development plans, eliminating the gap between the competencies needed to perform a function or position in the organization, and those that actually exist in the individuals available.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Other authors, such as the SINFIC organization (2007), present different benefits for the use of a competency management system. The following stand out:

- Smoothing the transitions of elements in the process of reform to their substitutes, by the anticipated preparation of the succession, based on the competency requirements necessary for each position;
- Motivation and compensation of employees, giving them the tools to model their career goals and align them with the needs of organizations;
- Meet performance objectives and support career goals by providing learning and development opportunities that are directly linked to skills improvement needs;
- Capitalization of existing talent in the organization, prior to departure for recruitment, using updated skills profiles of existing employees;
- Overall improvement of the company's stability through the extension of the hiring period of employees;
- Competency Selection Model.

In the competency management domain, it is important to describe how to define which competencies an organization should select to gain a competitive advantage over other organizations.

Zingheim et al (1996) proposed a method for selection and definition of competences. According to the method, the organization must define its business strategy, structure and organizational culture first. Then it is necessary to determine the desired results and what behavior is needed to attain them. The following is the definition of a compensation strategy for people. A study should be carried out to find possible sources of skills. Finally, the organization will have to select competencies that fit and then be defined and executed, with the ultimate aim of obtaining a competitive advantage (Zingheim et al, 1996).

Competency Architecture

According to Lankhorst (2013), architecture must exist to manage complexity in large organizations.

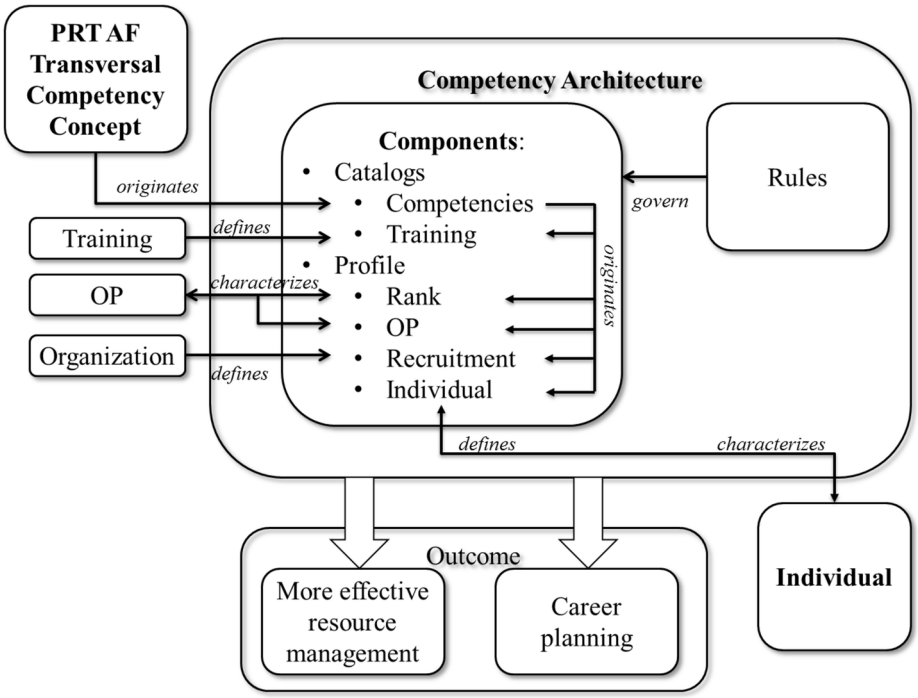
Thus, a competency architecture can be defined as "…the set of all the competencies that are necessary to the organization's activities, its representation and specification, the relationships that exist between them, how they are developed and where OP are used…" (Telha et al, 2016a; Rodrigues, 2016). Rodrigues (2016) developed a model (see Figure 2) for a facilitated competency architecture understanding, which understands that it is constituted by regulatory rules of the remaining components and the architecture itself.

After defining Competency Architecture, it is necessary to explain how it should be used in the management of competencies of an organization. Rodrigues (2016) has developed rules of application of Competency Architecture according to the needs of the organization in order to optimize the recruitment of personnel and OP occupation. These rules aim not only to match the competences of an individual with the competences necessary for the OP to be occupied, but also to maintain competencies and to develop new competences through the exercise of other OP.

The first phase of competency management begins with the recruitment and the drawing up of recruitment profiles, crucial tools in the selection of candidates (Rodrigues, 2016). It should be assessed which competencies are desirable in an individual to join the organization, and evaluate which individuals are effectively the holders of those competencies. Thus, it is possible to classify candidates as fit to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Competency architecture model (Rodrigues, 2016)



join the organization if their competencies are compatible with those desirable for the organization, and unfit otherwise.

The usefulness of the competency profile is not limited to recruitment, since it must be stored by the organization throughout the individual's permanence in the same, and updated whenever the individual's competences change, whether they are adding new skills, improving the level of existing competencies or the existence of skills that are not being applied, are lost and need to be renewed (Rodrigues, 2016).

Figure 3 presents a template for filling Organizational Positions. The interpretation of the model allows the reader to understand how to apply the Architecture of Competencies proposed by Rodrigues (2016). According to the author, after elaborating the competency profiles for each OP, which defines the competencies that an individual must have to successfully perform the OP, a correspondence with the competencies profile of the individuals must be made. If the competences of the individual correspond to the minimum level of competence of the OP, he is considered fit to perform it. In the opposite situation, in which the individual does not have the competencies to perform the OP, the same must be oriented to another position with a different competency profile. There is also the option of providing training to the individual in order to develop a set of competencies, making it fit for the OP in question (Rodrigues, 2016).

The performance of functions is also a method for the development of competences, in that when performing functions in a given OP the individual develops new competencies, making him / her fit for Organizational Positions for which he did not previously have competencies (Rodrigues, 2016). Figure 4 represents this process.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Organizational Position filling model (Rodrigues, 2016)

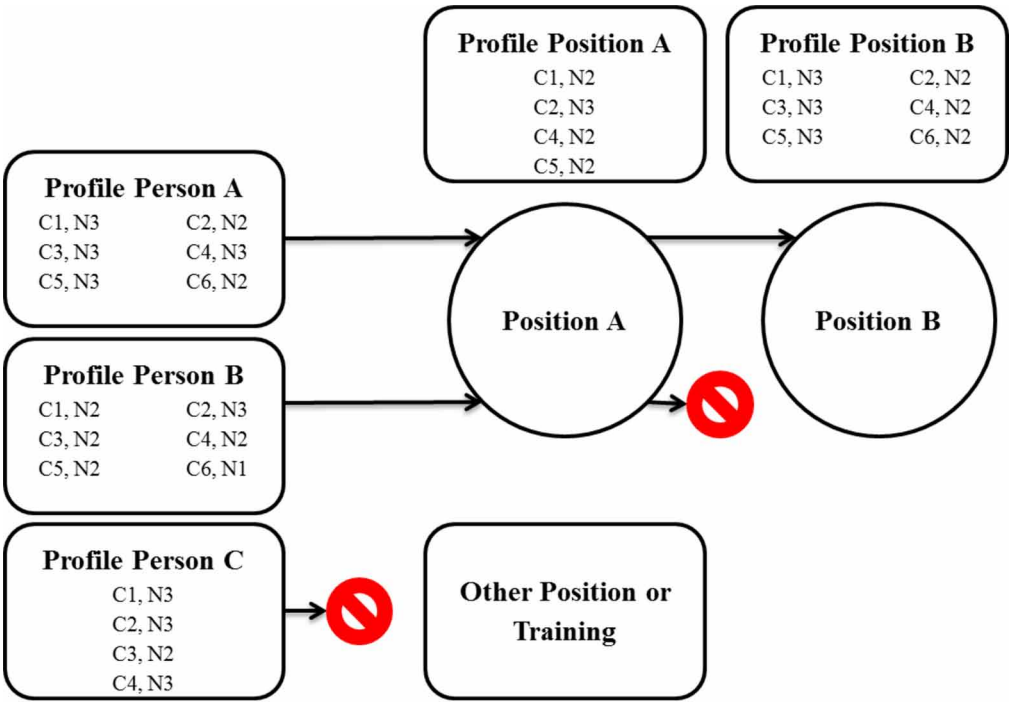
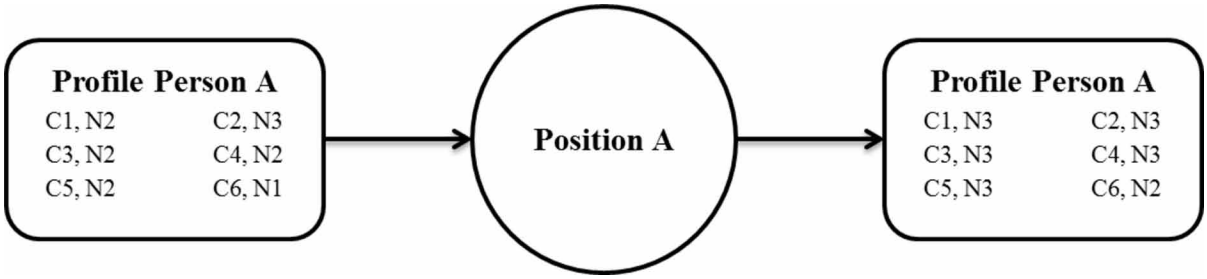


Figure 4. Competency development model based on experience obtained in an OP (Rodrigues, 2016)



Merit Evaluation

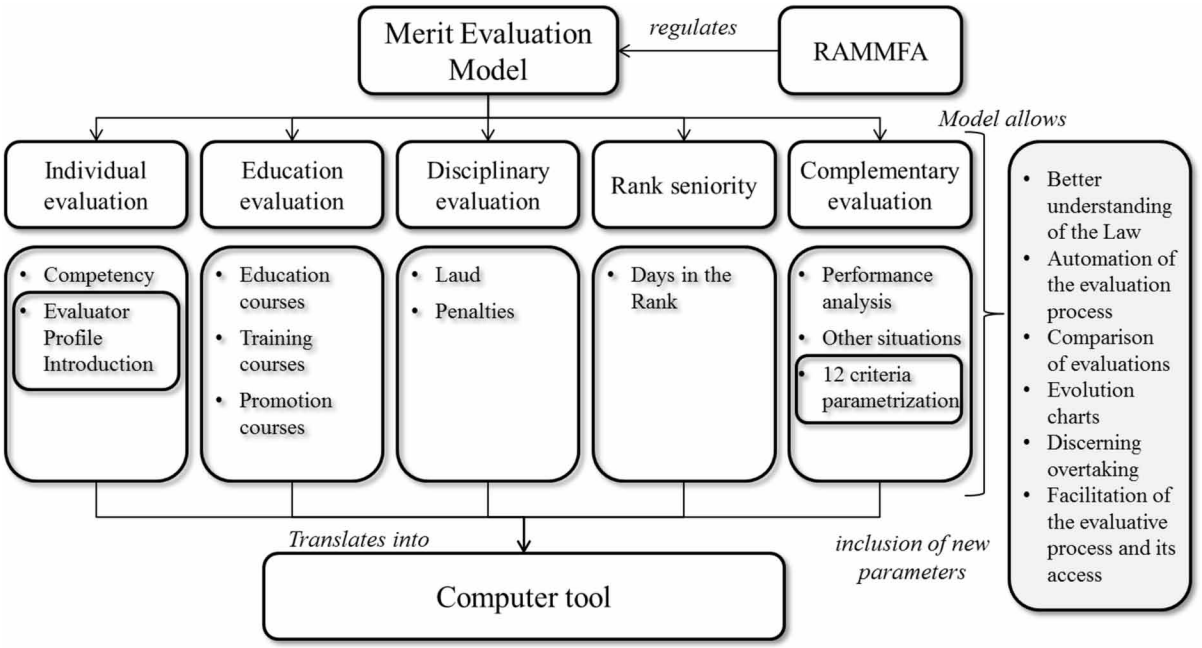
The evaluation of the merit in the organizations, allows them to gauge the real value of their employees, as well as identify training needs.

In the scope of the Armed Forces, a model was developed that reified the evaluation parameters defined in the Armed Forces' Military Merit Evaluation Regulation, aiming to integrate it into a computer tool (Pires, 2017).

The developed model comprises five distinct evaluation domains: Individual, Education, Disciplinary, Rank Seniority and Complementary (Pires, 2017). Figure 5 presents the five evaluation domains and its components indicating advantages of using the model through a computer tool.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Armed Forces merit evaluation model (Pires, 2017)



PtAF Literature Review

The Organic Law for the Air Force defines it Mission. The Chief-of-Staff Directives present its Vision. The Air Force 101-1 (Portuguese Air Force, 2013) Manual defines a set of professional competencies for each specialty.

MODEL DEVELOPMENT

Throughout the first paragraph, the author made an introduction to the topic to be addressed. It was also explained the motivation associated to the theme, based on the presented problem. In the same paragraph, a starting point has been elaborated, guiding all research, which has resulted in derived questions. Finally, the methodology used was presented. Paragraph two, literature review, addresses essential concepts.

This paragraph evaluates each concept's contribution to the research. The interviews will be analyzed qualitatively and later the model developed to solve the initial problem, followed by its validation, will be presented.

Literature Review Contribution

The contribution of the bibliographic review is based on contextualization. In reviewing the literature, the author has acquired the necessary scientific knowledge to develop the proposed model, being the link between the model and the initial objectives. Thus, this paragraph describes how each topic addressed in the literature review contributes to the development of the model.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Organizational Engineering strives to improve organizational performance by establishing new methods for increasing effectiveness and efficiency in organizations. The PtAF uses these methods to study and create a new artifact to perfect itself, aiming at the fulfillment of its objectives.

OSA is a concept strongly linked to Organizational Engineering. In order to understand its present state, an organization needs to develop the concept of organizational self-awareness. The concept of Online Organization is closely linked to the concept of OSA, since the PtAF online model would make it easier for the organization to develop its self-awareness. It would then be possible for PtAF to make adjustments over time based on its development, correcting the organization's course to achieve the objectives.

For an organization, it is not enough to simply define the concepts of Organizational Engineering. There is a need for a graphical representation of the organizational structure, and for this there is the EA. The Business Architecture, as a set of principles and methods for the design of the organizational structure, allows the representation of the organization according to different perspectives. The EA is divided into several levels, with Information Architecture being one of them. This level is of special importance for the subject to be addressed, since it consists of representing the organization according to the perspective of information and information systems. The IA defines the informational entities necessary for the business, and how they relate to one another. The importance of IA to the Online Organization is evident, serving as a repository of all information relevant to the PtAF.

The concepts of OE and OP are essential for the management of human resources in an efficient way in the organization. There must be organizational awareness to clearly identify the attributes of both organizational entities and organizational positions. Attributes such as qualifications or competencies are vital in the management of people in the organization. For a given OP there is a competency profile to be filled. To occupy the position, an individual must possess the minimum competencies established in the profile. Otherwise, it will not be able to perform the proposed function due to lack of skills.

Skills are thus an important concept. In an Online Organization, the concept of competence, transversal or specific, must play a prominent role, being associated with the organizational positions and the people who fill them.

Competency management is a tool used to increase the productivity of an organization. This management allows identifying the competencies necessary to the organization, so that these and the requirements of the organization are in tune, focusing efforts in the development of the employees. The OOm emerges in order to incorporate competency management into the PtAF.

In the previous paragraph we defined the concept of Competence Architecture and the rules applied to it. The contribution of these elements is vast, insofar as the competency architecture defines the competencies necessary for the activities of the organization, and in which OP is used. The rules of competency architecture describe how competency management should be performed according to the needs defined by the competency architecture. The Online Organization should implement these rules, as well as the correspondences between the competencies of the individuals and the organizational positions.

It is possible to affirm that all the concepts mentioned above contribute to the development of the OOm, expanding the hypotheses of development.

PtAF Literature Contribution

The PtAF literature review contributes to the organization knowledge development by including the revision of pertinent documents and legislation unveiling, with clarity, the Mission, nature and why it

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is relevant to carry out human resources management. The PtAF vision presents people as one of the pillars of the organization, thus revealing the importance of human resource management for the culture of service and well-doing that must be practiced.

The Air Force 101-1 Personnel Command Manual contributes directly to the development of the OOm as competencies are one of the key points to incorporate into the model. The professional profiles of the military define the ideal competences for a specialty, and although they are not defined according to the Organizational Position, they allow to identify the activities performed limiting the OP to be occupied.

The analysis of the organization's manuals allowed expanding knowledge about the organization and distribution of the units.

Interview Contribution

The interviews were a valuable tool that allowed the gathering of knowledge about the current management of human and material resources and the current IS. After the qualitative analysis of the interviews, key points were identified, and some conclusions drawn.

The concepts of competency management and competency management, although already studied, are not yet applied in current methods of human resource management in AF. Persons are mostly managed by functions.

The individual military information is managed by an information system (IS) called SIGAP, functioning as an information repository. Much of this information also exists in paper, which support the system and its updates.

The information on Professional Profiles for each OP is defined in manuals, outdated to the current needs.

The current phase of scarcity of resources does not allow an efficient management of human resources. It is imperative to adopt a more efficient system, which allows optimizing the few existing resources.

The organization's manuals do not provide for an instantiation of the material resources required for each OP. This instantiation, where applicable, is important in that it guarantees the availability of resources as well as the optimization of their distribution.

The creation of a dematerialized model for the management of human resources translates into the creation of an Online Organization. This concept allows a complete integration of organizational positions with their attributes and functions, while at the same time acts as a database for the organizational profiles of the people of the organization, storing information about them. In this way, the model allows the online allocation of an individual to an OP. It also allows an instantiation of the individual work tools at the workstation, when accessing it. The Online Organization enables a way of optimizing human resources and time spent in managing them.

THE MODEL

The Online Organization

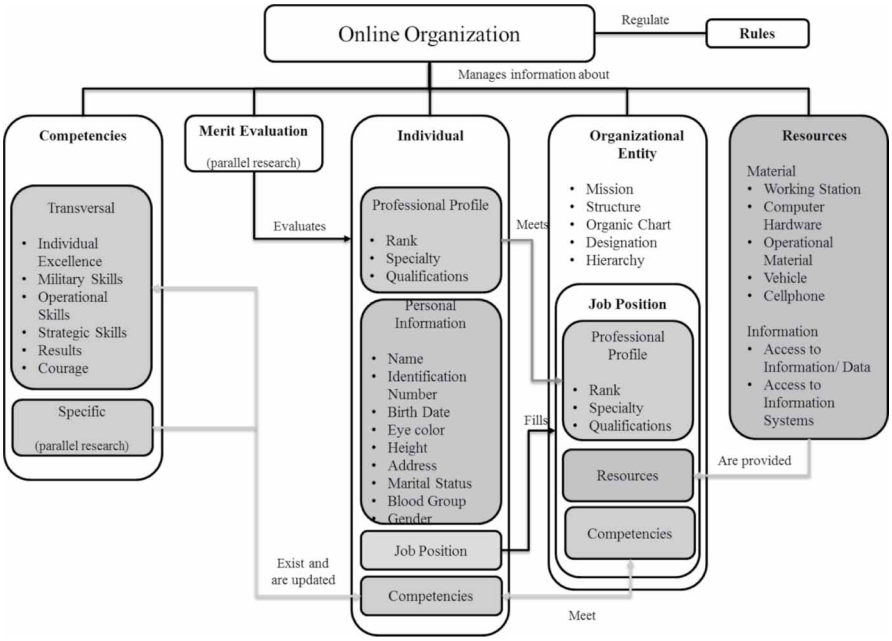
The PtAF Online Organization Model (Figure 6) consists of an automatic and unifying resource management tool, since it aims to manage people in OP effectively and competently saving significant hours

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of work in configuring for the organization rather than configuring for the individual. It is composed of several components and rules.

Each component of the model has attributes, which describe it and the relationships with the other components. The components are the Individual, the Competencies, the Merit Evaluation, the Resources and the Organizational Entities, of which the OP are part. Rules regulate and manage the model, determining which relationships exist between its components.

Figure 6. The online organization model (Source: Authors)



In order to facilitate understanding the model, each component will be further explained.

The individual is the center component. Its attributes are divided into four different areas: Professional Profile, Personal Information, Organizational Position (Job Position) and Competencies. Personal Information stores the relevant individual information. According to the Personnel Management Directorate, the personal information that is currently managed in the PtAF consists of Name, Personal Identification Number, Date of Birth, Eye Color, Height, Residence, Marital Status, Blood Group and Gender. The Professional Profile contains not only characteristic attributes of a military organization, such as Post and Specialty, but also the Qualifications and the current OP occupied. Skills are also one of the attributes related to the individual and will be discussed later in this paragraph.

The highest organizational component is the Organizational Entity. It includes attributes such as Mission, Structure, Organizational Chart, Designation, Hierarchy and Organizational Positions (Páscoa, Pinto & Tribolet, 2011). The OP attribute consists of three sub attributes: Professional Profile, Resources and Skills.

The Resources component is divided into two groups, Material and Information. The first group consists of the physical resources that an individual needs to perform the assigned functions. This group

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

includes resources such as a Post Office, Computer configuration (Software and Hardware), Operational Material, Car and Mobile. Information resources consist of either access to information or data, or access to information systems as a working tool.

Skills are also a component of the OOm and its importance lies in the fact that the model manages people according to competencies. This component is divided into Transversal Competencies (Telha et al, 2016) and Specific Competencies Bonifácio (2017). Transversal Competencies are composed of attributes such as Individual Excellence, Military Skills, Operational Skills, Strategic Skills, Results and Courage. Specific Skills are divided into the areas of Operations, Maintenance and Support, which in turn encompass the different specialties in the Air Force.

Finally, the Merit Assessment component is based on the model developed by Pires (2017), which is divided into five distinct fields of evaluation: Individual, Education, Disciplinary, Rank Seniority and Complementary.

The relationships between components of the OOm and how particular events influence the organization are of great importance. In this way it is important that rules are defined for this model.

According to the analysis of the organization's manuals carried out in previous paragraphs, it is possible to affirm that there are requirements for an individual to fill a particular OP. These requirements are included in the template through the Professional Profile of both the individual and the Organizational Position. Currently, these requirements are: Post, Specialty and Qualifications. However, according to the Skills Architecture developed by Rodrigues (2016), the OOm includes the Skills as a limiting factor in filling Organizational Positions.

Both the Professional Profile and the Competencies are attributes of both Organizational Positions and individuals, so that an individual can only occupy an OP if the requirements are met.

Figure 7 presents an example of this process and depicts the completion of OP Z by Persons X and Y. This Organizational Position has a Professional Profile with requirements such as A / B Post, F / H Specialty, Q Qualification, and a Competency Profile which includes C1, N2 and C3, N1 skills.

Both Person X and Person Y meet the requirements at the Professional Profile level. The same does not apply to Competencies. Person X has the Competencies 1 and 2, both with the level of proficiency 3. Person Y, on the other hand, has Competency 1 at proficiency level 2, has Competency 2 at proficiency level 1 and also has Competency 3 at proficiency level 2. OP Z requires Skills 1 and 3 at proficiency levels 2 and 1 respectively. This means that although Person X possesses skills with an average proficiency level above Person Y, cannot fill the OP Z, while Person Y, having a lower average level of proficiency, meets all minimum requirements and is able to fill OP Z.

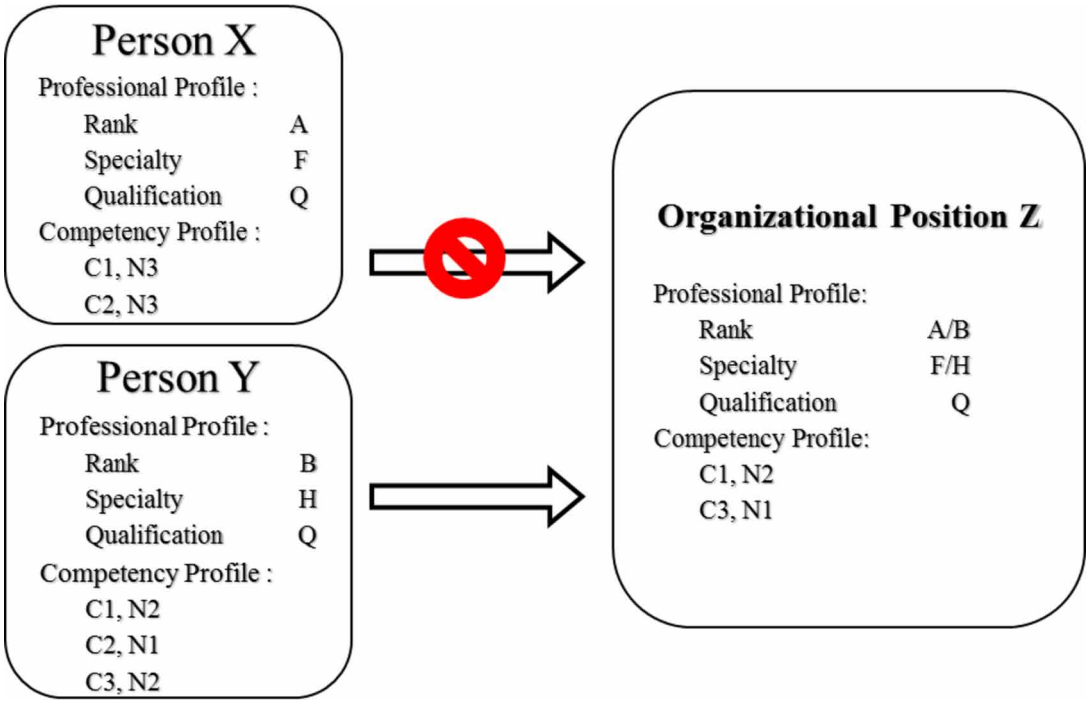
In order to maximize effectiveness and efficiency in the performance of duties, it is not enough to be the most competent person for the OP to perform duties. It is imperative that this person has at his disposal all the necessary resources, thus relating the Resources component to the OP.

According to a source in the Directorate of Communications and Information Systems, currently the resources needed for each OP are not typified, and are managed according to the need of the individual that occupies it. That is, if an individual needs a particular resource, it makes a request that later authorizes the distribution of that resource. Certain resources such as vehicles and mobile phones are associated with the individual and are not automatically assigned to the OP.

By including the resources in the Online Organization model, it is intended that an instantiation of the resources needed for each OP, as well as the resources that the organization has available for assignment, is made. In this way it is possible to associate the resources assigned to an OP, rather than to the individual, ensuring that when placing an individual, he will have access to the resources necessary for

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 7. OP completion (Source: Rodrigues, 2016; Telha et al, 2016a)



the position he plays. It is also possible to ensure that in the event of a new rotation of personnel, each individual will have access to the resources of the new OP to be performed.

There is the possibility that, when instantiating the necessary resources and available resources, it is possible to conclude that there are insufficient resources in the organization to allocate to all Organizational Positions. Efforts should therefore be made to acquire resources, or to re-instantiate the resources required according to available resources.

Events in an individual's career, from incorporation to retirement, influence the organization in a number of ways. Figure 8 shows how the OOm predicts these changes throughout the individual career.

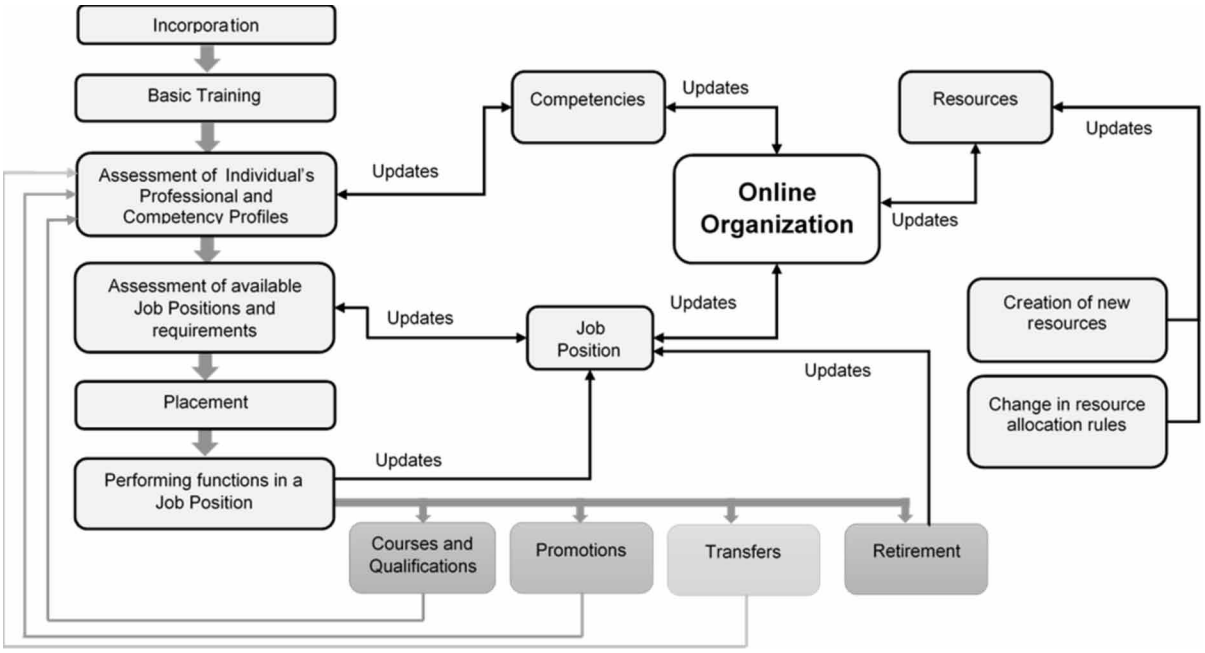
Since joining the organization, the individual has undergone several phases such as basic training, Competency and Professional profiles assessment, available OP evaluation and, finally, placing (posting) in an OP (to perform specific OP functions). After placement, the individual continues to influence the organization through various events: Courses and Qualifications, Promotions, Transfers and Retirement.

The first three events imply that an update of the Competency Profile and the Professional Profile of the individual should be made in the OOm, returning to the normal chain of events until new placement and performance of functions in a different OP. Retirement, on the other hand, implies that the OP that was occupied by the individual is now unoccupied, and this field should be updated in the Online Organization.

Resources also influence and change the Online Organization. The creation of new types of resources in the organization requires an update of the resources available, as well as the resources needed for each OP. A change in the rules of resource allocation, by changing the way resources are distributed, also requires updating resources.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 8. Individual career and events impacting the OOm (Source: Telha et al, 2017; Santos 2017)



CONCLUSION

This paragraph summarizes the research questions and hypotheses and presents the conclusions and proposals for future work.

Problem. There is no dematerialized system that represents and manages individuals by competencies, management of Organizational Positions and necessary resources, in an integrated, automatic and efficient way.

- **RQ:** How should a model for a Dematerialized Online Organization be built for the PtAF?
- **Q1:** How is it advantageous for the PtAF to create an OOm?
- **Q2:** Are there systems in the PtAF that allow the management of human and material resources in an integrated and dematerialized way?
- **H1:** An OOm allows better management of human resources, optimizing personnel placements in organizational positions, applying the concept of human resources management by competencies and ensuring the choice of the most competent person.
- **H2a:** There are systems that manage resources independently.
- **H2b:** The information is stored in digital and paper format.

H1 Validation: The current PtAF resource management system can be improved. The Organization faces a period of extreme shortage of human, material and financial resources, so resource management should be optimized. The OOm allows managing people by skills optimizing resource management guaranteeing that an OP is occupied by the most competent individual. The model components are implemented through an integrated IS (as opposed to many) which allows accessing different information easily. Hypothesis H1 is validated.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

H2a Validation: Resource management is currently done using several information systems through different platforms and computer applications. These systems, while communicating to one another, sharing various types of information are not integrated making integrated operation difficult to achieve. Thus, resource management is carried out independently, validating the H2a hypothesis.

H2b Validation: The research (including the interviews conducted) concluded that there are several types of information files in the PtAF. Much of the military information is stored in an personnel IS called SIGAP that is managed and updated based on physical information files, which are currently indispensable as a tool to support the IS. It is concluded that in PtAF the information is stored in digital format, and is supported by information in paper format. H2b hypothesis is validated.

RQ Validation: The OOm supports the construction of an IS that allows the integrated management of all its components. It is a highly complex task. It is possible to conclude from the qualitative analysis of the interviews carried out that there are several obstacles to the development and implementation of such a system. An integrated information system would allow for a simplified use of the model as a management tool. However, given the current budgetary difficulties, consideration should be given to adapting existing systems, with a focus on simplifying them and transferring information between systems. This information transfer is crucial to the functioning of the OOm, and the optimization of resource management depends on the links between the different components of the model.

The Online Organization model should ideally be implemented through the development of an integrated, simple and functional IS that assists the decision maker, never replacing the function of the human operator. It is also concluded that in the impossibility to develop a new system, the existing systems can be adapted to behave the model, implying, however, an update of the same in order to standardize these systems. Some clear advantages for IT professionals are:

- The organization is dematerialized and configured and the individual is inserted in a job position that has already all the settings identified;
- A considerable number of hours are saved on configuring the user software, hardware, printer access, privileges, etc.;
- Functions for the job position are identified and online which saves organization manuals, paper, printer consumables and immense work managing, updating and distributing paper versions.

The following future work recommendations are derived from conclusions drawn and advice from the entities interviewed and involved in the research:

- Classification of transversal and specific competences for each OP, in order to develop a manual;
- Development of a method to evaluate and update individual competences;
- Instantiation of the resources required for each OP;
- Development of an IS, or adaptation of existing systems, to enable the use of the OOm in an integrated manner;
- Study of the influence of Merit Evaluation on the choice of individuals for OP;
- Classification of Merit Assessment requirements for OP.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Andrade, N. (2015). *Representation of attributes of an Organizational Position in Business Processes*. Unpublished Master Thesis, Portuguese Air Force Academy, Sintra, Portugal.

Bonifácio, J. (2017). *Specific Competency Identification*. Unpublished master thesis, Portuguese Air Force Academy, Sintra, Portugal.

Camara, P., Guerra, P., & Rodrigues, J. (2010). *Novo Humanator - Recursos Humanos & Sucesso Empresarial* (4th ed.). Alfragide, Publicações Dom Quixote.

Ceitil, M. (2016). *Gestão e desenvolvimento de Competências. 2*. Lisboa: Edições Sílabo.

Draganidis, F., Chamopoulou, P., & Mentzas, G. (2006). An Ontology Based Tool for Competency Management and Learning Paths. In *Proc of IKNOW'06* (pp. 1–10).

Eriksson, H., & Penker, M. (2000). *Business Modeling With UML: Business Patterns at Work* (2nd ed.). New York: John Wiley and Sons, Inc.

Gruber, T. R. (1995). Toward principles for the design of ontologies used for knowledge sharing. *International Journal of Human-Computer Studies*, *43*(5–6), 907–928.

Hoogervorst, J. (2009). *Enterprise Governance and Enterprise Engineering*. Berlin, Heidelberg: Springer. doi:10.1007/978-3-540-92671-9

Houtzagers, G. (1999). *Empowerment, using skills and competence management*, Participation & Empowerment. *International Journal (Toronto, Ont.)*, *7*(2), 27–32.

Institute of Electrical and Electronics Engineers. (2011). *ISO/IEC/IEEE 42010:2011 Systems and software engineering - Architecture description*. Retrieved from <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=6129467&contentType=Standards&sortType=asc_p_Sequence&filter=AND(p_Publication_Number:6129465)>

Lankhorst, M. (2013). *Enterprise Architecture at Work - Enterprise Modelling, Communication and Analysis*. Springer. doi:10.1007/978-3-642-29651-2

Laudon, K., & Laudon, C. Jane (2016). Management Information Systems – Managing the Digital Firm (14th ed.). Essex, England: Pearson Education, Inc.

Liles, D. H., & Presley, A. R. (1996). Enterprise Modeling Within an Enterprise Engineering Framework. In *WSC '96 Proceedings of the 28th conference on Winter simulation*, Coronado, CA (pp. 993-999). 10.1145/256562.256882

McClelland, D. (1973). Testing for Competence Rather Than for "Intelligence". *The American Psychologist*, *28*(January), 1–14. doi:10.1037/h0034092 PMID:4684069

Mentzas, G., & Draganidis, F. (2006). Competency based management: A review of systems and approaches. *Information Management & Computer Security*, *14*(1), 51–64.

Merriam-Webster Dictionary. (2016). *Self-awareness*. Retrieved from http://www.merriam-webster.com/dictionary/self–awareness

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Monteiro, M. (2014). *Functions in an Air Unit*. Unpublished Master Thesis, Portuguese Air Force Academy, Sintra, Portugal.

Organizational Engineering Institute. (2016). *Organizational Engineering*. Retrieved from http://www.oeinstitute.org

Páscoa, C. (2012). *Design and Organizational Engineering of the Operational and Support Dimensions of an Organization: The Portuguese Air Force case study*. Unpublished Doctoral Thesis, Instituto Superior Técnico, University of Lisboa, Lisbon, Portugal.

Páscoa, C., Pinto, H. S., & Tribolet, J. (2011). Ontology Construction: Portuguese Air Force Headquarters Domain. In F. Harmsen, K. Grahlmann, & E. Proper (Eds.), *Practice-Driven Research on Enterprise Transformation. PRET 2011. Lecture Notes in Business Information Processing* (Vol. 89). Springer. doi:10.1007/978-3-642-23388-3_4

Pérez, A. G., & Benjamins, V. R. (1999). Overview of Knowledge Sharing and Reuse Components: Ontologies and Problem-Solving Methods. In IJCAI-99 workshop on Ontologies and Problem-Solving Method (KRR5) (pp. 1-15).

Pires, R. (2017). *Merit Evaluation Parameters*, (Unpublished Master Thesis) Portuguese Air Force Academy, Sintra, Portugal.

Portuguese Air Force. (2013). MCPESFA 101-1: Professional Profiles of the Air Force Personnel. Alfragide, Portugal.

Portuguese Government. (2014). Organic Law for the Air Force. Decree-Law 187/2014. D.R. 1 Série. 250, Lisboa, Portugal.

Quintas, M. (2016). *Transversal Concept of Competence as a Structuring Element of the Organization*. Unpublished Master Thesis, Portuguese Air Force Academy, Sintra, Portugal.

Quivy, R., & Campenhoudt, L. V. (2005). *Manual de Investigação em Ciências Sociais* (4th ed.). Lisboa: Gradiva.

Ribeiro, N. (2015). *Representation of the Qualification Concept in Business Processes*. Unpublished Master Thesis, Portuguese Air Force Academy, Sintra, Portugal.

Rodrigues, A. (2016). *The Architecture of Competencies as an Error limiting element and potentiator of the business processes effectiveness*. Unpublished Master Thesis, Portuguese Air Force Academy, Sintra, Portugal.

Rosenfeld, L., Morville, P., & Arango, J. (2015). *Information Architecture for the World Wide Web. 4*. Sebastopol: O'Reilly Media, Inc.

Santos, T. (2017). *A Organização On-line*. Unpublished Master Thesis, Education Department, Portuguese Air Force Academy, Sintra, Portugal.

Santos, T., Telha, A., & Páscoa, C. (2017). The Online Organization. *Procedia Computer Science*, *121*, 370–375. doi:10.1016/j.procs.2017.11.050

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

SINFIC. (2007). *Gestão de Competências: o Fundamento Para a Gestão de Talentos*. Retrieved from <http://www.sinfic.pt/SinficWeb/displayconteudo.do2?numero=24891>

Telha, A., Andrade, N., Páscoa, C., & Tribolet, J. (2015). Representation of the attributes of an organizational position in business processes. *Procedia Computer Science*, *64*, 570–577. doi:10.1016/j.procs.2015.08.567

Telha, A., Monteiro, M., Páscoa, C., & Tribolet, J. (2014). The Functions in an Air Unit. *Procedia Technology*, *16*, 212-221. 10.1016/j.protcy.2014.10.086

Telha, A., Quintas, M., Páscoa, C., & Tribolet, J. (2016). Transversal Competency Concept as a Structuring Element of the Organization. *Procedia Computer Science*, *100*, 658–664. doi:10.1016/j.procs.2016.09.208

Telha, A., Ribeiro, N., Páscoa, C., & Tribolet, J. (2015a). Representing of the "Qualification" concept in business processes. *Procedia Computer Science*, *64*, 180–187. doi:10.1016/j.procs.2015.08.568

Telha, A., Rodrigues, V., Páscoa, C., & Tribolet, J. (2016a). The competency architecture as error limiting element and efficiency enhancer in business processes. *Procedia Computer Science*, *100*, 665-670. 10.1016/j.procs.2016.09.209

Tribolet, J., & Magalhães, R. (2007). *Engenharia Organizacional: das partes ao todo e do todo às partes na dialéctica entre pessoas e sistemas*. Ventos de Mudança.

Uschold, M., & Gruninger, M. (1996). Ontologies: Principles, Methods and Applications. *The Knowledge Engineering Review*, *11*(2), 93–136.

Vicente, D. (2007). *Towards Organizational Self-Awareness: A Methodological Approach to Capture and Represent Individual and Inter-Personal Work Practices*. Unpublished master thesis, Instituto Superior Técnico, Lisboa.

Zingheim, P. K., Ledford, G. L., & Schuster, J. R. (1996). Competencies and competency models: Does one size fit all? *ACA Journal*, *5*(1), 56–65.

This research was previously published in the International Journal of Human Capital and Information Technology Professionals (IJHCITP), 10(1); pages 55-75, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 5

Organizational and Social Implications

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 67
Contemporary Change Management and Leadership in Local and International Businesses

Aytaç Gökmen
Çankaya University, Turkey

ABSTRACT

Organizational change is to transfer the organization from its current position to the desired future state. This process involves the differentiation of the activities, processes, structure, and targets of the organization. It is significant for an organization to decide where it is supposed to be in the future and to comprehend how to get to that new status-quo. Increasing globalization, fast technological changes, necessity of a well-trained labor force, changing social and demographic structures have intensified the competition and organizational change has become inevitable. The elements of an effective change process are openness to change, willingness of the personnel, flexibility, adjustment capacity of the business, optimism, and effective planning of change. The change process affects the organizations at structural, managerial, and individual basis as a result of the success of the change process.

INTRODUCTION

Organizational change is a process that is mostly difficult to manage, and which could be negative and destructive with regards to its affects. However, it is indispensable for businesses to change their structures and processes in a dynamic business environment with respect to market and economic conditions and also local and international customer needs, expectations and demands in order to adapt to the environmental change. In the new millennium, the obligations to be achieved by a business have diversified considerably. Thus, organizational change is an important tool to respond to the altering conditions. Organizational change is a process enabling the local businesses and international businesses to gain flexibility, competitive power and agility which are essential for organizational success. These are the

DOI: 10.4018/978-1-7998-7297-9.ch067

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

also the key issues of becoming a prominent enterprise in the business environment in both national and international terms. However, the organizational change issue might be hazardous and could lead to stress, unemployment distress, anger, displeasure, conflict, resistance to change, job dissatisfaction, poor performance, absenteeism and high rate of labor turn over when directed unsuccessfully (Safar et al., 2006; Doppelt, 2017).

21st century is the age of globalization. Globalization refers to the increasing convergence of national economics and declining worldwide commercial and investment barriers. In this sense, the agents dominating the global business arena emerge as multinational businesses (MNBs) which transcend borders to make investments. MNBs possess tremendous financial, human, knowledge, know-how, technological and managerial resources. Therefore, it is just natural for them to regard the goal business arena as their filed of interest. However, when they do business on the international scale, they must understand and adopt to the international market place very well. This could be defined as thinking globally and locally but acting appropriately. Therefore, any firm doing international business or wishing to do international business must comprehend situations in the local and international markets thoroughly. This includes having a profound comprehension of cultural, economic, financial, commercial, technological, legal and political parameters as well as defining and differentiating firms-specific strategies, policies, goods and services according to the environment in which a firm is operating. Therefore, it is not possible to act with only one product in a national or international market. It is not possible to perform the strategies and tactics of a business with only standardized goods, services and planning. Furthermore, if a company aims at sustainable successes and development, it has to change continuously. This involves the change in its structure, processes, human resources, improving knowledge, experience and technology, differentiating goods and services in accordance with the expectations, wants and demands of consumers as well as the differentiating parameters in. business environments. Yet, defining the need, process and execution of organizational change requires the guidance of an agent who stands out as a leader. A leader is the one who initiates the change process and motivates the personnel to take action and finish their duties successfully. A leader is the one who can influence the other to make the best of their effort. This requires different motivations in local and international conditions. Therefore, the aim of this study is to define the importance of the thriving change process, how to turn it into a successful one and define the role of the leader in this process with respect to local and international businesses.

AN OVERVIEW OF THE ORGANIZATIONAL CHANGE PROCESS

The organizational change process is a complex one. Organizational change is to transfer an organization from its current situation to a desired future situation in order to accomplish efficiency and effectiveness. Organizational change stems from the renovations within the environment that an organization tries to survive and prosper in. No business is established with a predefined time frame. Every business is intended to survive forever. Nonetheless, no business can stand still forever and survive too. So, the issue of change is both a need and a necessity for any business, no matter whether it operates on local or international scale. Moreover, as to remain up-to-date, competitive and innovative every business is to change its structure, processes, organizational commination system, cultural variables, statuses, positions, duties, liabilities, strategies, tactics, plans and policies. This would not only make a company an efficient and effective one with respect to accomplishing its goals and targets, but also a profitable

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

one with the capacity of responding to consumer expectations properly (Boshoff, 2005; Welford, 2006; Doppelt, 2017).

A well-known name on the subject of change is Kurt Lewin. Lewin's change process involves three steps as unfreezing, action and refreezing which is to overcome the existing mind-sets, bypass defense mechanisms and create a new equilibrium. This is called the Planned Change. Human nature is mostly resistant to differentiate, snice the status quo is always preferred. People are not willing and akin to abandon their status quo. A status quo is a situation in which a human being is used to survive. When a change agent or a manager spoils the status quo, an individual resists. That's why, within the Planned Change process, the intention is to break the patterns within the mindsets and create a brand-new equilibrium to transfer an organization from the current situation to desired future state (Boshoff, 2005; Welford, 2006; Burnes, 2004).

The process of change in organizations could be a problem-solving process. It could also stem from any opportunity that exists in its environment. Moreover, environmental factors such as economic, financial, cultural, commercial, political or legal factors could stimulate and require change in a company. When there is a good opportunity such as a developing market or increasing consumer demand in another host market, this requires a company to take action in the international market place. Th company may need to increase its production capacity, employ more personnel, use a new technology or differentiate its products for the consumers in the new host market. These issues all compel a business to change its strategy and policies in order to respond to the opportunities in the new host country market. The necessity of change could result from the business environment such as changes in the law, political atmosphere or business cycles in both the local and international market conditions. Laws can force companies to differentiate their products such as making them more environmentally friendly. The replacement of a political leader with a new one can affect the whole economic, financial and commercial order, in turn these impact on all companies whether local or international to apply a compulsory change process in their structures. Therefore, one can claim that the process of change can result from internal and external factors which affect a business or opportunities in the domestic or international market place. Moreover, the process of change can be triggered as a result of emerging issues in a company. In this sense, change begins with the determination of the issue and investigation of the problem. Fundamental strategies to solve issues are to be signified, the most convenient strategy is chosen and applied, then the efficiency of the strategy is tested and final step is to assess whether the desired target is achieved or not (Çavuşgil et al., 2014: 46-48; Boshoff, 2005; Doppelt, 2017).

The elements to be changed could be sorted as organizational structure, processes, management style, leadership model, technology, products and personnel, but not only limited with these mentioned subjects. The organizational factors related to the process of change could involve the internal environment, the role of the management; investigation and evaluation of external environment, well-defined organizational mission and goals, strategic planning, defining the customer needs and lining up appropriate relations with the suppliers. Of all the organizational elements, organizational leader and management play important role in securing the organizational change. The responsibility of a manager is to act as a problem solver and a change agent. A manager or a change agent (leader) is the one responsible from changing the behavioral patterns, stressing the need for change, establishing the suitable conditions for change and implementing the necessary plans to implement the change process in an organization. Furthermore, an accomplished change agent constantly seeks chances to change, feels necessity for change and develops efficient change methods. However, it is imperative to consider the position of the personnel in the face of organizational change. In order to secure the continuity and success of change,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the involvement of the personnel in the process is substantial; because, people who assist the constitution of a concept shall have a strong belief in the process as well. Therefore, for the success of a change program, it has to involve management, organization and personnel at the same time (Boshoff, 2005; Elsmore, 2017; Callaly, Arya, 2005; Doppelt, 2017).

Globalization which could be defined as the convergence of national economic, elimination of the restricting conditions and the development in communication and transportation technologies have intensified the competition among organizations and entail the change of organizational structures and processes in order to adapt to their internal and external environments. Almost all of the organizations have become vulnerable to environmental trends and customer demands as well as it is imperative to alter the organization in order to secure efficiency, competitive strength, fast communication and flexibility. Thus, this sort of organization patterns enables administration to decide and transfer data quickly in flattening and lean organizations. Organizations with rigid structures should be a matter of past. So, organizations with sound technological fundamentals, customer orientation, highly skilled workforce would be more competitive in the global market, if they sustain organizational change continuously (Gratez, Smith: 2005; Callaly, Arya, 2005).

Another important factor affecting the change process in businesses is knowledge economics. However, creating a business that is efficient in terms of structure, strategy, processes, capacity, personnel abilities, leadership, cooperation and joint values entail a detailed restructure process. Since, an organization is an agency where people unite to integrate their knowledge and abilities; then, those abilities and knowledge shall be interchanged in order to ensure efficient organizational change process. Benefiting from knowledge, human resources, technological synergy and organizational solidarity are crucial during positive change management. Utilizing these synergies building factors enable organizations to attain success in their turbulent environments. Furthermore, delayering, downsizing, restructuring, reengineering, slimming, contracting, flattening and delegation of authority are the methods that could be used in the organizational change process. Organizations achieving to benefit from these methods could perform the change process efficiently in a flexible and innovative manner. Since the change process is executed in a complex and turbulent environment, it is considerable to develop a core competence to differentiate the organization from other organizations too (Gratez, Smith; 2005; Boshoff: 2005; Elsmore, 2017).

SOURCES OF INERTIA AND FACTORS STIMULATING CHANGE IN LOCAL AND INTERNATIONAL ORGANIZATIONS

Organizational change is to transfer a business from one state to another desired status in order to accomplish the organizational goals and objectives as efficiently and effectively possible. Organizational change encapsulates to alter the scope and goals of the organization. The scope of change differs in a wide range such as change in procedures, entry to international markets, merger and acquisitions, joint venturing, restructuring and etc. Factors influencing organizational change are as openness to change, personnel support (whether the personnel resists the change or not), careful implementation (applying the change process by creating a new and harmonious organizational environment and atmosphere which are conducive to development) as well as ability of adaptation (differentiating and adjusting organizational elements to the new equilibrium), flexibility (ability to adjust new conditions and organizational components agilely), optimism, well-planning of change process and tendency to change (how much an

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

organization and its individuals are akin to accept a new status quo) (Kearney, 2018; Tan, Tiong, 2006; Karp, 2006; Reynolds, Vince, 2017).

Organizations facing change with an open and positive manner shall adapt competition and altering market conditions easily. However, being open to change is not a common issue. Although, resistance to change is mostly a case related to an individual, there could also be a resistance in organization wide and group level as well. A solution for this resistance is to set up an appropriate organizational climate by establishing affective communication channels, informing personnel adequately, motivating personnel for change and preoccupying personnel as a part of the change process. That's why, it is considerable to establish a process that is akin to change. Thus, it is possible to say that organizations akin to change would be less resistive and adaptive to their environments (Welford: 2006; Tan, Tiong, 2006; Karp, 2006; Welford, 2006).

Resisting to change and exhibiting inertia are negative conditions hindering the change process in organizations. Inertia stands for a slow and unwilling change in organizations. Some sources of the organizations are collected over the years such as assets, technology, experience, human resources, well-known products and tacit knowledge as well as are used to create an efficient organizational structure and business processes. Yet, a structure that becomes too large could also become too clumsy. For, large structures are difficult to change and could be resistive too. It is easier to convert above mentioned sources into cash by current and established ways of doing business. Moreover, changing the structure of an organization is to differentiate the situation and could also mean the loss of some of the sources as technology, experience, human resources, trademarks, patents, copyrighted materials and tacit knowledge. Furthermore, if the change process is like a radical one like the business process reengineering (BPR), radical changes fail to positively affect a company and its personnel. For instance, when the name of a company changes or modifies as a result of a radical change process, merger or acquisition, the change process could lead to inertia, since a new company would emerge and the network of the firm can alienate the business in its new form. A company's name, logo, trademark, products represent a status quo and related parties would not want to lose them. For example, when the pc branch of IBM acquired by the Chinese firm Lenovo, the aim was to obtain a company with a well-reputation, distribution network and consumer portfolio. Yet, converting the company to a Chinese one was not easy and caused slight inertias (Kearney, 2018; Hannan, Freeman, 1989: 72- 74; Ahrne, Papakostas, 2001).

The internal environment of an organization could be a source of inertia and inflexibility. Rules, policies, decision making styles, communication and inter-organizational relations could also bring about inertia and resistance to change. Members of an organization could have a certain understanding on specific issues and would not abandon their existing way of doing business in an organization. When the members of an organization would not abandon certain decision-making styles, authority, rules and policies, it is clear that this issue can lead inertia and resistance to change (Ahrne, Papakostas, 2001; Fligstein, 1991: 312-313).

Yet, another source of resistance to change and inertia is not having the ability to perceive new things and act quickly. This is related to having a need for change or not and acting rationally or not. Organizations shall have personnel who has a good perception of the business environment and comprehend the changing conditions around the business quickly. It is sometimes a matter of creating and sustaining competitive advantage to specifically perceive what is changing around the business and take action right away (Reynolds, Vince, 2017; Perrow, 1986; Ahrne, Papakostas, 2001).

Implementing the change process in an organization involves the positive tendency of the personnel. Acquiring the support of the staff at all levels simplifies the change process for managers and leaders.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sometimes, the administration would not inform the staff about a forthcoming change course. Shall the staff be not informed about the change decisions good-enough; mistrust, inertia and resistance against senior management may emerge. However, the more staff believes in the change process and is informed enough on it, the more they would be willing to participate in the implementation phase. If the change is exercised in an environment that has an appropriate organizational climate, then this would give an impetus to the process (Welford: 2006; Tan, Tiong: 2006).

Harmony and flexibility are two factors which are necessary to maintain and conclude the change process. Harmoy is how much the members of an organization can have an agreement on an accord. Flexibility is the litheness of how much an organization can restructure itself according to altering internal and external conditions. In today's highly competitive environment, businesses can only survive with dependable, flexible and adaptable structures; because, businesses that are slow in adaptation shall cease to end, on the other hand, business akin to alter may predict the conditions in the competitive environment. Google is a good example of a flexible firm. The structure, decision-making processes, allocation of authority and cooperation mechanisms make up a good and flexible company in Google which guides it to agility, improving consumer satisfaction and enhancing competitive advantage. Flexibility and adaptability requires a business to respond the ever-changing conditions in a market within an acceptable period of time and to adjust the goods and services to customer demands and expectations. Therefore, a business that is able to adjust itself to the market conditions, would work competitively. For instance, changing the target market and mission of an organization harmoniously with an environment. Flexibility is to adjust one organization's internal structure according to the environmental conditions. For example, adjusting the human resources with regards to current necessity is an instance of flexibility. Moreover, creating an optimistic and positive atmosphere by senior management, promoting and supporting the change process shall yield to the successful aftermath; for, organizational change brings about distress and reluctance. Yet, a positive atmosphere in an organization simplifies the process (Kearney, 2018; Reynolds, Vince, 2017; Welford, 2006; Tan, Tiong, 2006; Karp, 2006).

However, even though the aim of change in an organization is to achieve effectiveness, some of the plans for change could fail to succeed for not being able to receive the support and active participation of the staff. Whereas, change process shall be devised by taking into consideration of the expectations and demands of organizational members. On the other hand, the change process should involve communication, participation of the staff, transition plan and training of the human resource too (Welford: 2006; Tan, Tiong: 2006). Common factors inducing change and inertia in an organization are stated in this section. The classification of the change process is defined in the next section of this study.

CLASSIFICATION OF THE CHANGE PROCESS

The operation of change of a business is to adjust its organizational processes, structure, and capacities in order to harmonize the organization with its environment. Change is an ever-existing feature of an organization both in the operational and strategic levels. Nevertheless, it bears great a significance for a business to decide its future status and goals as well as to determine to how to attain those goals. Factors such as the intensification of globalization, fast changing technological innovations, more competent workforce, altering social and demographic inclinations, intensified competition compel organizational change and renovation. The necessity for change and renovation is usually not foreseen and thus is triggered by reactive, ad hoc impetus and organizational complexities. Although there is a considerable

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

necessity for change in today's ever-changing and competitive business environment, the rate of success is not likely to be 100% in all cases. Thus, conducting the operation of change is not a simple issue. Furthermore, this complex issue of the classification of change is defined in the subsequent paragraphs (Todnem By, 2005; Hudescu, Ilies, 2011; Bruch et al., 2005).

- **Change With Regards to the Rate of Emergence:** The organizational change theories to be examined under this heading state that should organizations change constantly, they might not be able to be efficient or have high performance. According to this opinion, organizations need routines in order to be efficient. However, when the theory is examined from a different point of view, after some time, change itself becomes a routine and change becomes a regular response to both the external and internal environment. Types of change to be investigated under this heading are discontinuous change, incremental change, bumpy incremental change, continuous change and bumpy continuous change (Todnem By, 2005).
- *Discontinuous change* expresses the quick variations in organizational structure, strategy or culture. These quick variations may originate from both internal and external concerns. Discontinuous change happens once in long time intervals and is followed by a long consolidating and stabilizing periods. Therefore, discontinuous change refers to making organizational changes within long standing intervals. For example, reframing, restructuring, revitalizing and renewing an organization after a long period is discontinuous change. A response to this sort of change is to change gradually, that is *incremental change*. An example of incremental change is to streamline, optimize, reengineer the company and achieve cost reduction and reliability. Toyota Inc. is a corporation that innovates and applies incrementally and continuously (which is defined in the next line). *Continuous change* is to have a basic changing pattern in an ever-changing surrounding. On the other hand, incremental change means every part of the organization deals with its certain problems incrementally. According to the supporters of this view, change can be best achieved by alternations in every department and part of the business consistently without striking radically. Incremental change evolves in a systematic and predictable pattern (Bruch et al., 2005; Todnem By, 2005).
- **Change With Regards to How it Emergences:** When change is examined from the point of view of how it emerges, it could be sorted as planned change, emergent change, contingency change and choice change. However, the most known ones are planned and emergent change and it is generally accepted that planned change is the most popular one and lines up the factors of change specifically (Boshoff, 2005; Todnem By, 2005; Welford, 2006).
- *Planned change* was first introduced by Kurt Lewin. According to this concept, in order to complete the change operation successfully and alter behavioral patterns, former behavioral patterns must vanish. As for Lewin, an accomplished change operation involves three steps: First step is unfreezing and involves tackling inertia and dissolving the existing mindset. Second step is to transfer the organization to the targeted level. And finally, last step involves freezing which refers to preserve the status-quo and prevent from returning to previous levels. This model reveals the fact that in order to secure a targeted new status quo, previous status-quo must be removed (former structure, management and culture to be oppressed) and new status-quo must be reserved without returning to previous stages. Planned change is a forecasted change and is proper in a non-turbulent organizational environment; but, in a fast-changing surrounding, its positive effect is a question mark, sine the organization is affected by external forces too. Therefore, planned

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

change is adequate in constant times, whereas in a fast altering surrounding it may not be likely to have a positive effect since there might not be time for detailed planning. Yet, another criticism for planned change is that planned change requires to fallow certain stages in times of change. Yet, in a period like emergency, it is imperative to act fast and an implementation like planned change would be inadequate and slow. Last criticism for planned change is whether the change would be accepted voluntarily by the staff or not. An instance of planned change is for a software company could be to redesign the structure and reallocate the sources in order to restructure the productivity and business processes, establish an intelligent cloud platform and computer system as well as supporting this process with staff training (Boshoff, 2005; Todnem By, 2005; Welford, 2006; Burnes, 2004).

- *Emergent change* was devised in response to planned change. Planned change is a top-to-down implementation of change. Furthermore, in emergent change, the change process occurs down-to-top direction. According to this opinion, the change process could necessitate fast and momentous implementations. For, the senior management may not be able to comprehend and provide solutions for concerns. It shall be reasonable to establish the necessity for change at the bottom of organization and begin implementation. With regards to emergent change, it is to adapt the organization to its turbulent environment continuously rather than adopting a linear change. Emergent change occurs with the interaction of factors related to the internal and external environment of the organization. Also, emergent change enables organizations to serve as learning originations, since the structures of the businesses adapts to altering, unpredictable conditions constantly. In addition to that, since organizations adapt the altering situations continuously, the change process would be implemented more efficiently in emergent change in comparison to planned change; because, in order organizations to be successful to adapt complex and turbulent environments, the behavioral patterns of the staff of organizations should be congruent open systems. Thus, the system of the organization should be devised in order to prevent inertia in strategies, structure, staff and organizational culture. Moreover, an efficient change operation depends on benefiting from appropriate opportunities rather than always implementing detailed and highly planned operations. The most critical property of emergent change is to be prepared for all sorts of unexpected change concerns and involves dynamic processes. Emergent change simply realizes in biological and social systems when the underlying factors have accomplished a new order which leads to new behaviors. Facebook and Twitter are contemporary examples of emergent change which emerged as a new worldwide way of communication. They have developed quickly and become an integral part of our lives (Brotheridge, 2005; Todnem By, 2005; Burnes, 2004).

Furthermore, a model for emergent change could be as (Brotheridge, 2005; Todnem By, 2005; Burnes, 2004);

- Analyzing the reasons for change,
- Determining a joint vision and mission,
- Creating a compulsory feeling of change among the staff,
- Support of a strong leader,
- Influencing support of the staff for the change policy,
- Formulating a change plan,
- Devising the new structure,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Involving the staff in the process and informing,
- Stabilizing change and institutionalization.

Yet another classification for the organizational change is the *contingent change* is to adapt an organization in accordance with current conditions and situations. Contingent change does not seek the best change operation for an organization; but, it seeks to devise the best change operation for every organization. Thus, the performance and structures of organizations vary at each organization separately. For example, the contingent change in organizations is aimed at empowering management and subordinates to constitute particular integrated solutions to solve business challenges and meet the expectations of clients incessantly. *Optional change* is to maintain a change process according to certain and optional factors. According to this view, it is considerable to implement change voluntarily, not by enforcement. For example, a multinational business making a differentiation in its products for a certain host market rests on its consideration (Brotheridge, 2005; Todnem By, 2005).

IMPLEMENTATION AND EFFECTS OF CHANGE IN LOCAL BUSINESSES

In order to execute a successful change process, management of organizations shall take into consideration the former, current and later situation of individuals, groups and organizational structure. By taking into consideration the former, current and later situation of individuals, groups and organizational structure, the administration could identify the factors that might favorably or unfavorably affect both the organization and staff. The external factors that could affect the organization in this process are local market conditions, business cycles, local culture and customs, domestic socio-economic factors, government policies and legal regulations and etc... On the other hand, internal components are the staff, organizational structure, management characteristics and inter-group relations. Conditions to begin the change process successfully are (Fisher, 2005; Brotheridge, 2005);

- Full explanation of the reasons for change. It would be appropriate to explain the reasons for change to the staff in order to overcome the resistance,
- Predicting the expectations of the staff,
- The involvement of the staff in the process to facilitate the operation; because, people would support causes which they actively participate in,
- Organizational vision should be explained in detail in order to unveil the future state, structure and processes of the organization,
- A road map clarifying the responsibilities of the staff should facilitate to establish behavioral patterns,
- Preparing transition plan from current situation to future potential situation would facilitate the staff to act rationally,
- The staff should be a part of the change operation possibly at all levels.

Beginning a change process is a complex operation that has some grades. The process shall be executed with great care since the former structure is to be replaced with a new one. Moreover, the change process would have various effects on the organization in the transition period and the effects might be as follow (Collerette et al., 2006; Smollan, 2006);

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- The change process could make individual, social and structural effects on the organization,
- The staff would learn the reasons for change process that affect their status-quo,
- The staff that feel ignored might think that they are not considered and act defensively,
- Since the change process could influence each and every level of the organization technologically, socially and individually, it might bring about uncertainty,
- The staff could be in a state of unwillingness, distress and disinclination in transition period,
- Transition stage is a learning phase where efficient leadership is compulsory,
- The staff that is under stress in the change process may act dishonest, furious and unfaithful,
- The quality of goods and services might be negatively impacted during the transition operation,
- Failing to determine priorities of the organization and staff could affect the organization inversely.

The operation of change is such an arduous and tough period. Thus, supportive measures should be taken and implemented during the operation of change. Some precautions to back up the process of change with respect to local business are (Collerette et al., 2006);

- Informing the staff regularly,
- A group of specialists to monitor the process of change could be summoned. These specialists should be from the domestic business environment to know and estimate local conditions better,
- Efficient leadership of senior management,
- Regulative reviews of senior management,
- Proper consultation of senior management to the staff during the operation of change,
- Individual support to the negatively influenced staff.

If the process of change is concluded successfully at the end of the progress, the organization, groups and individuals strive to establish a stable structure with new status-quo. However, at the end of the process, this new status-quo could specify various effects on the structure, staff, and processes. These effects and the consultation that is to be managed are as follows (Collerette et al., 2006; Smollan, 2006);

- Since the stress and burn out could affect the personnel adversely, the assistance of a consultant could be needed,
- The personnel might feel disqualified in the new system. Therefore, in order to secure the adaptation to the new system supplementary training shall be provided,
- New system may involve completely new working conditions. The staff should be promoted to share their knowledge and experience to create a learning organization; because, the new system may involve a delicate structure and individual problems could deteriorate the operation of change. Thus, senior management should strive to constitute a positive organizational climate,
- The operation of change may involve methods such as rightsizing, restructuring, reengineering or downsizing, all which might have adverse effects on the organization. The staff might be skeptical of losing their jobs. Therefore, the personnel should be informed properly,
- As the new stable situation has removed the former status-quo, assistance of an external advisor may necessitate,
- The new status-quo could entail new technology, management processes and structure,
- The supervision of the senior management shall always remain as a support for the staff.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THE LEADER'S ROLE IN EFFICIENT CHANGE MANAGEMENT IN LOCAL BUSINESSES

Creating an environment that is conducive to the process of efficient organizational change depends on some external and internal factors in the local business arena. In addition to this, the conditions in which an organization exists, differentiates the ability of the leader and management to intervene in the process of change. The leader and management shall have certain properties to influence efficient change operation both at the beginning, in implementation and also to conclude the process. The application of the change process in terms of a determined vision by an influential and persuasive leader and changing the organization's structure and processes is substantial. When faced a status necessitating change, the responsibility of a leader is to mobilize the staff in favor of the organization. Therefore, if the leader is to execute and willing to be successful at the end of the operation of change, one must bear the necessary leadership capacity. The structure, system and processes of a domestic organization is formed with the supervision and directives of the leader. If stated specifically, the leader of the organization should be the key person that directs the process of change. The influence of the leader also depends on how the staff regards him/her and whether the staff has faith in its leader or not. Leaders execute processes much better when the personnel have got faith in them, perform and adopt the directions of the leader with loyalty and confidence. Thus, the leader plans, organizes, leads, coordinates and monitors the process of change with the confidence derived from his personnel. Moreover, the leader shall constitute a structure and processes that could be absorbed by everyone in the organization; because, the factors and parameters might affect the organization both positive and negative depending on the capacity of the leader. So, at the inception of the of change process, the leader (Kavanagh, Ashkanasay, 2006; Smid et al., 2006; Elsmore, 2017):

- Shall demonstrate positive behavioral patterns,
- Shall prefer adequate managerial strategies to implement,
- Should influence the staff in favor of adopting the new structure, system and procedures,
- Must assume the key role in the operation of change.

The leader shall undertake the responsibility as a prime architect at the beginning of at the process to both initiate and structure the change mechanism. It is also considerable to involve all staff in the process. Only by this way, the resistance, inertia and conflict could be avoided in the individual, group and organizational basis. When individuals, groups and permanent systems resist to change in an organization, the capacity of the leader proves to be significant to find out an effective solution by also taking domestic conditions and environment into consideration (Kavanagh, Ashkanasay, 2006; Smid et al., 2006).

The operation of change affects the organizational processes, structure and mentality of the personnel substantially. Therefore, the duty of the leader is to supervise the change process in order to progress it as efficiently as possible. An organization's fundamental values and strategic goals influence the staff and their domestic environmental perception significantly. The recruiting and training of the new personnel after the operation of change and adaptation of the former personnel to the new structure are of the responsibility of the leader. Regarding to this, the process of change brings about uncertainty and distrust in the personnel and threatens their welfare as well. Thus, the negative effect of the operation of change on the personnel must be monitored and avoided by the leader instantly (Rowland, Higgs, 2005; Smid et al., 2006; Kavanagh, Ashkanasay, 2006).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The process of change is to adapt the organization difficulty in the local organizational environment and thus derives resistance as well. Therefore, the conditions, in which the personnel might resist during the operation of change, shall be examined thoroughly before the execution of the process. If the process not examined with regards to its significance, potential developments with respect to the leader could be (Rowland, Higgs, 2005; Kavanagh, Ashkanasay, 2006);

- Unfaithfulness against the leader and his implementations,
- Sentiments such as anger, conflict, absenteeism and wrath,
- Malfunction and inefficiency in the process,
- Involuntary and resistive action by the personnel.

Misperception of the personnel's behaviors and their motivation factors by the leader are also reasons for resistance to change; thus, this could cause an increase in personnel turnover for the reason of disbelief in management and leader. If the local job market is abundant, then the personnel turnover might increase. The staff that loses their positions and authority may feel insignificant. As a result, aversive behaviors and reactions of the personnel during the process of change could affect the operation unfavorably. Therefore, it would be quite beneficial for organizations and the staff to create a positive organizational climate by a leader in order to sustain the process positively; because, as for the personnel, adopting the new organizational structure, climate, management and processes would take time. Therefore, it is the leader's responsibility to involve, promote and motivate the staff in favor of the operation of change. In order to create individual trust and inclination, the leader shall be in contact with the personnel continuously and act as a transformational leader. Moreover, the personnel could adopt the new organizational order and a return to the former status should be avoided. Briefly, the liability of the leader is to promote and support the staff in the operation of change. Hence, at the end of the process, if the organization accomplishes its goals, this means to achieve the operation of change efficiently (Kavanagh, Ashkanasay, 2006; Elsmore, 2017).

The leader has a significant responsibility to conclude the process of change. It is important to initiate, implement and conclude the process of change in accordance with the goals and targets set before. This is similar to the planned change process. It is necessary to make sure that the firm would not return to the previous problematic stages, to differentiate existing mindsets and replace the mindsets with the new ones compatible with the new situation. It is also essential to ensure that new status quo is preserved strictly at the end of the change process (Boshoff, 2005; Welford, 2006). The nature of the international business, its differentiating characteristics and organizational change in the international context are going to be reviewed in the next section.

MANAGEMENT OF CHANGE IN THE INTERNATIONAL BUSINESS CONTEXT

International business is the sort of business that goes beyond the national frontiers. It involves importing, exporting, licensing, franchising, mergers and acquisitions (M&As) and foreign direct investment (FDI). International business has got a wide scope of interest. International businesses are significant organizations (including MNBs) which do business and make investments in numerous countries with their affiliates and subsidiaries. International businesses could have considerable sums of financial resources, technology, knowledge, know-how and managerial experience which facilitate them to act in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the world. International businesses are indispensable players of the world business forum and make their investments in many places. They do a substantial volume of business in the world that they have got a comprehensive influence in the global business arena and shape how the global business conducted. Moreover, international firms do not only impact on countries and globe by commercial and economic means, they also make considerable effect in the socio-cultural, political, legal and financial environments of host countries too (Harrison et al., 2000: 28-29; Taoka, Beeman,1991: 15-24; Leontiades, 1985: 3-6).

Every international business has got a distinctive capability which gives it an advantage over others and this capability can be utilized in different national markets. The distinctive assets enjoyed by international firms enable them to do business in numerous regions, encounter numerous experiences and modify their structures and processes accordingly. International businesses allocate their activities in the entire world so that they have got more commercial and investment potential in host country markets apart from where their headquarters are situated. International companies have value chains covering the world. They source inputs wherever it is the most convenient and sell their merchandises wherever it is the most profitable. Yet, in this process, they are subject to cultural, commercial, country and currency risks. That's why, it is very difficult for international companies to manage the process of change effectively for almost every national market where they do business stemming from country differences and the risks associated to do international business. Risks associated with doing global business and bringing about organizational change are presented in Table 1 (Wild et al., 2003: 21-22; Harrison et al., 2000: 29 – 30).

Table 1. Risks Associated with International Business

Cultural Risk	Country Risk (Political Risk)	Commercial Risk	Currency Risk
Differences in culture, Patterns of negotiation, Manners in decision making, Ethical issues.	Unstable politics, Laws not in favor of foreign businesses, Unreliable legal system, Corruption, red tape, bureaucracy, State intervention and protectionism.	Wrong and weak partnerships, Operational difficulties, Wrong timing of market entry, Intensive competition, False implementation of strategy.	Exposure of currency, Undervaluation of assets, Unequal taxation, Inflationary economic environment.

Source: Çavuşgil et al., 2014: 45.

Resting on the four different types of risk mentioned in Table 1, one can conclude that international businesses are supposed to do business and apply change management when necessary to avoid country-specific differences in every national market where they do business. Issues stated in Table 1 are the major sources of risk in international business which differentiate it from local business endeavors. For, today, organizations struggle in the global business arena where they must achieve and apply changes in manufacturing, technological development, marketing, promotion, global value chain activities, quality, cost effectiveness, managerial strategies, organizational structures, managerial issues and leadership as well. These items are the key factors which an international business utilize to achieve competitive advantage. Therefore, these factors must be managed effectively. When the change process is not managed effectively and properly in the global business arena, there is always a big toll that must be paid. For the executives of international businesses, fundamental reasons for initiating and dealing with organizational change process determine the success of international business operations and the steps to be taken in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

such a critical process could define the faith of an organization and its workforce. Moreover, when it is inevitable to make organizational changes within the structure, processes and scope of business interests, it is critical to preserve employee motivation and their commitment firmly regarding every level of the organization. Also, since there could be workers from various nations in an international business, the motivation of each worker could be different. It is also important to sustain the customer portfolio and profitability of the business as stable as possible since changing the status-quo would inversely impact on firm-specific stability (Sofat et al., 2015; Tran, Anvari, 2014; Ajagbawa, 2012; Luo, Jiang, 2014; Singh, 2011).

After defining the differentiating characteristics of international business, it would be convenient to review the change process with respect to the issue of international management. Therefore, change is indispensable for any organization whether local, international or multinational. The term change in international management refers to a variation in one or many premises of an international company in order to adjust and adopt new ways of doing business and/or internalizing new processes to secure and enhance competitive advantage in the global business arena where the conditions are different from local markets. The issue of change management in international business could be defined as the continuum of constant renovation in global organizations to improve the firm-specific structures and capacities to best cater the needs and expectations of internal/external clients of a firm and customers located in numerous markets in the world as well as taking different cultural, social, economic, legal and commercial issues into consideration. Such a change in an international firm should never be a coincidence of or a reflection to a sudden economic, political or financial fluctuation since, the management of change and constituting a new status-quo are not simple issues in global business. So, these factors must be taken into consideration profoundly by the manager/leader of an international business/MNB. For, international businesses are supposed to monitor the global business market continuously to follow up changes instantly. The international forces of organizational change could result from laws, regulations, political, financial, cultural, legal, ethical and governmental factors. Nonetheless, the internal forces of organizational change may originate from wrong firm-specific policies in different national markets, local and expatriate employment policies, false administrative mechanisms not compatible to the international environment and false product development schemes. Therefore, firms operating in international business are compelled to monitor and adopt to the global business place, no matter in which country or region the business operations are applied continuously. The supervision of the global business arena with respect to almost every culture, political, economic, financial and commercial issues are indispensable. In other words, the management of change is a prevalent topic which is always current and valid in international business. Therefore, monitoring and executing the organizational change in international business is transformational by its nature. The magnitude of the operations of the firm, how these operations are structured on an international scale, what strategies are appropriate and which change agent conducts the organizational change are critical factors in global business (Sofat et al., 2015; Valackiene, 2015; Tran, Anvari, 2014; Hudescu, Ilies, 2011; Luo, Jiang, 2014).

Organizational change is never easy. Whether it is a local or an international company, organizational change is not welcome by the staff. When individuals feel that they lose power, vested rights, status-quo, titles, prestige, etc, they would resist. The resistance could be at different levels respecting to local and international personnel. Yet, it is imperative to explain the local and expatriate personnel of an international business that organizational change stems from commercial, legal, economic and/or financial factors which the company can barely influence and the continuum of change would be in favor of them. Or, the organizational change could result from the proactive reasoning of executives to take measures

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

which could make a firm stronger in the future in various host markets. This is generally the case when the employees do not comprehend the intended reasoning of the organizational change. Resistance to change may intensify when the personnel of the international company feel that they will not be able to satisfy the requirements of the new status-quo. Therefore, executives of international organizations shall never disregard and underestimate the resistance to change as well as shall determine the fundamental reasons of resistance and apply the right strategy with the proper diagnosis. The reasons stemming from the facts summarized in Table 1 must be especially considered. Also, when the organizational change process is applied, there should be no discrimination related to nationality, gender, age and ethnics (Luo, Jiang, 2014; Sofat et al., 2015; Singh, 2011; Hassin, 2010).

The executive management of an international business shall closely supervise the change process. Board members and executives of an international corporation must be precise to decide what process, procedures, subsidiary or affiliate would be subject to change since the implementation of organizational change could cause extreme costs in organizations which may extend over borders. The focus of the process shall be oriented on the products (goods & services), cost, quality, technology and marketing issues since each of them differentiate in different country markets. Besides, any organizational change applied respecting to elements enumerated in previous line will be a long-lasting change in the organization. For example, differentiating the product, price, promotion and marketing processes for every national market. Therefore, it is essential to cautiously determine the marketing mix for every product. The change agent or the leader would be the catalyst in this process. Globalization and internationalization of firms compel them to innovate, invent and rapidly change in a constant manner. These are the issue that must be monitored by the top executives of international companies and MNBs (Luo, Jiang, 2014; Sofat et al., 2015; Martincic, 2010; Valackiene, 2015).

While the roles of the board members and the top executives are profound and they have significant responsibilities, the country environments that an international business operates must be considered, since the organizational change could be unavoidable for companies which do business in various country environments. Within the different country environments, the objective of the process is to adopt to everchanging consumer needs and wants as well as prevent the risks associated with doing global business. Conversely, the company may research the market and differentiate its products with a proactive rationale. Besides, the solution for optimal change management for international companies could be obtained with proper strategies for change, development of necessary skills and capacities as well as the application of convenient leadership styles. Global business requires sophisticated organizational structures, processes and strategies owing to its complex nature and expanding need for change. International organizations are supposed to follow and adopt to change to maintain competitive advantage. Also, the organizational change is substantial for international companies to fit their internal, external and host country environments. As to adopt to such complex situations, organizations are supposed to consciously rethink current situations and devise plans for short, middle and long terms. These plans shall not be only limited to organizational processes, strategies or structures, but also involve product differentiations, pricing policies, investment opportunities, market niches in different countries, amendments in vision and mission statements, organizational rules, new M&A policies and utilization of investment opportunities in new markets (Luo, Jiang, 2014; Sofat et al., 2015; Singh, 2011; Hudescu, Ilies, 2011).

The organizational change process could have negative mental repercussions on the staff. Organizational change in international firms may create a psychological reaction and opposition by the personnel for altering status-quo. It is more difficult to create a status-quo in international business than domestic business, since the conditions are more complex. When organizational change is applied in an interna-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tional business as well as in its subsidiaries and affiliates, the impact of ambiguity, stress and fear might influence organization members pervasively. The experience of uncertainty and disorder in the process of change might stimulate anxiety, frustration and mental discontent. Local personnel of a corporation might be negatively affected by the change process much more with respect to expatriates in terms of downsizing, rightsizing, restructuring and reengineering of the business structure, processes and asset allocation. Such developments may prompt distrust and absenteeism as well as weaken organizational commitment of local staff. In order to avoid such distress in an international organizational change process, senior executives shall define and communicate the reasoning of change and its expected outcomes not only to the personnel, shareholders and the board members, but also to the closely related stakeholders as its laborers and lower level managers to sustain cohesion in the company. Considering different cultural norms, values, styles, customs as well as local legal, commercial and financial conditions are essential. Henceforth, it is imperative to deal with the emotional situation of employees, especially the local ones. To deal with the emotional situation of employees, a change agent should follow the emotional disparities of employees and assist if necessary; devise strategy to manage the emotional state of employees in a sweeping change process; attempt to neutralize employees in the process; and continuously communicate with employees to inspire enthusiasm, trust and aspiration among the personnel (Luo, Jiang, 2014; Tran, Anvari, 2014; Hudescu, Ilies, 2011; Sofat et al., 2015 Valackiene, 2015).

There are many developments in field of technology and transportation which compel businesses to rethink their organizational structures and status. Intensifying global rivalry among international and multinational businesses, immense developments in technology, spread of communication technologies all over the world, especially the Internet, and business cycles in national economies continuously compel businesses to innovate and fine-tune their organizations for survival and accomplishment. As to respond such an everchanging international business environment, change agents and particularly organizational leaders should address the issue with outmost care. Nonetheless, affective organizational change management entails a change agent to have the knowledge and experience of individual and organizational psychology, finance, accounting, economics, consumer behavior; since, organizational change would first impact on the internal environment of businesses, then its external environment. When such changes and developments are accommodated to the businesses and organizational structures with efficient change processes, the outcome would be favorable (Hudescu, Ilies, 2011; Hassin, 2010; Ajagbawa, 2012; Tran, Anvari, 2014).

Organizations dealing with international business mostly operate in turbulent business environments in various countries or regions. This substantiates the importance of monitoring culture, politics, economics and legalities in general as well as employee motivation and retention in particular. Therefore, organizational change must be addressed with great care and a cautiously devise plan shall be executed in the process. Within the change continuum, some issues to be considered in the change management of international business are as follows (Tran, Anvari, 2014; Martincic, 2010; Hudescu, Ilies, 201; Hassin, 2010; Ajagbawa, 2012; Singh, 2011):

- It is necessary to constitute capabilities to share experience among the employees and encourage cooperation along different cultures and nationalities in the company. The objective shall be to share knowledge and skills to establish enhanced motivation and organizational commitment,
- The process of change requires conscious leaders who can act as firm change agents. Such change agents are supposed to encourage innovation and renovation, obtain the rapport of both local and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

international employees to particularly cope with resistance and employee morale disruption. It is essential to propagate the positive outcomes of the new system after organizational change,

- The objective of the change process should be adopted by company personnel to build cohesiveness and promote cooperation,
- A rational affiliation ought to be constructed between the initiators of change and the ones who are against. Establishing well-structured relation with company personnel and communicating the objective of the operation could be quite beneficial,
- It is considerable to ensure the loyalty and commitment of employees to execute effective change management; because, an organizational change process which lacks coherence might fail, particularly in a host country or another national market,
- The more employees know about the change process and its goal, the more they would be willing to cooperate or the less they would resist. Yet, this should be defined in an international language for simplicity and clarity,
- Understanding cultural traits of employees is crucial. Culture is composed of values, beliefs, customs, language, religion and related ways of life which distinguishes a group of people from others. Culture is the recognition of a mindset. Moreover, comprehending, internalizing and institutionalizing various cultures, combining them in a pot and establishing a joint organization-wide culture can enable executives to clarify the situation for the whole staff,
- The ultimate task of the organizational change process shall be continuous change to constitute an efficient and advantageous framework which is conducive to permanent adaption to any environmental circumstance.

The global business arena involves a turbulent, dynamic and perpetually changing and challenging environment involving differentiations in commercial conditions, customs issues, exchange rates, economic subjects, etc. Therefore, the process of change should be an incessant one. The effective change management in an international organization under global issues and complexities compels international companies to keep the business alive and sustain its continuity along with a never-ending organizational change process. Moreover, change management is not a one-time process. Change management entails reassessment of the progress in various markets continuously and unceasingly. Organizational change in an international business mostly involves a wide initiative, redefinition of functions and duties, reallocation of resources and assigning of managers/leaders. Organizational change and management in international companies requires a holistic comprehension of processes and optimal combination of cultural differences. Nevertheless, the fundamental objective of the change initiative is to reinforce the structure, processes, positions and assets of a corporation and to achieve successful business continuity over the long-run. As to accomplish the permanency of a firm in the international business arena, the continuum of organizational change should comprise of constituting, applying and maintaining ideal change projects to procure competitive advantage over international rivals. In addition to this, securing flexibility and agility is essential. While the sustainability of a successful business is priority in the organizational change process, conservation and further improvement of company trademarks, fame and efficient value chain are also essential. Financial losses ought to be avoided, current and potential customers shall be preserved. Henceforth, the sustainability of the success and incessant adjustment of an international company to its environment shall be the main intention (Valackiene, 2015; Savolainen, 2014; Hassin, 2010; Ajagbawa, 2012).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The international organizational change mechanism is supposed to comprise of its subunits in a holistic manner. The change continuum should be implemented to reorganize, fine-tune, reorient and adjust to conditions pertinent to a company. The wider purpose of organizational change in international companies may comprise of (Ajagbawa, 2012; Valackiene, 2015):

- A competitively intended strategic initiative,
- A log lasting life span which would never end,
- A knowledge-oriented learning process in which the acquired data and knowledge would be utilized in further endeavor,
- A far-reaching and long-term oriented leadership initiative relevant to global business.

The intention to positively impact the process of organizational change in an international company can involve the following items (Ajagbawa, 2012; Martincic, 2010; Gillam, 2013; Valackiene, 2015; Singh, 2011)

- Mission and vison statements could be changed according to the new status-quo,
- Long-run plans and strategy can be rearranged,
- Goals and performance objectives and its evaluation criterions should be redefined,
- Organizational culture ought to be restructured in order to encapsulate both local culture and international customs,
- Duties, skills and tasks of employees should be refurbished,
- Organizational structure, processes, titles, resources, positions and duties shall be developed to adjust any change in the external and international environment almost instantly,
- It is imperative to constitute a comprehension among the staff for the necessity of change and developing the vision accordingly,
- Change agents, especially the leader, act as role models and create a framework to put the system of change in an order and design an adaptive structure,
- Handling the phase of transition is critical in the process of change; because, parties affected by the progress might display negative attitude and resist. Therefore, it would be rational to have contingency planning along with continuous and adaptive plans,
- Measures must be taken to avoid conflict between and among the local and expatriate staff as well as the personnel and organization,
- The impact and reflection of the organizational change process must be assessed in order to evaluate whether the change process matches with the objectives or not,
- The final of a successful change process is not an end, but just the beginning of a new era. Therefore, one should never forget that what does not only change is the change process of itself. Therefore, a successful organizational change must be reinforced with further adoption schemes.

Organizational change is very important for businesses to renew their structures and build optimal means through success. This issue is also considerable for international businesses since they operate in foreign environments and global marketplace characterized with various cultural, legal, political, economic and financial variables. Since every national market is different than the other ones, it is essential for international firms to differentiate and attune to new market conditions. This means that an international or multinational company must do its best to get accustomed to new consumers, laws,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

regulations, customs, employees, rivals, local conditions and many other variables. Yet, the management of the organizational change process is also important. Therefore, the optimal and effective leadership of a change agent is indispensable to fulfil the differentiation and adjustment operations.

ORGANIZATIONAL CHANGE MANAGEMENT AND LEADERSHIP IN INTERNATIONAL BUSINESS

Organizations do not exist alone. They are a part of a quickly changing globalized world. When the situation is considered regarding international businesses, they operate in a wider, more active and more dynamic business world. Today, global business environment compels businesses to constantly change and adjust to fast developments in technology, communication means, laws, regulations, local and international politics, sophisticated customer preferences from different parts of the world, competitive global rivalry and shareholder expectancies relative to increasing volume of dividends. Therefore, in order to adapt to the continuously changing business world, international organizations keep changing on a consistent pace. Actually, creating and sustaining this ability is the source of survival. This stands for rivaling in numerous scopes of business and industries in different countries. So, international businesses are supposed to adjust their subsidiaries and affiliates to local conditions in host countries. This entails a polycentric managerial orientation which champions visionary leadership to adjust the company to host country local conditions as well as to the differentiating customer wants and demands. Henceforth, the means to accommodate the differentiating demands and expectations of customers is to look for distinct solutions for every host market and search optimal diagnosis for transformation in international businesses with the effective leadership of an executive. Effective leadership in organizational change shall adjust company policies, procedures, products, processes, managerial orientations and mentality, employee skills and performance, organizational culture and strategy to global and/or host country market conditions. The aim is to find out and establish the most appropriate and competitive organizational status-quo in terms of international business (Hassin, 2010; Quinn, Quinn, 2016; Savolainen, 2014; Kostovski et al., 2015; Martincic, 2010; Gillam, 2013).

The agent of the organizational change process should be a competent leader with global point of view who can facilitate the organization to gain and enhance the necessary capacity to transform the firm to a new status-quo in which it can act and use its resources more efficiently than its competitors. The leader's role in a foreign environment is especially emphasized and critical since the accomplished leaders should create a global mindset, common culture and joint organizational climate among the staff to constitute cohesiveness. Furthermore, leaders of organizational change in international businesses can develop their skills with global point of view by visiting the subsidiaries and affiliates of a parent company, corporate training, applying teamwork with employees from different nations and gaining experience in different international companies. Henceforth, successful and effective global leadership comprises of the talent to influence and inspire the values, attitudes, mindsets and behavior of employees (Deresky, 364: 361-363; Quinn, Quinn, 2016; Martincic, 2010; Savolainen, 2014; Hassin, 2010).

Leaders in international companies are supposed to display certain roles. They are the representative of their parent companies; so, they must adapt to the local conditions and culture not to make serious mistakes, understand endogenous markets, local consumer behavior and domestically recruited personnel as well as apply the same thing to the companies' structures and processes. Leaders also bear the responsibility to act as a local, a citizen of a host country and a member of a multicultural framework.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The context in which leadership executed and the content of it also matter. Moreover, the context of the leadership involves the entire peculiarities unique to an issue. As the peculiarities related to a situation result from cultural, political, cultural variable as well as the context of leadership compels enjoying creative skills (Deresky 2014, 364: 361-363; Martincic, 2010).

Also, the leader of an international company should have certain traits as (Deresky, 2014: 364; Martincic, 2010):

- International experience of comprehensive management skills and knowledge,
- Adaptability to different cultures, customs, values and norms,
- Collect and internalize information about the host country where business is conducted,
- Ability to use its authority impartially and rationally among different nationalities, ethnic groups and customs,
- Good at cooperating with employees from different nations as well as host country governments and partners,
- Capable of designating convenient facility locations in various geographies which are favorable for business continuity and resource availability,
- Ability to establish domestic professional contacts which can facilitate its business and good relations with the local community,
- Having contemporary international knowledge and experience on modern technology, business structure and means of internationalization,
- Capacity to comprehend and apply country-specific political, commercial, socio-economic and cultural conditions,
- Establishing a fair system of staffing and rewarding for both local and expatriate personnel.

Leaders of international businesses are to learn and adopt various leadership traits unique to global business environment, international interaction patterns, global and local perception and capability to implement organizational tasks and influence organizational culture to adjust to both local and international contexts. Executives from different countries and cultures can create an environment which can be conducive for organization-wide learning and experience share. Yet, leadership styles of executives differentiate over time according to environmental conditions. These leadership styles could be democratic (who delegates authority and involves employees in the decision-making process), autocratic (makes decisions without consulting others), laissez-faire laissez-passer (who have a more advisory style, stimulating organizational members to contribute ideas rather than specifically directing their tasks) and visionary leaders (who manage to inspire others, believe in their own vision, and encourage people toward a shared dream). The leader might use all of its authority pervasively in times of uncertainty which requires risk management; be a mentor and coach just to monitor the business processes in peaceful times; involve as many as employees in the decision-making process and delegate its authority; and allow its stuff to act by itself and tolerate their actions as much as possible. In other words, leadership process promotes leaders to act contingently as well as arrange and apply norms, rules and policies to influence, motive and encourage their staff to contribute their best to realize the objectives a business in a host country (Deresky, 2014: 366-368; Martincic, 2010).

Leadership is a complex, sophisticated and paradoxical issue particularly in international organizations; because, the business is done in an environment of divergent cultures, economic conditions and commercial contexts. That's why, the guidance of an international experienced and competent change

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

agent is essential. This change agent is to be a leader who has a comprehensive understanding of international business environment and local differences. Organizations, especially the international businesses cannot only follow a routine. International organizations must change and adapt to the hectic global business environment continuously. In such a dynamic and turbulent global business context, international companies need leaders who can influence and motive the workforce to contribute their best more than conventional business periods. Managers acquire their authority originating from a position; but, leaders have natural appealing impact on the workforce and are followed voluntarily. (Martincic, 2010; Quinn, Quinn, 2016; Savolainen, 2014; Gillam, 2013; Hassin, 2010).

Leading change is not easy in any organization, particularly in international ones. A leader of organizational change in an international company should highlight the importance and necessity of change in its organization and try to prevent any resistance that might appear. The leader shall inspire motivation and courage on its local, expatriate and third country personnel to take the organization to a further developed desired status in which it will evolve to be a competitive one. Moreover, leadership is related to managing the corporate culture which should be structured firmly. Leadership signifies motivation, encouragement, involvement and communication of the personnel. The effective leadership in international businesses requires to take various cultures and nations into consideration and shall highlight the significance of organizational change and development to employees as well as stimulate the individuals to carry on and finalize the tasks intendedly. Good leaders are comfortable in complex and sophisticated situations in order to inspire the personnel. Eventually, leadership in international organizations is an arduous duty which can make or break the destiny of a corporation. That's why, it must be handled cautiously and entrusted to capable individuals who can transform a business into a successful one and constitute a long-lasting structure which can facilitate its improvement continuously (Kostovski et al., 2015; Gillam, 2013; Singh, 2011).

FUTURE RESEARCH DIRECTIONS

Organizations do not only exist in the local business environment, but also exist in the international business context too. Yet, 21.st century comprises of a dynamic and turbulent business environment which compels businesses to change and adapt their processes, routines, status and structure to the ever-changing nature of the global business. It is intended to review the optimal change management and effective leadership in national and international businesses in this paper. However, in further studies and research, the same issue could be investigated with respect to certain country groups or regions such as BRIC, NAFTA, Latin America, South East Asia, emerging countries or Eastern Europe, especially considering the importance of cultural differences.

CONCLUSION

The process of organizational change is a difficult operation to execute. Thus, when the process is conducted successfully, the result would be favorable, but if it is conducted unsuccessfully the result might be devastating. However, if the organization strives to be competitive in the ever-changing business environment and respond to customer needs and demands effectively, they have to change. Completing this task is not easy as well. The process of change must be handled cautiously and carefully, since it

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

may affect individuals, groups, structure, processes and organizational climate randomly and negatively. For, a business change operation that is managed efficiently, may lead to a flexible structure, advantage over the rivals, an agile structure and personnel satisfaction, but on the other hand, a business change operation that is conducted without the necessary care may lead to stress, anger resistance and absenteeism in the personnel and decrease the efficiency in all operations and output of the business. In order to avoid the negative effects of the process of change, management of an influential leader is imperative. A leader who is competent, experienced, prospective as well as involving the personnel, their necessities and demands in the operation of change would likely to be successful and accomplish an efficient change process. That's why, a leader having hands on management and involving its personnel in the change process, explaining the reasons, stimulating positive climate and restructure the organization soundly would bring about positive results in both national and international organizations.

When the situation is considered with respect to international companies/MNBs the process of change and leadership shall be regarded from a different point of view and should involve:

- The change process for international businesses/MNBs must involve cultural, economic, political, commercial and financial issues.
- Application of the change process requires the overcome of inertia which might result from changing decision-making, authority, communication, management and leadership styles for every host country and region.
- Leaders that initiate change in international businesses/MNBs are supposed to strike a balance among the local, third country and expatriate personnel.
- The acquisition of local knowledge and experience as well as converging these with international knowledge and experience.
- The authority shall be implemented neutrally.
- Local goals and targets ought to be reconciled with international goals and targets.
- A company-wide international mindset shall be constituted to beat inertia and resistance.

REFERENCES

Ahrne, G., & Papakostas, A. (2001). Inertia and Innovation. *SCORE Rapportserie*, *5*, 1–17.

Ajagbawa, H. (2012). Bank Branch Restructuring: Effective Management Tool. *ISM Journal of International Business*, *1*(4), 1–34.

Boshoff, K. (2005). Towards Facilitating Change in Service Delivery: An Illustrative Example. *Australian Occupational Therapy Journal*, *52*(3), 149–159. doi:10.1111/j.1440-1630.2005.00484.x

Boshoff, K., Callaly, T., & Arya, D. (2005). Organizational Change Management in Mental Health. *Australasian Psychiatry*, *13*(2), 120–123. doi:10.1080/j.1440-1665.2005.02173.x PMID:15948906

Brotheridge, C. (2005). A test of the Evolution and Managers' Interpretations of Change. *Journal of Change Management*, *5*(3), 281–294. doi:10.1080/14697010500216559

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bruch, H., Gerber, P., & Maier, V. (2005). Strategic Change Decisions: Doing the Right Change Right. *Journal of Change Management*, *5*(1), 97–107. doi:10.1080/14697010500067390

Burnes, B. (2004). Kurt Lewin and Complexity Theories: Back to the Future. *Journal of Change Management*, *4*(4), 309–325. doi:10.1080/1469701042000303811

Çavuşgil, T., Knight, G., & Reisenberger, J. (2014). *International Business, The New Realities*. Boston: Pearson.

Collerette, P., Legris, P., & Manghi, M. (2006). A Successful IT Change in a Police Service. *Journal of Change Management*, *6*(2), 159–179. doi:10.1080/14697010600694259

Deresky, H. (2014). *International Management, Managing Across Borders and Cultures*. Boston: Pearson.

Doppelt, B. (2017). *Leading Change toward Sustainability: A Change-Management Guide for Business, Government and Civil Society*. London, UK: Routledge. doi:10.4324/9781351278966

Elsmore, P. (2017). *Organisational Culture: Organisational Change?* London, UK: Routledge. doi:10.4324/9781315186917

Fisher, J. (2005). A Time for Change? *Human Resource Development International*, *8*(2), 257–263. doi:10.1080/13678860500100665

Fligstein, N. (1991). *Institutionalism in Organizational Analysis*. Chicago: University of Chicago Press.

Gillam, S. (2013). Leadership and Management for Quality. *Quality in Primary Care*, *21*(4), 253–259. PMID:24041143

Graetz, F., & Smith, A. (2005). Organizing Firms in Change Management: The Role of Structures, Processes and Boundaries in a Longitudinal Case Analysis. *Journal of Change Management*, *5*(3), 311–328. doi:10.1080/14697010500226723

Hannan, M. T., & Freeman, J. (1989). *Organizational Ecology*. Harvard University Press.

Harrison, A., Dalkıran, E., & Elsey, E. (2000). *International Business, Global Competition from a European Perspective*. New York: Oxford University Press.

Hassin, A. (2010). Effective Diagnosis in Organization Change Management. Journal of Business Systems. *Governance and Ethics*, *5*(2), 23–29.

Hudescu, L., & Ilies, L. (2011). Challenges in Choosing an Effective Change Management. *Managerial Challenges of the Contemporary Society*, *2*, 125–129.

Karp, T. (2006). Transforming Organization for Organic Growth: The DNA of Change Leadership. *Journal of Change Management*, *6*(1), 3–20. doi:10.1080/14697010600565186

Kavanagh, M., & Ashkanasay, N. (2006). The Impact of Leadership and Change Management Strategy on Organizational Culture and Individual Acceptance of Change during a Merger. *British Journal of Management*, *17*(S1), 81–103. doi:10.1111/j.1467-8551.2006.00480.x

Kearney, R. (2018). *Public Sector Performance: Management, Motivation, And Measurement*. New York: Routledge.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kostovski, N., Bojadjiev, M., & Buldioska, K. (2015). Leadership Styles and Organizational Culture in Macedonian Companies. *Journal of Sustainable Development*, *5*(13), 33–44.

Leontiades, J. (1985). *Multinational Corporate Strategy, Planning for World Markets*. New York: Lexington Books.

Luo, Y., & Jiang, H. (2014). Effective Public Relations Leadership in Organizational Change: A Study of Multinationals in Mainland China. *Journal of Public Relations Research*, *26*(2), 134–160. doi:10.1080/1062726X.2013.864241

Martincic, R. (2010). Change Management in Adult Educational Organizations: A Slovenian Case Study. *Managing Global Transitions*, *8*(1), 79–69.

Perrow, C. (1986). *Complex Organizations*. New York: McGraw-Hill.

Quinn, R. W., & Quinn, R. E. (2016). Change Management and Leadership Development Have to Mesh. *Harvard Business Review*, *1*(7), 2–4.

Reynolds, M., & Vince, R. (2017). *Organizing Reflection*. New York: Routledge.

Rowland, D., & Higgs, M. (2005). All Changes Great and Small: Exploring Approaches to Change and its Leadership. *Journal of Change Management*, *5*(2), 121–151. doi:10.1080/14697010500082902

Safar, J., Defields, C., Fulop, A., Dowd, M., & Zavod, M. (2006). Meeting Business Goals and Managing Office Bandwidth: A Predictive Model for Organizational Change. *Journal of Change Management*, *6*(1), 87–98. doi:10.1080/14697010600578668

Savolainen, T. (2014). Trust-Building in e-Leadership: A Cause Study of Leaders' Challenges and Skills in Technology Mediated Interaction. *Journal of Global Business Issues*, *8*(2), 45–56.

Sing, R. (2011). Job Enrichment: A Prerequisite for Change Management. *Global Management Journal*, *5*(1), 39–44.

Smid, G., Van Hout, E., & Burger, Y. (2006). Leadership in Organizational Change: Rules for Successful Hiring in Interim Management. *Journal of Change Management*, *6*(1), 35–51. doi:10.1080/14697010600578601

Smollan, R. K. (2006). Minds, Hearts and Deeds: Cognitive, Affective and Behavioral Responses to Change. *Journal of Change Management*, *6*(2), 143–158. doi:10.1080/14697010600725400

Sofat, K., Kiran, R., & Kaushik, S. (2015). Management of Organizational Change and its Impact on Commitment: A Study of Select Indian IT Companies. *Global Business and Management Research: An International Journal*, *7*(3), 69–86.

Tan, V., & Tiong, T. N. (2006). Change Management in Times of Economic Uncertainty. *Singapore Management Review*, *27*(1), 49–68.

Tan, V., Tiong, T. N., & Karp, T. (2006). Transforming Organizations for Organic Growth: The DNA of Change Leadership. *Journal of Change Management*, *6*(1), 3–20. doi:10.1080/14697010600565186

Taoka, G., & Beeman, D. (1991). *International Business, Environments, Institutions and Operations*. New York: Harper Collins Publishers.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Todnem By, R. (2005). Organizational Change Management: A Critical Review. *Journal of Change Management*, *5*(4), 369–380. doi:10.1080/14697010500359250

Tran, H. M. T., & Anvari, F. (2014). Reflective Frameworks for Change Management. *Proceeding of the European Conference on Information Management & Evaluation*, 253-261.

Valackiene, A. (2015). Significance of Business Continuity in Change Management: Theoretical and Practical Perspective. *Proceedings of the European Conference on Management, Leadership & Governance*, 504-512.

Welford, C. (2006). Change management and quality. *Nursing Management*, *13*(5), 23–25. doi:10.7748/nm.13.5.23.s16 PMID:16986556

Wild, J., Wild, K., & Han, J. (2003). *International Business*. Prentice Hall.

ADDITIONAL READING

Anderson, L. A., & Anderson, D. (2010). *The Change Leader's Roadmap: How to Navigate Your Organization's Transformation*. San Francisco, USA: Wiley.

Andriapulos, C., & Dawson, P. (2010). *Managing Change, Creativity and Innovation*. London, UK: Sage Publications.

Bridges, W., & Bridges, S. (2017). *Managing Transitions: Making the Most of the Change*. Boston: Nicholas Brealey Publishing.

Conner, D. (2006). *Managing at the Speed of Change: How Resilient Managers Succeed and Prosper Where Others Fail*. New York, USA: Random House Publishing.

Drucker, P. F. (2009). *Managing in a Time of Great Change*. Boston, Massachusetts, USA: Harvard Business School Publication.

Ferlie, E., Boch Waldorf, S., Reff Pedersen, A., Fitzgerald, L., & Lewis, P. G. (2015). *Managing Change: From Health Policy to Practice*. Hampshire, UK: Palgrave Macmillan.

Hayes, J. (2010). *The Theory and Practice of Change Management*. Hampshire, UK: Palgrave Macmillan.

Kotter, J. (2018). *Leading Change*. Harvard Business Review Press.

Kotter, J., Chan Kim, W., & Mauborgne, R. (2011). *HBR's 10 Must Reads on Change Management*. Boston, Massachusetts, USA: Harvard Business School Publication.

KEY TERMS AND DEFINITIONS

Change Agent: Any party which initiates, conducts, and finalizes the organizational change process.

Change Management: The process of transforming an organization into an efficient and effective status along with its sources, processes, and structure.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Change Stimulus: Factors instigating organizations to change status when they are deficient.

International Business: Business and its operations conducted over the borders of a country in a host market by means of importing, exporting, licensing, franchising, mergers, acquisitions, greenfield investments, and international joint ventures.

Leadership: The process of influencing and motivating individuals to contribute their best to achieve the goals and targets of an organization as effectively as possible.

Local Business: Business and its operations conducted in a domestic market.

Management: The process of planning, organizing, leading, coordinating, and controlling the material and nonmaterial sources of an organization to accomplish its goals and objectives.

This research was previously published in the Handbook of Research on Contemporary Approaches in Management and Organizational Strategy; pages 405-430, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 68
Leading Digital Transformation in Higher Education:
A Toolkit for Technology Leaders

Christine Elizabeth Miller
California State University – Sacramento, USA

ABSTRACT

The pace of innovation continues to accelerate. Students expect campuses to keep pace with the technology they use in their daily lives, and the technology they will likely need to use when they enter the workforce as graduates. Students and their families now pay more of the costs associated with earning a degree, and they want to have a voice in campus planning and decision making. Higher education technology leaders will need to help their campuses shift from incremental adoption of disparate technologies to digital transformation. Digital transformation includes adopting innovative technologies to transform mission critical activities and optimizing related processes and data with the objective of increasing customer satisfaction and providing an excellent end user experience. To guide digital transformation, technology leaders in higher education need a toolkit to build buy-in and facilitate cultural transformation on their campuses.

INTRODUCTION

Technology leaders in higher education can empathize with Cassandra of Greek mythology. Technology leaders try to illustrate the opportunities that digital transformation can offer their campuses in essential areas such as teaching, learning, advising, fundraising, and administration. Sometimes these prognostications receive a daunting level of resistance or a confounding lack of interest. Higher education technology leaders need to help their campuses envision and implement a digital future that preserves core values and embraces strategic innovations more broadly, deeply, and rapidly. In simplest terms, "digital transformation means transforming an organization's core business to better meet customer needs by leveraging technology and data" (Clark, 2018). For example, in higher education digital transformation

DOI: 10.4018/978-1-7998-7297-9.ch068

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

could involve a strategic, campus-wide effort to plan, implement, and adopt an integrated ecosystem of advising technologies powered by data analytics to improve student persistence and graduation rates. Labeling students as customers causes some campus members to bristle; nevertheless, "Money is exchanged, debt is incurred, and a valuable asset in the form of a degree, certificate, or badge is obtained" (Stoller, 2014). Technology leaders tend to view everyone they serve as a customer. Higher education does itself a disservice by rejecting customer-centric concepts on principle. A distinction should be made between digital transformation and initiatives that result in incremental improvements or innovations that have transformative effects on a small target audience. According to Harvard Business Review, "a digital transformation occurs when you use digital technology to change the way you operate, particularly around customer interactions and the way that value is created" (Libert, Beck, & Lind, 2016). Digital transformation is not a one-and-done project or initiative; it can and should be repeated selectively. When enculturated, digital transformation becomes the approach the organization uses to achieve many of its strategic goals.

The private sector regularly introduces disruptive innovations by leveraging technologies such as the Internet of Things (IoT), artificial intelligence, and machine learning (Sastray, 2018). What about higher education? A couple of universities, such as Western Governors University and Singularity University, receive recognition as innovators in pedagogy and curriculum, but the list of examples is not very long. Entrepreneurial campuses, such as Georgia State University, that use a strategic blend of data, technologies, and cost-effective, time-tested practices are ahead of many of their peers (Quinton, 2013). How will traditional universities embrace digital transformation when there is so much dissonance between the pace of change in academia and the pace of technical innovation? Technology leaders in higher education need a robust toolkit to address this conundrum.

BACKGROUND

The Defense Advanced Research Projects Agency (DARPA) and scholars affiliated with research universities such as MIT and UCLA collaborated to develop the network of networks that we call the Internet (Leiner et al., 1997). The technology leadership role once played by higher education lapsed in the dot com and post-dot com eras as the Internet evolved from a predominantly public-sector resource to a predominantly commercial resource. Some universities have innovative research centers such as the National Center for Supercomputing Applications at the University of Illinois Urbana-Champaign. Typically, universities adopt technology innovations at an unhurried pace. When the pace of innovation was slower, universities could exert more control over the pace of adoption. A couple of decades ago, email accounts and File Transfer Protocol (FTP) were for power users, and universities were deciding if they wanted to have websites. These things were still optional in the mid-1990s. They are not optional now, and these technologies, or their successors, are ubiquitous at all universities. Although digital transformation may seem optional now, it will likely become commonplace in the future much like email, FTP, websites, etc. Universities that are effective early adopters of digital transformation will differentiate themselves from their peers.

Higher education has experienced periodic revolutions such as the Serviceman's Readjustment Act of 1944, the coupling of accreditation with federal financial aid programs, and the civil rights movement (Thelin, 2004). In the early 2000s, some thought that for-profit universities like the University of Phoenix might eat the lunch of traditional universities by bringing economies of scale to the design,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

development, and delivery of instruction (Pepicello, 2012). More recently there has been buzz about badges and micro-credentials unseating universities from their position of authority over the conferring of degrees. If badging and micro-credentials gain greater legitimacy, this could reduce the attractiveness of making the substantial investment of time and money required to earn a college degree. Large technology companies like Microsoft have boldly stated that they recruit based on skills, not degrees (Bunio, 2018). Technology startups have had this mindset even longer. Waiting passively on the sidelines could lead to being disrupted by more nimble alternatives, and the higher education news media has reported an increasing number of university closures (Lederman, 2017).

Students are becoming less and less tolerant of large gaps between the technologies they use in their daily lives, and the technologies provided by the universities they attend. Universities compete with an increasingly instant gratification-oriented world. The student experience should not feel like a visit to a time capsule, and many students will deride a university experience that puts the burden of siloed processes and legacy systems on them. They expect a unified, seamless, secure, and accessible experience. According to John Gardner, "Students experience college as a whole, not as discrete units" (J. N. Gardner, personal communication, September 1, 2009). In other words, students do not care about the organizational chart.

Students have become more influential in campus planning and resource allocation in part because they and their families are bearing a larger portion of the costs associated with attending college (U.S. Government Accountability Office, 2014). The gap between technology inside the university and outside it continues to widen. One can still find VCRs and CRT monitors in dark corners of some classrooms at public universities. Prevailing Student Information Systems are not natively mobile device friendly. The cultures and organizational structures of universities often lead to proliferation of tools that may or may not be integrated. A holistic student record with appropriate role-based access is a rarity.

Increased scrutiny from federal and state governments and the public have created a greater emphasis on outcomes and student success. Selective universities have the advantage of focusing on inputs and admitting students who are academically well-prepared and typically persist through graduation. These students often have parents who attended college and set expectations about college attendance and graduation. These students may want a traditional college experience characterized by living on campus and participating in student activities, and they may not require interventions to persist and graduate. Access institutions play a different role; they admit many students who are first generation, non-traditional, underrepresented, or undocumented. Education can be transformational for these students and their families. Access institutions are already in the transformation business.

The fragmentation of some university processes and data creates barriers to student success, and these disparate systems can provide poor or confounding experiences for students, faculty, staff, and administrators. Now, universities can and should implement seamless student information systems powered by technology and data, and technology leaders in higher education must often serve as the standard bearers for this and other digital transformations. In a time of dissonance, characterized by greater expectations from students, increasing competition from alternatives that may be viable, and rapid introduction and adoption of disruptive technologies outside of academia, embracing digital transformation is a necessity to ensure that higher education retains its place as an institution of enduring regard, relevance, and value.

Leading digital transformation involves tools and challenges that will be familiar to technology leaders in higher education. Digital transformation can still be elusive because it is not limited to the implementation of new technology. To transform the 'customer' experience, digital transformation also

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

involves transforming underlying data, processes, and even some roles. Digital transformation will be a cultural transformation on most campuses.

A DIGITAL TRANSFORMATION TOOLKIT FOR TECHNOLOGY LEADERS

Based on the definitions provided, digital transformation includes the following essential elements: innovative technologies, people, data, and transformation that affects core organizational activities. Fundamentally, digital transformation is organizational transformation led by people for people.

Drivers for digital transformation include eventual necessity, competition from universities that innovate more rapidly or alternatives outside academia, and student expectations in terms of both technology and university governance. Students, and prospective employers, expect universities to provide knowledge, skills, and abilities that enable graduates to successfully transition to an increasingly digital workplace. Barriers to digital transformation include lack of buy-in and resistance to changing campus culture and processes that would enable greater capacity for innovation and the increased agility that will be required to maintain greater parity with the world outside academia. Leading digital transformation may seem daunting. Using the past and current climate as context, this chapter identifies 11 capabilities and opportunities that comprise a digital transformation toolkit for higher education technology leaders. Technology leaders should be able to use all the tools proficiently and select the right tool or tools for the task at hand. Many of the tools in the toolkit are soft skills such as communication, collaboration, and change management. The chapter concludes with a few suggested initiatives that may represent low-hanging fruit and an example of a university that has successfully achieved a digital transformation.

Transformational Leadership for Cultural Transformation

The first tool in the toolkit is transformational leadership. In the university context, digital transformation will require a cultural transformation from incremental and/or shallow changes to accelerated, campus-wide changes that affect mission critical activities. The American Council on Education provides the following definition of transformation:

Transformation 1) alters the culture of the institution by changing select underlying assumptions and institutional behaviors, processes, and products; 2) is deep and pervasive, affecting the whole institution; 3) is intentional; and 4) occurs over time. (Eckel, Hill, & Green, 1998, p. 3)

In the future, highly effective universities will develop highly collaborative cultures that are nimble and adaptable. Fortuitously, technology leaders in higher education have been working to cultivate these qualities in their organizations for decades so they already have some experience making these shifts.

Cultural transformation requires transformational leadership. EDUCAUSE recognized the need for transformational technology leadership over a decade ago: "Transformational leaders are good role models: they inspire, empower, and motivate staff; encourage creativity; and effectively communicate a shared mission and vision" (Katz & Salaway, 2004, p. 5). Furthermore, technology leaders must serve as trusted partners in the academic enterprise: "This new leadership approach requires these people to be partners in reconceptualizing the institution's mission, articulating a vision, and forging the political alliances necessary to achieve the kind of change required" (Katz et al., 2004, p. 6). They must develop

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

strong alliances with other campus leaders and engage in continuous collaboration and communication with faculty, staff, and students across the university. They will need to cultivate a keen understanding of the digital landscape, apply the technical expertise of their organizations, seamlessly play multiple roles, and most importantly be mindful of working within the culture to change the culture (Eckel, Hill, Green, & Mallon, 1999). Additionally, they will need to find allies and areas of receptivity that will ripple concentrically into bigger and better opportunities that culminate in transformation.

Shared Governance and the Big Table

Most universities have some degree of shared governance characterized by stakeholder engagement in matters such as curriculum and academic policies; engagement and buy-in often go hand in hand. Shared governance serves as the second tool in the toolkit. Technology leaders in higher education need to incorporate shared governance in digital transformation initiatives to build buy-in and support. Sometimes this can be accomplished simply by including shared governance representatives on project or advisory committees. When stakeholders are excluded, issues are inevitable. These issues typically affect faculty, staff, or student experiences, and they reduce trust between people and organizational units. Technology projects are susceptible to failure due to role ambiguity, change fatigue, lack of buy-in, or shifting priorities. Experientially, technology projects are more likely to fail due to a lack of buy-in than problematic technology.

Universities need a bigger table for planning and decision making in the digital age. Brian Hawkins (2008), past President of EDUCAUSE, initiated the 'big table' conversation and advocated making room for technology leaders at the senior leadership table over 10 years ago. Using technology strategically and partnering to transform mission critical activities necessitates a place for technology leaders at the planning and decision-making table. Dualism of controls (Birnbaum, 1988) has been replaced with quadruple controls that include 1) administrators, 2) faculty, 3) staff, and 4) students. Students, who are bearing more of the costs associated with college, expectedly also want their voices heard as priorities are set and resources are allocated.

Because digital transformation typically crosses organizational boundaries, the positioning of technology in the academic enterprise is more important than ever. Reporting relationships can reflect the role of technology at the university. When technology reports to finance or administration, the university may view technology as a cost. When technology reports to academics, the university may view technology in a support role. Reporting to the academic side of the house could accelerate intentional use of technology for teaching, learning, and scholarship, and optimizing technology in Academic Affairs should ease the path to optimizing technology in other areas. When technology reports to the President, the university, at a minimum, recognizes that technology is ubiquitous and spans all functions of the university, and when technology leaders report to the President, they have the opportunity to demonstrate how the university can leverage technology and data to achieve strategic goals, improve end user experiences and processes, and increase efficiency throughout the campus. Regardless of reporting relationship higher education technology leaders will need to have campus-wide influence to facilitate digital transformation successfully.

Although expanding the table can be threatening to some stakeholders, a bigger table does not reduce status or influence nor does a bigger table need to result in protracted processes or deferred decisions. The size of most universities makes direct participation in shared governance impracticable (Bates, 2000); technology can help facilitate engagement opportunities through polls, surveys, webinars, and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

other feedback mechanisms. Committees and taskforces continue to provide valuable engagement opportunities; effective committees tend to be small in size, include representative stakeholders, and are designed to manage expectations and achieve defined outcomes. Committees have their limitations:

Committees are useful for communication, education, consultation, recommendations, and sometimes decision making. However, in most higher education institutions committees do not execute actions. This is usually best done by individuals, or more accurately by people with the power and mandate to do things. (Bates, 2000, p. 53)

Avoiding role ambiguity by documenting roles and responsibilities at the outset of a project or initiative will help ensure success. A model such as RACI (Responsible, Accountable, Consulted, and Informed) can be used to assign accountability, facilitate involvement, and set boundaries. Role definition will help avoid conflict, turf wars, and confusion. Borrowing from the email signature of a colleague and faculty member: "Genuine consultation happens when the party being consulted has a meaningful chance of influencing the outcome."

Sometimes campus leaders may perceive urgency and omit the consultation process. According to Tierney and Lanford (2018),

The rhetoric of change and disruption also plays a role in contemporary strategic decision making, particularly when it appears that early adopters of a new technology may have a strategic advantage over peer institutions. Lest they be placed at a disadvantage that could cripple their institutions' future economic viability, many leaders feel compelled to make quick decisions, circumventing traditional participatory processes that give voice to multiple constituencies. Consequently, communication becomes an essential tool for the dissemination and implementation of institutional strategies. (p. 5)

Since consultation tends to be a core value, it should be omitted with caution and selectivity. Tierney and Lanford's research indicates that communication before the fact may diffuse some resistance. Meaningful consultation will continue to be valued at many universities, and technology leaders will need to develop engagement strategies that make engagement meaningful and nimble.

Technical Expertise and Academic Acumen

To lead digital transformation or any far-reaching change in higher education, technology leaders must know technology and higher education. The combination of technical expertise and academic acumen represents the third tool in the toolkit. Some espouse the idea that leadership skills are transferable, and great leaders can lead anything. Technology leaders in education will have to initiate technical changes in their organizations and on their campuses. They will not be able to proclaim 'cloud first' and drop the mic. Technology professionals in higher education tend to have long tenures. Over time, this can limit exposure and/or receptivity to innovations. Technology leaders will need to drive and manage change inside and outside the technology organization. This task will be insurmountable if the technology leader does not have at least a high-level understanding of current and emerging enterprise architectures and applications, or will not endure if he/she cannot reasonably assure confidentiality, integrity, and availability of data and other campus information assets. At the same time, the technology leader must understand the strategic goals and business processes of the campus. The term, business processes, can

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

be anathema to traditional academics, but the higher education technology leader must understand the academic calendar, and the complete student lifecycle from prospective student to matriculate, to graduate, to alumna, or one will not be able to get buy-in for proposed improvements or innovations. Technology leaders need to effectively navigate campus culture and respect the role of the faculty in delivering the teaching and scholarship missions of the university. Other leaders can contribute to technology strategy; the technology leader should be tapped to coordinate **how** the strategy will be accomplished to ensure compatibility, security, accessibility, and sustainability of the solution. The technology leader should know the capabilities of the technology organization in terms of expertise, infrastructure, applications, and other resources.

Empathy

Empathy serves as the fourth tool in the toolkit. Higher education technology leaders must develop a wellspring of empathy for those they serve because these are tough times on many campuses. Many public universities continue to experience a recession in the portion of their budgets that comes from the state. Many faculty have witnessed a decline in the number of full-time, tenure-track faculty in favor of greater dependence on part-time, temporary, and adjunct faculty. Sometimes universities adopt this practice in an effort to serve students by offering seats and sections to meet demand, and sometimes saving money is the driver. Students are bearing a greater portion of the cost of college and adding debt to their college experience; concurrently, students are vying for more influence in campus governance. The stress experienced by many campus constituents affects receptivity to digital transformation and necessitates an abundance of empathy on the part of technology leaders. Practices such as active listening and reviewing user stories and feedback help cultivate and sustain empathy.

Change Management

Technology leaders spend an abundance of their time serving as change managers; the fifth tool in the toolkit is change management. Many administrators, faculty, and staff members couple technology and higher education technology leaders by association, with change, and most typically, with changes that are not wanted or welcomed. This mindset can be a barrier to pursuing even incremental changes. However, early career faculty are increasingly likely to be digital natives who are more receptive to innovations and accustomed to the pace of technological change outside the university. Effective technology leaders must excel at change management. The critical role of change management in any change endeavor cannot be overstated. Digital transformation, or enduring change of any kind, cannot be accomplished without effective change management. Change management is not easy. It is easier if the change is a goal that can be accomplished by a range of alternatives. Change management is excruciating if the goal is to drive an organization to a single, specific alternative. For example, change management will be easier if the goal is to undertake an inclusive and intentional process including an evaluation of alternatives that will lead to the selection of a next generation learning management system. Getting buy-in for a predetermined outcome is much harder. For example, announcing that the campus will be moving to Instructure Canvas without gathering requirements, evaluating alternatives, and consulting with faculty, staff, and students will likely be received with resistance and disparaging remarks even if the campus would have chosen this option.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Change management often begins with a change readiness assessment. The assessment can help identify support and barriers that will facilitate the creation of strategies to help build buy-in. A well-defined change management process and the ability to demonstrate some change management wins will help make the process more nimble with each iteration. Change management is especially important in organizations that lack trust. A published project plan that includes engagement strategies provides transparency and helps build trust. Defining roles and responsibilities is essential, and this step can diffuse conflict and turf wars. In addition to stakeholder analysis and engagement strategies, change management also includes setting metrics, making organizational changes, creating training, navigating culture, and developing communications (Lewis, 2011). Change control processes for infrastructure, systems, and applications are an essential aspect of effective change management to ensure that all system changes are documented and approved.

Communication

Communication serves as the sixth tool in the digital transformation toolkit for higher education technology leaders. EDUCAUSE, the leading professional organization for technology in higher education, has an IT Communications Constituent Group listserv, and the practice of having a communications officer or team embedded in the technology organization has become a necessity. Because technology and change can be synonymous, technology leaders must communicate early and often. Tierney and Lanford (2018) recognize the essential role communication plays in stakeholder engagement and strategic projects; they provide the following advice:

When new people join an institution, the socialization process needs to establish preferred forms of communication so that feedback channels can be utilized. Additionally, communication from administrators is essential during strategic reform processes that can easily be misinterpreted by individual actors. (p. 6)

Best practices include developing communication plans for campus-wide projects and marketing campaigns to reiterate services offered and shared responsibilities such as information security and accessibility. Information overload continues to be a challenge, and the quantity and frequency of campus messages leave many recipients teetering on the verge of email bankruptcy (Musgrove, 2007). Effective leaders will have to identify new communication channels that enable them to rise above the noise. The usefulness and viability of email is evaporating (Brandon, 2015).

Collaboration

The road to digital transformation is paved with collaboration, and collaboration requires cultivating and sustaining effective relationships throughout campus. The seventh tool in the toolkit is collaboration, and all collaborations are personal. Taking advantage of opportunities provided by digital transformation necessitates removing barriers to integrating systems, sharing data and processes, and developing a culture of collaboration. Many universities have organizational silos. Technology leaders must facilitate the task of making their campuses less siloed and more collaborative. Organizational silos tend to operate more like separate, semi-autonomous units. Technology spans all functions of the university so there are abundant opportunities for collaboration, and the technology organization must partner with the entire campus. Lack of collaboration can be an enormous barrier to creating or maturing university capabilities

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

in critical areas such as online learning and research computing. Academic Affairs and the technology organization must work as partners when technology intersects with teaching, learning, and scholarship.

Silos can lead to a proliferation of disparate or redundant tools that the university would like to integrate. Integration platforms like Oracle X, Dell Boomi, and Mulesoft can help with this task. In the future, universities will be more intentional about technology investments and likely adopt 'born digital' platforms such as Workday that can provide a responsive and intuitive experience for faculty, staff, and students. The disparate systems of the present will likely be replaced by holistic, next generation student information systems or at least well-designed interfaces that create the illusion of seamlessness.

Carr (2003) provocatively stated that information technology ceased to be strategic when it became ubiquitous. Carr's pronouncement predated mobile and digital transformations. Technology can be a differentiator when used strategically and led effectively. Weick (1976) and Birnbaum (1988) described higher education as a loosely coupled, open system. One of the stated benefits of loose coupling is that subunits of the university can respond to changes without affecting the whole (Birnbaum, 1988). Furthermore, loose coupling prevents management fads from taking hold in the university (Birnbaum, 2000). Unfortunately, loose coupling can be a barrier to change including changes that could improve experiences for all faculty, staff, and students by increasing the consistency and reliability of shared systems, processes, and data. Loose coupling is good if campus goals can be accomplished through initiatives at the unit level; loose coupling will not create a seamless campus-wide experience for students, and campus-wide goals such as reducing time to degree cannot be realized without a tightly coupled, campus-wide strategy. Collaboration helps decrease the fragmentation that students can experience as they navigate organizational complexity. Digital transformation requires using standards, processes, and tools campus-wide. Campus-wide projects and programs can lay the groundwork for meaningful, ongoing collaboration. Digital transformation cannot be accomplished without effective, campus-wide collaboration.

Business Process Analysis

Business Process Analysis is the eighth tool in the toolkit. Because digital transformation typically involves process improvement, business process analysis is a core competency of technology leaders and their organizations. Technology leaders in higher education are uniquely positioned to see data and processes flow through the campus. Conducting process analysis and revealing complexity, vestiges, or gaps can facilitate collaboration across disparate campus units that share processes or data. Because many universities have been loosely coupled or siloed for decades, processes and data have not been reviewed regularly, and they tend to drift over time. If the technology leader can facilitate process mapping and diffuse conflict and defensiveness, he/she has a chance to build trust, create value, and position the university for innovation. It is impossible to innovate effectively on top of bad processes and data. Technology leaders must do the hard work of busting silos and their clutter. Unfortunately, processing mapping and analysis is high effort work that does not yield instant gratification; frankly, it is a slog. Technology leaders may collaborate with campus partners, for example, to significantly reduce the time it takes to make financial aid disbursements. This creates better experiences and increases satisfaction, and it is not the kind of work that yields rock star recognition. Do this work anyway.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Strategic Planning and Visioning

Strategic planning and visioning serve as the ninth tool in the toolkit. Understandably strategic planning projects are often met with cynicism. Many have had the experience of participating in a planning process that yielded a dusty binder or a website. Nonetheless, the organizational changes that need to occur to support digital transformation require a concerted planning effort. Strategic planning requires an understanding of where you are and where you want to go, and there is more than one way to do strategic planning.

Strategic planning readiness begins with reviewing mission, updating vision, and scanning the environment to understand context. Strategic planning also requires some urgency and sustained energy to drive it to its specified outcomes. Sometimes strategic planning needs a nudge. The technology leader may have to paint a picture of a highly desirable alternate reality. Would you like your preferred classroom settings to be stored and launch automatically as soon as you are recognized? Although some campus community members will be skeptical, techniques such as working backwards (Vogel, 2006) and design thinking (IDEO, 2018) can facilitate exploring new directions. Other nudges include compliance, security, and students. Drivers related to compliance or security often emerge external to the university; students serve as internal drivers. Students can be very effective change agents, and their campaigns for change are often received with greater receptivity by the campus community.

Presidents and other leaders need to create expectations for transformation and reiterate the messages associated with the transformation. "For mission statements to be effective, their basic principles need to be reinforced by leadership through speeches, letters, and other forms of written and spoken discourse, especially at times of institutional uncertainty" (Tierney & Lanford, 2018). One will have an uphill battle attempting to transform a campus that strongly resists. One could also consider creating a Center of Excellence for innovation or digital transformation or conducting a pilot or proof of concept. These experiments will help identify the allies and champions who may make broader initiatives possible. One will find areas of receptivity and create pockets of transformation that could lead to culturally palatable incremental transformation.

"A vision is a picture of the success…at a particular time in the future" (Weinzweig, 2008). Furthermore, an effective vision needs to be inspiring, achievable, documented, and communicated (Weinzweig, 2008). The vision statement should reflect the aspirational culture; clarifying, communicating, and reiterating the vision is a necessity. Stakeholders need to understand the target as well as the rationale. Digital transformation offers benefits such as reducing the technology gap between the university and the outside world, improving processes and experiences, and facilitating a seamless, holistic experience for students and other campus members. A well-crafted vision can help sustain organizational transformation efforts when frustration, impatience, and fatigue set in.

Culture Change Management

The tenth tool in the toolkit is culture change management. Universities tend to embrace their history and traditions. Although universities are often loosely coupled, community members also have a strong, shared identity as demonstrated by the preponderance of school colors and logos that appear on the apparel, backpacks, water bottles, etc. of students, faculty, staff, and alumni. Culture is palpable on many campuses, and as the saying goes, culture eats strategy for breakfast. Culture consists of multiple attributes, and culture tends to have both enduring and fluid aspects. Tierney and Lanford (2018) define culture from

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a social constructionist perspective. They state that culture is more than structures, norms, and values: "Instead, a broad array of factors — including changes in the greater environment, the unanticipated actions of individual actors, and the constructed understanding of an institution's history are more likely to inform contemporary events." Tierney (1988) created a frequently cited cultural framework for higher education, which includes the following categories: environment, mission, socialization, information, strategy, and leadership. The American Council on Education Project on Leadership and Institutional Transformation (Eckel, Hill, Green, & Mallon, 1999) identified the change paradox: change agents, such as technology leaders, must work within the culture to change the culture. Cameron and Quinn (2006) espouse the belief that a *modified culture* is the output of change, and they developed an instrument called the Organizational Cultural Assessment Instrument (OCAI) that is intended to measure culture and identify the gap between current and desired culture. Digital transformation and cultural transformation are tightly coupled. Technology leaders need to plan digital transformation projects that will be compatible with campus culture and push boundaries at the same time.

Maturing Information Technology Governance: Data, Project, and Procurement

The eleventh and final tool in the toolkit is information technology (IT) governance. Effective technology governance on the front end always saves time in the long run and helps universities reduce and/or prevent technical debt. Technical debt is the practice of taking short cuts to achieve short-term gains that will reduce efficiency or create complexity in the long run. Before one attempts digital transformation, the effectiveness of the technology organization and IT governance processes must be addressed. Although there are many types of IT governance, data governance, project governance, and IT procurement governance are a powerful trio.

Data Governance

Hawkins (2006) advised technology leaders, among other things, to make information an asset:

Institutional leaders must understand that our colleges and universities are information-based organizations, that technology facilitates highly interdependent relationships between organizational units, and that the traditional stove piped or vertical structures are inadequate to manage the information-based institution. This educational responsibility is an obligation that all IT professionals need to actively assume. (p. 8.5)

Making information an asset requires intentional data governance efforts. Rouse (2017) defines data governance as "the overall management of the availability, usability, integrity and security of data used in an enterprise." Information and processes must flow across the organization; they cannot be stuck in silos. Technology leaders often must make the case for data governance and serve as enablers or facilitators of the process as well as implementers of data definitions and data models. Technology leaders must hone facilitation and mediation skills to bring functional data owners and stewards together and stress the necessity of maturing data governance.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

IT Project Governance

Enterprise project management is a core competency of higher education technology leaders and their organizations. The project management office facilitates an inclusive and standardized process for gathering and prioritizing project requests, allocating resources, and delivering value on time and within budget. Digital transformation will undoubtedly involve projects, and universities desperately need effective project management capabilities. One of the reasons technology projects fail is the lack of a project charter. The charter should include goals, roles, scope, risks, and milestones. In addition to the charter, technical project management includes sub-plans for communication, engagement, testing, and change controls. Having a vetted engagement plan with milestones will increase the likelihood of buy-in and cultural compatibility.

Some technology organizations have adopted agile project management in whole or in part. Traditional waterfall project management tends to be more sequential and can include long gaps between defining requirements, producing deliverables, and engaging customers. Agile facilitates iterative development and customer check-ins that provide an opportunity to revisit requirements, make micro-decisions, and review micro-deliverables. Agile may also be more compatible with university culture because the agile experience feels more like incremental change. Based on the characterization of higher education as a loosely coupled (Weick, 1976), open system (Birnbaum, 1988), adjustments, or incremental changes are more compatible with the organizational culture of many postsecondary institutions than transformation.

IT Procurement Governance

Many technology leaders understand the experience of being circumvented – sometimes intentionally and sometimes accidentally by colleagues who have good intentions; many technology and other leaders in higher education can relate to the experience of having to oversee an implementation after procurement or a decision-making process has occurred. This situation is problematic on a number of levels. The product may not be a fit for campus technology standards and practices, and it may not have been reviewed to ensure that information security and accessibility standards are met. Sometimes it may even duplicate features or functionality of an existing investment. Additionally, it puts the technology organization in a reactive mode, and this makes it impossible to manage resources effectively.

Due to the increased emphasis on student success, many universities are making significant investments in technologies and other initiatives that may help students stay on track, persist, and graduate. This is another way that loose coupling can be problematic. All units want to contribute to or take credit for student success so campuses may unwittingly invest in multiple products that have similar features or functionality. Inclusive IT procurement governance will be even more important in the digital age. Many of student success tools can be beneficial, but none of them offers a quick fix or instant gratification. They need buy-in, a well-developed project plan including communications, testing, and the development of change controls and other processes to ensure sustainability, consistent and inclusive participation, and eventually program management. These tasks are daunting, and many universities do not persist in their efforts to implement tools that are designed, ironically, to improve student persistence and success. Technology procurement review should ensure that all aspects of program management have been considered prior to procurement and implementation. Project managers typically cycle off a project when deliverables are achieved; program managers tend to have a portfolio of products with ongoing responsibilities.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

LOW-HANGING FRUIT

Digital transformation offers an incredible opportunity to improve core campus activities for 'customers' through implementation of innovative technologies and transformation of related processes and data. Some technology leaders have initiated digital transformation, and others need to identify opportunities that represent the path of least resistance to digital transformation. This section offers two suggestions.

Innovate the Technology Organization

Digital transformation is about using technology, data, and processes to innovate the end user or customer experience. All campus members use technology resources and services so the technology organization can serve as the inception point for digital transformation. Technology leaders cannot facilitate other digital transformations if the technology organization is lagging. The technology organization should be able to serve as an innovation engine for the campus. If the technology organization does not embrace digital transformation, it is unlikely that the campus will embrace digital transformation. The technology organization can serve as a microcosm of the university at large. The digital transformation toolkit can be used to innovate the technology organization and the rest of the campus. The technology leader will need to collaborate with the technology organization and other stakeholders to develop a shared vision and strategic plan. Silos within the technology organization will need to be busted; the use of standard tools and practices must begin in the technology organization, or they will not scale campus-wide.

Digital transformation includes both digitization and transformation (Gruman, 2016). Implementing new technologies accomplishes digitization; underlying processes and data must be optimized to achieve transformation. Gruman (2016) advises organizations to become fungible; he states,

Fungibility means the ability for something to be changed. That's not the same as the ability to change something; fungibility is an intrinsic characteristic, not a force imposed by an external source. Transformation is the act of making substantive change; fungibility is the intrinsic ability to be substantively changed. (para. 9)

Technologies of the future will be adaptive, and the technology organization will also need to be adaptive, or fungible, as well. Solutions will need to be designed to adapt to new requirements and questions that have not been asked yet. Becoming an adaptive organization will likely be a culture change for many technology organizations.

Change management also plays an important role in the technology organization. The changes that accompany digital transformation can create fear and anxiety for some technology professionals, and digital transformation will involve augmenting some roles and responsibilities and diminishing others. For example, administering cloud-based hardware or applications requires different emphases than administering on-premise hardware and applications. Reductions in staffing are unlikely based on campus appetites for software and services. Staff in the technology organization will need both technical and soft skills training to prepare for changes associated with digital transformation and the increased emphasis on the end user experience that goes along with it.

Technology spans the campus, and the technology organization must serve as a trusted partner to shepherd digital transformation initiatives. Technology does not add value if it operates in isolation. Although it is desirable for technology infrastructure to operate in the background with the reliability of a utility,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the team and its members need to have a lot of visibility. Visibility is important because it gives team members the opportunity to build the partnerships that will help ensure that technology planning happens in the early stages of emerging initiatives. Visibility also gives members of the technology organization the opportunity to understand business processes, pain points, and the end user experience firsthand.

The higher education technology organization will need to adopt a culture more like a technology start-up company. These cultures are characterized by agility and innovation. The technology organization needs to transform first and lead the way for the rest of the university by adopting agile project management and implementing adaptable solutions that use technologies such as artificial intelligence and machine learning.

Many universities have accumulated technical debt; technical debt accrues from the practice of taking short cuts for short-term gains without recognizing the long-term costs associated with cutting corners. Technical debt is another driver for innovating the technology organization. Technology is still fairly young, and technology on many campuses developed organically rather than intentionally or strategically. Technical debt may exist in many applications and processes throughout the university. The process of getting the debt out may improve efficiency and end user experiences; it is unlikely to save money. Technical debt may be inevitable when implementing innovations that are not mature. Universities may need to spend more on technology in the age of digital transformation, not less. Entrepreneurial universities will invest in digital transformation and the technology organization to meet aspirational goals.

Democratize Data

Democratizing data can be a digital transformation if it is adopted pervasively. Pervasive adoption requires trusted data and a well-documented and supported set of tools. Data democratization increases role-based access to data and provides tools that facilitate self-service reporting, analysis, and data-driven decision-making. Most universities have an abundance of data that could be made broadly available, especially aggregate data. Effective identity and access management and data governance help make data democratization possible. Identity and access management includes the policies and processes used to provision and de-provision identities or accounts.

Many universities are investing in home-grown or off-the-shelf analytics to help identify opportunities to improve student success. The tools can be used, for example, to optimize classroom space utilization, analyze student demand for courses, and identify proactive (intrusive) advising opportunities at the individual or group level. Specifying roles and developing interventions and assessments are essential to making the use of analytics effective. Inevitably, analytics have the positive effect of forcing campuses to review the quality of their data. This can be a painful process if inconsistencies in practice or data definitions are discovered. Data governance should be one of the positive outcomes of initiating the use of analytics. Ideally, data governance comes first. Data governance and democratizing data are tightly coupled. Democratizing data also facilitates ongoing communication and collaboration. To prevent drift, data owners will need to meet on an ongoing basis to address changes and opportunities.

DIGITAL TRANSFORMATION AT GEORGIA STATE UNIVERSITY

Georgia State University raised graduation points 22 points in a 10 year period (Quinton, 2013). Although the pace couldn't be described as accelerated, this qualifies as digital transformation. Georgia State used

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a combination of technology, data, and best practices (or processes) to improve student experiences and outcomes. Georgia State University Senior Vice President for Student Success, Timothy Renick (2018), states, "While the transformation seems far from sudden from my perspective — it is the result of, no joke, participating in an estimated 10,000 meetings with faculty, staff, vendors, and others." Transformation requires extensive effort — communication, collaboration, change management, project management, program management, and effective governance mechanisms.

In a video featuring Renick, Georgia State University (2018) describes their student success model: 1) demographic differences do not have to make a difference in success rates, and 2) the pathway is not through small, targeted boutique programs, but instead by changing the ways the university operates at its very essence — the way it treats all students, the way it serves all students. The Georgia State website features a total of ten student success initiatives. Tinto (1993) indicated that institutions must make a commitment to the students they serve and commit to all students, not just select subgroups. Based on the success of Georgia State, implementing a student success model that serves all students creates an inclusive student experience and facilitates evaluation and continuous improvement.

FUTURE RESEARCH DIRECTIONS

Because this chapter is looking into the future, the recommendations come from a blend of existing scholarship, professional experience, and prediction. Future research provides an opportunity to determine the effectiveness of the toolkit. Some higher education technology leaders may use the toolkit, in whole or in part, to benchmark their digital transformation strategy. They may develop rubrics or other tools that could be used by the community. Scholars may conduct case studies or other types of research on one or more campuses that undertake digital transformation to identify best practices. This research will enhance the toolkit through additions, subtractions, and other improvements.

CONCLUSION

According to Birnbaum (1988), only those who love higher education should try to change it. The rewards of serving as a higher education technology leader come from contributing to the mission, vision, and achievement of strategic goals. The higher education technology leader has an epic opportunity to make a difference and find a way to play a strategic role that is tolerated by all and celebrated by some. Digital transformation will require seeing the university in terms of its possibilities, and seeing the university with fresh eyes may be a challenge for some established campus members who may feel invested in the status quo. Technology leaders will undoubtedly play essential roles in coaxing their campuses to undertake digital transformation.

Making a positive difference is rewarding. Technology leadership in higher education could be considered a calling. It is not the most lucrative opportunity in the technology field. Technology leaders have to love the mission of higher education, love the culture, and love the challenges and opportunities they face. The work of digital transformation will be both high effort and high impact – think back to Renick's 10,000 meetings – and it won't happen overnight. Sometimes it feels like a lifetime. Sometimes it's exhausting, and sometimes it's lonely. It is important to persist in these efforts. At this time, higher

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

education needs change agents even more than it needs preservationists. Now is the time to work together, find common ground, and build the future together.

REFERENCES

Bates, A. W. (2000). *Managing technological change*. San Francisco, CA: Jossey-Bass.

Birnbaum, R. (1988). *How colleges work*. San Francisco, CA: Jossey-Bass.

Birnbaum, R. (2000). The life cycle of academic management fads. *The Journal of Higher Education*, *71*(1), 1–16. doi:10.2307/2649279

Brandon, J. (2005). *Why email will be obsolete by 2020*. Retrieved from https://www.inc.com/john-brandon/why-email-will-be-obsolete-by-2020.html

Bunio, C. (2018). *Microsoft higher education: Executive briefing presentation* [PowerPoint slides]. Academic Press.

Cameron, K. S., & Quinn, R. E. (2006). *Diagnosing and changing organizational culture based on the competing values framework* (2nd ed.). San Francisco, CA: Jossey-Bass.

Carr, N. G. (2003, May). IT doesn't matter. *Harvard Business Review.* Retrieved from https://hbr.org/2003/05/it-doesnt-matter

Clark, E. (2018, May 21). Digital transformation: What is it? *EDUCAUSE Review*. Retrieved from https://er.educause.edu/articles/2018/5/digital-transformation-what-is-it

Eckel, P., Hill, B., & Green, M. (1998). *On change I: En route to transformation*. Washington, DC: American Council on Education.

Eckel, P., Hill, B., Green, M., & Mallon, B. (1999). *On change II, reports from the road: Insights on institutional change*. Washington, DC: American Council on Education.

Georgia State University. (2018). *Student success* [Video file]. Retrieved from https://success.gsu.edu/approach/

Gruman, G. (2016, June 14). What digital transformation really means. *InfoWorld*. Retrieved from https://www.infoworld.com/article/3080644/it-management/what-digital-transformation-really-means.html

Hawkins, B. (2006). Habits of successful IT professionals. In C. Golden (Ed.), *Cultivating careers: Professional development for campus IT* (pp. 8.1-8.11). Academic Press. Retrieved from https://www.educause.edu/~/media/files/library/2006/1/pub7201w-pdf.pdf?la=en

Hawkins, B. (2008). *Playing at the big table* [PowerPoint slides]. Academic Press.

IDEO. (2018). *Design thinking*. Retrieved from https://www.ideou.com/pages/design-thinking

Katz, R. N., & Salaway, G. (2004, January). *Information technology leadership in higher education: The state of the community*. Retrieved from https://er.educause.edu/articles/2004/1/~/media/20a9fbf854e043eaae9e9a92443478ce.ashx

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Lederman, D. (2017, July 19). The culling of higher education begins. *Inside Higher Ed.* Retrieved from https://www.insidehighered.com/news/2017/07/19/number-colleges-and-universities-drops-sharply-amid-economic-turmoil

Leiner, B. M., Cerf, V. G., Clark, D. D., Kahn, R. E., Kleinrock, L., Lynch, D. C., . . . Wolff, S. (1997). *Brief history of the internet*. Retrieved from https://www.internetsociety.org/internet/history-internet/brief-history-internet/

Lewis, B. (2011). *Bare bones change management: What you shouldn't not do*. Eden Prairie, MN: IS Survivor Publishing.

Libert, B., Beck, M., & Wind, Y. (2016, July). 7 Questions to ask before your next digital transformation *Harvard Business Review*. Retrieved from https://hbr.org/2016/07/7-questions-to-ask-before-your-next-digital-transformation

Musgrove, M. (2007, May). E-mail reply to all: Leave me alone. *The Washington Post.* Retrieved from http://www.washingtonpost.com/wp-dyn/content/article/2007/05/24/AR2007052402258.html

Pepicello, W. (2012). University of Phoenix. In D. Oblinger (Ed.), Game changers: Education and information technologies (pp. 133–144). Academic Press. Retrieved from https://www.educause.edu/~/media/files/library/2012/5/pub720310-pdf.pdf?la=e

Quinton, S. (2013, September 23). Georgia State improved its graduation rate by 22 points in 10 years. *The Atlantic*. Retrieved from https://www.theatlantic.com/education/archive/2013/09/georgia-state-improved-its-graduation-rate-by-22-points-in-10-years/279909/

Renick, T. M. (2018, July 1). How to best harness student-success technology. *The Chronicle of Higher Education*. Retrieved from https://www.chronicle.com/article/How-to-Best-Harness/243798

Rouse, M. (2017, August). data governance (DG). *Techtarget*. Retrieved from https://searchdatamanagement.techtarget.com/definition/data-governance

Sastray, S. S. (2018, June). Universities and the digital transformation of society. *Berkeley Engineer*. Retrieved from https://engineering.berkeley.edu/magazine/spring-2018/universities-and-digital-transformation-society

Stoller, E. (2014, June 5). The business of higher education. *Inside Higher Ed.* Retrieved from https://www.insidehighered.com/blogs/student-affairs-and-technology/business-higher-education

Thelin, J. R. (2004). *A history of American higher education*. Baltimore, MD: The Johns Hopkins University Press.

Tierney, W. G. (1988). Organizational culture in higher education. *The Journal of Higher Education*, *59*(1), 2–21.

Tierney, W. G., & Lanford, M. (2018). Institutional culture in higher education. In J. C. Shin & P. N. Teixeira (Eds.), *Encyclopedia of international higher education systems and institutions*. Dordrecht: Springer. doi:10.1007/978-94-017-9553-1_544-1

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago, IL: University of Chicago Press.

U.S. Government Accountability Office. (2014). *Higher education: State funding trends and policies on affordability*. Retrieved from https://www.gao.gov/assets/670/667557.pdf

Vogels, W. (2006). *Working backwards*. Retrieved from https://www.allthingsdistributed.com/2006/11/working_backwards.html

Weick, K. E. (1976). Educational organizations as loosely coupled systems. *Administrative Science Quarterly*, *21*(1), 1–19. doi:10.2307/2391875

Weinzweig, A. (2008). Why and how visioning works. *Zingtrain*. Retrieved from http://www.zingtrain.com/content/why-and-how-visioning-works

ADDITIONAL READING

Bolman, L. G., & Deal, T. E. (2003). *Reframing organizations: Artistry, choice, and leadership* (3rd ed.). San Francisco, CA: Jossey-Bass.

Collins, J. (2001). *Good to great: Why some companies make the leap…and others don't*. New York, NY: Harper Collins.

Collins, J. (2005). *Good to great and the social sectors: A monograph to accompany good to great*. Boulder, CO: Jim Collins.

Kezar, A., & Eckel, P. D. (2002). Examining the institutional transformation process: The importance of sensemaking, interrelated strategies, and balance. *Research in Higher Education*, *43*(3), 295–328. doi:10.1023/A:1014889001242

Kezar, A., & Eckel, P. D. (2002). The effects of institutional culture on change strategies in higher education: Universal principles or culturally responsive concepts. *The Journal of Higher Education*, *73*(4), 435–460.

Kezar, A. J. (2001). *Understanding and facilitating organizational change in the 21st century: Recent research and conceptualizations*. San Francisco, CA: Jossey-Bass.

Schein, E. H. (2004). *Organizational culture and leadership* (3rd ed.). San Francisco, CA: Jossey-Bass.

KEY TERMS AND DEFINITIONS

ADKAR: A change management model created by Jeff Hiatt that includes the following steps: awareness, desire, knowledge, ability, and reinforcement. The model can be used for both planning and benchmarking.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Agile: The quality of being quick to respond to change, and the ability to plan for emerging change. Agile project management principles include sprints to produce deliverables quickly, gather feedback to regroup or proceed to the next deliverable.

Business Process Analysis: The act of mapping a business process in a comprehensive manner. The process provides documentation and helps identify improvement opportunities.

Change Management: The planning and processes associated with identifying all stakeholders, determining their needs, and addressing them to the extent possible.

Culture: The shared identity of an organization that is both fluid and enduring. Identity is influenced by both the internal and external environment as well as outliers, norms, values, and structures.

EDUCAUSE: The leading professional organization for technology leaders and professionals in higher education.

IT Governance: The way that a campus defines roles and accountabilities for information technology; this process typically encompasses policies and standards for the multiple technology domains such as security, project management, IT procurement, data, enterprise resources planning, etc.

RACI: This acronym stands for responsible, accountable, consulted, and informed. This model provides a useful matrix for clarifying roles and expectations in the context of governance, projects, etc. Responsible generally refers to those who will do the work; accountable refers to the executive sponsor.

Silos: Semi-autonomous sub-units in an organization. Sub-units can be a barrier to transformation if they own campus-wide processes or data, and they resist collaboration.

Technical Debt: The result of taking short cuts for short term gains; the short cuts decrease efficiency and increase costs.

Transformational Leadership: A type of pragmatic, selfless leadership that focuses on identifying strategies to achieve goals and outcomes rather than recognition.

Vision: The achievable aspirations of your organization. Ideally, the aspirations are clear and reiterated frequently.

This research was previously published in Technology Leadership for Innovation in Higher Education; pages 1-25, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 69
Determining the Accessibility of e-Government Websites in Sub-Saharan Africa Against WCAG 2.0 Standard

Silas Formunyuy Verkijika
University of the Free State, Bloemfontein, South Africa

Lizette De Wet
University of the Free State, Bloemfontein, South Africa

ABSTRACT

The purpose of this study was to determine the conformance levels of government websites in Sub-Saharan Africa (SSA) to Web Content Accessibility Guidelines (WCAG) 2.0 and examine which macro factors influenced the accessibility these websites. The findings indicated that the majority of government websites in SSA still had a long way to go to become accessible based on the WCAG 2.0 standards. None of the 217 government websites examined adhered to all the WCAG 2.0 guidelines. Cross country analysis showed that there are three macro factors influencing e-government accessibility in SSA, namely Human Development Index (HDI), Corruption Perception Index (CPI), and percentage of the active population (15-64 years). Countries with high HDI levels and low CPI levels tend to have websites with fewer accessibility errors, while those for countries with high percentage of the active population have more accessibility errors.

INTRODUCTION

During the last two decades, governments in developing countries have progressively adopted e-government as an essential means of improving their general performance. E-government, which broadly refers to the espousal of Information and Communication Technologies (ICTs) into mainstream government activities, is continuously becoming an extremely valuable strategy for governments to enhance their

DOI: 10.4018/978-1-7998-7297-9.ch069

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

administrative efficiency, gain citizen's trust, eliminate corruption, and ultimately boost democratic governance (Elbahnasawy, 2014; Jun, Wang, & Wang, 2014; Seifert & Chung, 2009). Eliassen and Sitter (2007) expound that e-government initiatives have significantly improved how the public sector manages its resources and deliver required services to the public. Consequently, e-government development has become a vital precondition in the strategy of many governments worldwide (Hui, Xiaolin & Jianying, 2014; Sorrentino, & De Marco, 2013). With government websites being one of the key platforms for government interaction with citizens and other stakeholders, a key e-government competency has been the creation of universally accessible government websites to allow the broad-spectrum of e-government stakeholders to gain access to government information and e-services. Ensuring e-government accessibility is particularly important as it enables all citizens, including those with any form of cognitive or functional limitations, to effectively access government services.

People with disabilities form a considerable part of the world's population, and the need to provide them with access to government information and electronic services have gained considerable attention over the years. Latest statistics from the World Health Organization (WHO, 2011) indicated that over 15% of the world's population was affected by from some form of disability (over 1 billion people), of which 80% are found in developing countries. The case is even worse for poor people living in developing countries as 20% of them are affected by some form of disability (World Bank, 2011). This is concerning, as many factors within a country can establish and maintain barriers to access of e-government services that prevent people with disabilities from actively engaging in economic, civic, and community life (Kuzma Dorothy & Oestreicher, 2009; World Bank, 2011). As such, several researchers (Kuzma, 2010; Olalere & Lazar, 2011; Youngblood, 2014; Abanumy, Al-Badi & Mayhew, 2005; Adepoju et al., 2016; Al Mourad & Kamoun, 2013) across the globe have engaged in e-government accessibility research to examine the compliance levels of e-government portals and provide directions for improving their accessibility. Albeit web accessibility guidelines are well developed, many government websites do not comply with these guidelines (Leist & Smith, 2014). Even in developed countries where e-government accessibility has matured immensely, evidence still indicates that the accessibility compliance of government websites have not improved noticeably over the last two decades (Youngblood, 2014). Consequently, governments in the developed world are continuously enforcing stringent legislations to mandate the accessibility of these websites. This is, however, not the case with countries in the developing world regions, like Sub-Saharan Africa (SSA), where accessibility laws are either non-existent or less stringent (Kuzma et al., 2009).

While e-government accessibility research has gained momentum and is receiving considerable attention in many parts of the globe, there is still a dearth of such research in SSA. E-government development, adoption and diffusion in SSA still lack behind other regions of the globe and the only way to ensure that a wide array of people can access e-government services in SSA is to make the government websites more accessible. Current efforts to examine the state of e-government accessibility in SSA include Adepoju, Shehu and Baker (2016); Costa, Fernandes, Neves, Duarte, Hijón-Neira and Carriço (2013); and Kuzma et al., (2009). With almost all countries in SSA having some form of government website and the existing studies covering less than 15% of these countries, it is evident that there is still a huge gap in terms of understanding the state of e-government accessibility in SSA. In order to fill in this gap, and to contribute to the development of universally accessible government websites in SSA, this study will address the following objectives:

- Determine the compliance levels of government website accessibility in SSA

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Identify the specific accessibility guidelines that are most commonly violated by government websites in SSA
- Examine which macro level factors influenced government websites' accessibility in SSA

Government Website Accessibility

Website accessibility refers to the capability of making websites accessible to a wide array of possible users regardless of their technical aptitude or possible disabilities, thus ensuring that all users have equal access to information and functionality (Olalere & Lazar, 2011; Reis, Barroso and Goncalves, 2013; Shi, 2007). The need to ensure that government websites are accessible to people with disabilities (e-inclusion) have been widely emphasised across the globe. E-government services need to be accessible to every stakeholder who needs the services in order for its benefits to be fully enjoyed by all. As such, the delivery of government services over the internet holds promise for all citizens as the World Wide Web (WWW) is primarily designed for everybody. The WWW Consortium (W3C, 2010) explicates that the internet "is fundamentally designed to work for all people, whatever their hardware, software, language, culture, location, or physical or mental ability."

Several researchers (Potter, 2002; Olalere and Lazar, 2011; Kuzma, 2010; Youngblood, 2014) have contributed to the literature on government website accessibility by evaluating non-SSA government websites in different countries. For example, in the United States, Potter (2002) evaluated the accessibility of government websites in Alabama and found that about 80% of the websites had accessibility errors. Over a decade later, Youngblood (2014) revisited the evaluation of Alabama government websites and established that there had not been any substantial improvement since Potters' evaluation. At the level of federal websites in the United States, Olalere and Lazar (2011) found that 90% of the websites failed in at least one of the accessibility guidelines, which is similar to results obtained in prior studies in the USA (Jaeger, 2006; West, 2008). In the United Kingdom (UK), Kuzma (2010) showed that only about 5% of a total of 130 evaluated government websites met all the accessibility criteria. Likewise, in the Netherlands, Butt (2014) evaluated three Dutch government websites and found that all three failed in at least one aspect of website accessibility.

In the Middle East and Asia, researchers have examined e-government accessibility in Saudi Arabia and Oman (Abanumy et al., 2005), Dubai (Al Mourad & Kamoun, 2013), China (Sun & Chen, 2010), and Malaysia (Latif & Masrek, 2010). All these different studies had a common finding suggesting that government websites in the Middle East and Asia still have a long way to go in terms of accessibility. None of these evaluated websites met all the examined accessibility evaluation success criteria.

Lastly, as briefly mentioned before, there have also been some efforts to evaluate government website accessibility in SSA. Adepoju et al. (2016) recently examined 34 state-level government websites in Nigeria and found that none of the websites fully met the evaluated accessibility standards. Also, Costa et al. (2013) evaluated government websites in three SSA countries (i.e. Angola, Mozambique and South Africa) and established that government websites in all the three countries were plagued by accessibility issues. Kuzma et al. (2009) examined the accessibility of government websites in four SSA countries (i.e. South Africa, Namibia, Liberia and Kenya) and concluded that all the countries had a large number of errors for each of the accessibility priority levels. Nonetheless, out of the 24 SSA government websites evaluated in these four countries, there were two (one for Namibia and one for Kenya) that met all the accessibility criteria. It is important to note that the study by Kuzma et al. (2009) was based on Web

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Content Accessibility Guidelines version 1.0 (WCAG 1.0) which have become obsolete as a result of numerous calls for governments to upgrade to WCAG 2.0 compliance.

Evolution of WCAG

Several accessibility standards and guidelines have been developed, such as the WCAG, Section 508 of the U.S. Rehabilitation Act Amendments of 1998 (henceforth referred to simply as Section 508), Microsoft's Guidelines for Accessible Web Pages, UK's Disability Discrimination Act (DDA) of 1995, and the Stanca Act of 2004 (Abanumy et al., 2005; Kuzma et al., 2009; Youngblood, 2014). Among these different accessibility standards and guidelines, the most widely used in the domain of e-government accessibility are the WCAG and Section 508. However, the WCAG is the most preferred standard around the world, as it is internationally accredited (ISO/IEC 40500), most explicit and also written in an objectively testable manner (Lazar, Goldstein & Taylor, 2015). Moreover, competing standards (including Section 508) are mostly based on the WCAG, with many governments around the world currently using WCAG 2.0 as their preferred standard, while others have been updating their laws to incorporate provisions outlined in WCAG 2.0 (Youngblood, 2015; United States Access Board, n.d). As such, WCAG 2.0 has been argued to be the core accessibility standard around the world (Akgul, 2015; Lazar et al., 2015), and thus, the most preferred benchmark for evaluating accessibility of websites in different countries (Al Mourad & Kamoun, 2013; Butt, 2014; Kuzma, 2010).

The WCAG was developed by the Web Accessibility Initiative (WAI) of the W3C and the first version (WCAG 1.0) was released in 1999 (W3C, 2008). Since then, a later version (WCAG 2.0) was released in 2008 (W3C, 2008). On the other hand, Section 508 is a US legislation of accessibility that was signed into law in 1998 and went into effect in 2001. There is actually a huge overlap between Section 508 and WCAG 1.0, as section 508 guidelines were fundamentally developed from the WCAG 1.0 standard (Olalere & Lazar, 2011; Youngblood, 2014). With the development of WCAG 2.0, the US Access Board, which is responsible for developing accessibility policy in the US, made a detailed comparison between WCAG 2.0 and Section 508 and found that there were several new dimensions that Section 508 did not cover. As a result, the US Access Board has been working to revise Section 508 guidelines to match WCAG 2.0 standards (United States Access Board, n.d). This suggests that the WCAC 2.0 standards are the leading accessibility standards at the moment. Additionally, Section 508 guidelines are based on US-specific legislation, while the WCAG standards are applicable worldwide. As such, studies outside the US mostly focus on the WCAG guidelines (Adepoju et al., 2016; Al Mourad & Kamoun, 2013; Butt, 2014; Kuzma, 2010; Kuzma et al., 2009). With the development of WCAG 2.0, the WCAG 1.0 guidelines became obsolete, with websites that were previously WCAG 1.0 compliance being advised to upgrade to WCAG 2.0 (Al Mourad & Kamoun, 2013; Kamoun et al., 2013). As such, this study will only focus on WCAG 2.0 guidelines.

WCAG 2.0 standards emphasise the need for websites to meet four fundamental accessibility principles (W3C, 2010). These principles are perceivable, operable, understandable, and robust. For websites to be perceivable, the information of the website and user components must be presentable to users in ways that can meet their different perceptive preferences. The operable principle relates to the need for ensuring that user interface components and navigation are designed in a way that users can manoeuvre it with different options such as mouse and keyboard controls or different devices. The understandable principle emphasises the need to ensure that the information and user interface operations are clear to the users, while the robust principle upholds that content presented in a way that it can be interpreted

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. WCAG 2.0 Guidelines (Compiled from W3C website)

Guideline	Description
1. Perceivable	
1.1. Text Alternatives	Provide text alternatives for any non-text content so that it can be changed into other forms (formats) that people need, such as large print, braille, speech, symbols or simpler language.
1.2. Time-based media	Provide alternatives for time-based media.
1.3. Adaptable	Create content that can be presented in different ways (for example simpler layout) without losing information or structure.
1.4. Distinguishable	Make it easier for users to see and hear content, including separating foreground from background.
2. Operable	
2.1. Keyboard accessible	Make all functionality available from a keyboard.
2.2. Enough time	Provide users with enough time to read and use content.
2.3. Seizures	Do not design content in a way that is known to cause seizures.
2.4. Navigable	Provide ways to help users navigate, find content, and determine where they are.
3. Understandable	
3.1. Readable	Make text content readable and understandable.
3.2. Predictable	Make web pages appear and operate in predictable ways.
3.3. Input Assistance	Help users avoid and correct mistakes.
4. Robust	
8.1. Compatible	Maximize compatibility with current and future user agents, including assistive technologies.

reliably by a wide variety of user agents, including assistive technologies (W3C, 2008). These four principles are evaluated based on twelve accessibility guidelines. Table 1 below presents the different accessibility guidelines as they apply to the four WCAG 2.0 central principles.

WCAG 2.0 evaluations examine these twelve dimensions based on three levels of conformance according to different established success criteria. The conformance levels are levels A, AA, and AAA. Level A depicts the basic website accessibility and is evaluated based on 25 success criteria. It is important for websites to satisfy all the success criteria for level A conformance in WCAG 2.0, as these are considered to be the accessibility aspects that developers must satisfy (West, 2008). Level AA focuses on the most common and biggest barriers faced by people with disabilities, while level AAA is the highest level of accessibility. While it is important to address all success criteria, it is, however, important to note that in some cases, it is not possible to address all level AAA success criteria (W3C, 2008).

Macro Level Factors Affecting E-Government Website Accessibility

Macro factors generally refer to national level indices that capture the state of progress in a nation or region using different dimensions especially in the political, legal, economic, social, and technological spheres (Ifinedo, 2012; Ifinedo & Singh, 2011). The development of government websites has long been associated with macro level factors that characterise the jurisdiction of the website. For example, Gaulė and Žilinskas (2013) showed that economic and social factors had a significant influence on the development of government websites in Lithuania. Likewise, Youngblood & Mackiewicz (2012) showed that national income influences the accessibility of government websites. In addition to national income,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

other important macro factors, such as such as HDI, CPI, population age distribution, and commitment to the rights of people with disabilities also capture different socio-political, legal, economic macro environmental resources and capabilities that can provide an understanding of e-government progress in a nation. This follows from the fact that macro factors are particularly important in e-government as macro environmental resources play a vital role in fostering e-government maturity, as well as the dissemination and acceptance/usage of e-government services by citizens (Dias & Costa, 2013; Ifinedo, 2012). With e-government websites being the primary platforms for dissemination of e-government services, it is expected that these macro factors will have a pertinent association with the quality and thus accessibility levels of e-government websites. These factors are discussed below.

National Income

Financial resources play an important role in the development of government websites (Huang, 2007). This has been evident in Alabama when the allocation of more funds towards government website development significantly enhanced the usability of the websites (Youngblood & Mackiewicz, 2012). Likewise, Gaulė & Žilinskas (2013) illustrated by using data from Lithuania that richer municipalities had better-developed government websites than poor municipalities. A macro factor such as national income does not only end at the website development level but can also explain specific aspects of the government website, such as accessibility, as revealed by Youngblood and Youngblood (2013). These authors showed that there was a significant negative correlation between the gross national income (GNI) of a county and the accessibility of its websites, with lower income counties having considerably higher government website accessibility errors. This finding is, however, not surprising, as the link between e-government development and national income has been widely established (UN, 2014). This is because rich countries allocate more financial resources to e-government development. As such, it can be expected that with more resources, rich countries are more likely to develop better accessible websites. This study, therefore, hypothesises that the higher the national income of a country, the fewer the accessibility errors will be among its government websites. Following prior e-government studies (UN, 2014), national income will be operationalised in terms of the GNI per capita.

Human Development

Human development was operationalised in terms of the HDI. The HDI is a measure of a country's overall well-being based on three dimensions, namely: health, education, and standard of living (Deneulin & Shahani, 2009). The link between e-government and HDI has been established in prior literature (Holzer & Manoharan, 2009), with HDI having a positive relationship with e-governance. The 2014 UN e-government survey also showed that countries with higher HDI paid more attention to e-inclusion by providing more e-government services for vulnerable groups, like persons with disabilities and the elderly (UN, 2014). E-inclusion generally entails the act of expanding ICT benefits to everybody and website accessibility is a key aspect of e-inclusion in ensuring that people with disabilities and the elderly can have equal access to e-government services. Since countries with higher HDI pay more attention to e-inclusion, there is a high probability that these countries also pay more attention to the accessibility of government websites to ensure that vulnerable groups can fully gain access to e-government services. This study, therefore, hypothesises that countries with a higher HDI will have government websites with fewer accessibility errors, as they pay more attention to making their websites accessible to all stakeholders.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Corruption

Corruption in public administration generally refers to "the misuse of public power or authority for private gains" (UNDP, 2008). E-government is expected to yield several benefits to governments and citizens; however, its development, especially in SSA, is significantly thwarted by corruption (Cloete, 2012). Several researchers (Aladwani, 2016; Corojan & Criado, 2012; Kim, 2014) have highlighted the notion that corruption significantly contributes to the failure of e-government projects in developing nations. From a technical perspective, many studies (Kirui & Kemei, 2014; Ray, 2011) have indicated that e-government projects in developing countries have failed because of poor usability. It is, therefore, possible that corruption in e-government projects can lead to the redirection of resources, thereby leaving little room for developing high quality, usable websites. This is in line with the argument presented by Aladwani (2016) that corruption in developing countries limits the moral and governance abilities of administrative systems managing e-government projects in a manner that inhibits their capability to produce e-government initiatives that meet stakeholder expectation thus resulting in failure of the projects. As mentioned before, one such key stakeholder expectation in terms of government websites is to ensure that these websites are accessible to all stakeholders, including people with disabilities and the elderly. Consequently, if corruption negatively affects the quality of government website projects, there is a possibly that such government websites will have poor accessibility? In this regard, this study hypothesises that government websites in highly corrupt countries will have more accessibility errors than those in less corrupt countries.

Population Age Distribution

The link between population age distribution and e-government services have been widely discussed in extant literature (Baker, Al-Gahtani, & Hubona, 2007; Gaulė and Žilinskas, 2013; Xu & Asencio, 2015; Wigand, 2011). Xu and Asencio (2015) showed that e-government development was negatively associated with the elderly (i.e. people older than 65 years). This trend can be attributed to the fact that older people are more resistant to change and thus less likely to adopt and use e-government services (Baker *et al*., 2007). In Lithuania, Gaulė and Žilinskas (2013) established that while the development of government websites was not associated with the elderly population, it actually had a significant positive correlation with the percentage of active citizens. This could possibly be explained by the fact that active citizens mostly preferred communication via the internet, while the elderly prefer face-to-face communication (Wigand, 2011). Nonetheless, it is generally emphasised that e-government services should be widely available to vulnerable groups as they are also consumers of many government services (Gaulė & Žilinskas, 2013). With a higher percentage of people with disabilities belonging to the elderly population (Youngblood & Mackiewicz, 2012), there is a greater need to develop accessible government websites to cater for the elderly. As such, this study hypothesises that the higher the percentage of elderly in a country, the more accessible the government websites will be. Similarly, since the active citizens are currently the predominant users of e-government services (Xu & Asencio, 2015) and their percentage is positively correlated with the development of government websites (Gaulė & Žilinskas, 2013), it is expected that the percentage of active citizens will positively correlate with high government website accessibility.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Commitment to Disability

As already mentioned in the previous sections, a key goal of accessibility research in e-government is to enable people with disabilities to gain equal access to e-government services (Akgul, 2015; Bakhsh & Mehmood, 2012; Jaeger, 2006). While several countries in the developed world have laws protecting people with disabilities, most developing world countries, especially those in SSA, lack such laws (Kuzma *et al*., 2009). However, in 2006, the UN passed a Convention on the Rights of the Disabled in a bid to protect people with disabilities worldwide. To date, several countries in SSA have signed the treaty, while others have gone so far as to ratify the treaty. Protecting the rights of people with disabilities in the context of e-government entails ensures that they can easily access e-government services. Arbour (2007) explicates that the UN convention provides an incentive for governments to improve access to ICTs for the disabled. This is because Article 9 of the UN Convention on the Rights of the Disabled emphasises the need for making ICTS accessible in such a way. As such, it is expected that countries that have committed to the treaty will increase access to their e-government services to people with disabilities. Since this can be attained through government website accessibility, this study hypothesis that a country's level of commitment to the Rights of the Disabled treaty (i.e. by signing or ratifying the treaty) will have a significant impact on the accessibility of its government websites.

METHODOLOGY

Sample Selection

In order to determine how well government websites in SSA adhere to accessibility guidelines, it is important to have a representative set of websites from SSA, as well as enough websites from a given SSA Country. As such, seven websites were selected from each SSA country included in the study. Seven websites are enough to depict the state of accessibility in a country as in Kuzma et al. (2009), while also maintaining a manageable amount of total websites for the study. The websites were grouped around seven government ministries as a means to ensure consistency across the different countries. The different ministries included in the study were: ministries of Finance, Education, Health, Tourism, Labour, International Affairs and the website of the Presidency. All the countries in SSA did not share the exact same portfolios for each of the ministries, as some governments had one ministry to cover more than one portfolio. However, the websites were carefully evaluated and selected based on them covering the selected portfolios. Additionally, only websites presented in English and/or French were selected to allow the researchers to fully verify that the website was the official website of a given government ministry of an SSA country. Out of the forty-nine countries in SSA, thirty-one (63.3%) fulfilled the conditions to be selected for this study. A total of eight countries (Eritrea, Somalia, Angola, Mozambique, Sao Tome and Principe, Cape Verde, Sudan and Mauritania.) were eliminated because their websites were not in English or French, while ten countries (Guinea, Swaziland, South Sudan, Togo, Guinea-Bissau, Niger, Equatorial Guinea, Central African Republic, Congo, and Comoros) were eliminated because e-government was still in its infancy with few or no websites to be considered. In total, 217 government websites from 31 countries in SSA were evaluated in this study.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Accessibility Evaluation

Accessibility can always be evaluated either with the use of automated accessibility testing tools or with manual evaluation methods by human evaluators. Even though a combination of both methods provides the most optimal accessibility evaluation, using only automated evaluation still provides a reliable indication of website accessibility. Similar to prior studies (Abanumy et al., 2005; Adepoju et al., 2016; Al Mourad & Kamoun, 2013) this study adopted an automated tool for accessibility evaluation. In order to assess the WCAG 2.0 conformance of government websites in SSA, an appropriate accessibility tool needed to be selected. Even though numerous automated accessibility testing tools exist, they differ in several ways, such as cost, presentation of reports, conformance levels, etc.

Amidst these tools, TAW (Test de Accesibilidad Web) was selected for this study because of it being a free tool and its breadth and depth of report presentation that is easier to comprehend in line with the WCAG 2.0 guidelines. TAW is a Java-based tool developed by the Spanish Center for the Development of Information and Communication Technologies. It has also been used to examine accessibility in several prior studies (Adepoju et al., 2016; Akgul, 2015; Al Mourad & Kamoun, 2013; Butt, 2014). The validity of TAW in comparison with other accessibility tools was also presented by Al Mourad and Kamoun (2013) by showing that the accessibility evaluation results from TAW correlated with results from another widely accepted accessibility evaluation tool known as EvalAccess 2.0. TAW was designed to evaluate all three levels of conformance, thus testing all three priority levels.

Only the homepages of the 217 government websites were examined. It is frequently argued that the homepages of government websites are usually the first point of contact with users and, therefore, very important to be highly accessible (Akgul, 2015; Olalere & Lazar, 2011). This is because homepages shape a user's first impression of the website (Olalere & Lazar, 2011). Additionally, Vigo, Abascal, Aizpurua and Arrue (2009) showed that the accessibility error profile of a homepage mirrored that of other pages in the website. Consequently, the focus on limiting e-government web page accessibility to the homepage has been widely adopted in e-government accessibility studies (Akgul, 2015; Al Mourad & Kamoun, 2013; Olalere & Lazar, 2011; Youngblood & Mackiewicz, 2012). This also allows for cross-study comparisons of accessibility evaluations.

Macro Level Measures

As explained above, five macro level indices were used for examining cross-country differences in accessibility. These include the HDI, GNI, CPI, Commitment to UN treaty of the Rights of the Disabled, and population age distribution. The most recent data for each of the macro indices was used to capture the current state of each country in relation to the current state of its government website accessibility. The following data sources were used to obtain data for the Macro Level indices (Table 2).

RESULTS AND DISCUSSION

Conformance to WCAG 2.0 Standard

The results in Table 3 depict the accessibility compliance level of government websites in SSA based on the 3 priority levels across the four domains of the WCAG 2.0 guidelines. Looking at all WCAG

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Data sources for Macro Level indices

Variable	Description of data
HDI	2014 Human Development Index data from the 2015 Human Development Report (UNDP, 2015).
National Income	2014 Gross National Income (GNI) per capita based on purchasing power parity. GNI World Bank data last updated on February 27, 2016 (World Bank, 2016a).
CPI	2015 CPI data from Transparency International (Transparency International, 2015).
UN disability	Country status as on January 31, 2016, regarding the Convention on the Rights of Persons with Disabilities (United Nations, 2016).
Population Age Distribution	2014 age demographics data from the World Bank (World Bank, 2015). Two data groups of interest were used in this study namely: the active population group (i.e. age 15-64 years.) and the elderly population group (i.e. older than 65 years.)

2.0 domains, it is evident that all 217 government websites had some form of accessibility error. The mean number of errors per website was 53.5 with a median of 41, suggesting that over 100 government websites in SSA have more than 41 accessibility errors. These findings further confirm the dire state of government website accessibility in SSA, as shown by prior studies (Adepoju et al., 2016; Costa et al., 2013; Kuzma et al., 2009; Makoza & Chigona, 2013). This trend of poor accessibility is, however, not only common to government websites in SSA. Kamoun et al. (2013) evaluated 21 Dubai government websites for WCAG 2.0 compliance and found that all had accessibility errors. Similarly, an evaluation of 130 government websites in the UK for WCAG 2.0 compliance showed that only 5% had no accessibility errors (Kuzma, 2010). However, the UK websites fared far better than those in SSA, as the average errors per website were 3.6 with an average of 7.7 warnings compared to 53.5 mean errors and 440.7 mean warnings for SSA websites.

The most common accessibility errors were operable errors, where 98.6% of the websites had at least one type of operable error. Similarly, all the websites had accessibility warnings for the operable dimension. The websites had an average of 17.1 errors and 33 warnings. The main operable dimension that is a call for concern based on high errors and warnings is user navigation. It is imperative to make websites accessible in ways that allow users to easily navigate and find content. If not, this would hinder the overall navigation of a government website, which is very disturbing, as navigation is one of the essential usability dimensions vital for user adoption and usage of government websites.

The second WCAG 2.0 domain needing attention among SSA government websites was the perceivable domain. The most violated perceivable guideline was the creation of content that could be presented in different ways without losing its meaning, including being presented for use by assistive technologies. Equally violated was the lack of text alternatives for non-text content.

The third critical domain was the robust domain which dealt with maximising compatibility with current and future tools. A total of 88.9% of the websites demonstrated robust errors, with errors averaging 11.8 and warnings 308.1.

The understandable domain had the most websites in compliance. About 20% of the websites had no understandable errors. The understandable factor in which more than half of the websites faltered, had to do with helping users to avoid and correct mistakes. The country level analysis is provided below in Figure 1.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Accessibility errors

Domains	Accessibility Errors							
	Number Websites with Error (%)				Average Number of Errors (Median)			
	A	AA	AAA	W	A	AA	AAA	W
PERCEIVABLE								
1.1	181(83.4)	0(0)	0(0)	191(88.5)	10.1(5)	0(0)	0(0)	18.1(13)
1.2	4 (1.8)	0(0)	0(0)	8(3.7)	0.1(0)	0(0)	0(0)	0.4(0)
1.3	204(94.0)	0(0)	0(0)	195(88.0)	12.5(4)	0(0)	0(0)	34.0(17)
1.4	0(0)	0(0)	0(0)	200(92.2)	0(0)	0(0)	0(0)	27.1(22)
Overall	211(97.2)			205(94.5)	22(12)			79 (59)
OPERABLE								
2.1	5(2.3)	0(0)	49(22.6)	49(22.6)	0.1(0)	0(0)	1.6(0)	1.4(0)
2.2	27(12.4)	1(0.5)	2(0.9)	0(0)	0.2(0)	0(0)	0.1(0)	0(0)
2.3	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
2.4	185(85.25)	0(0)	203(93.6)	217(100)	7.1(5)	0(0)	8.1(5)	31.9(29)
Overall	214(98.6)			217(100)	17.1(12)			33(30)
UNDERSTANDABLE								
3.1	85(39.2)	0(0)	0(0)	1(0.5)	0.4(0)	0(0)	0(0)	0.1(0)
3.2	69(32.8)	0(0)	2(0.9)	151(69.9)	0.4(0)	0(0)	0.1(0)	11.2(6)
3.3	122(56.2)	0(0)	0(0)	154(70.9)	1.2(1)	0(0)	0(0)	8.6(8)
	174(80.2)			187(86.2)	2.1 (1)			19.8 (16)
ROBUST								
4.1	193(88.9)	0(0)	0(0)	200(92.2)	11.8(7)	0(0)	0(0)	308.1(61)
	193(88.9)			200(92.2)	11.8 (7)			308.1(61)
All Categories	217(100)			217(100)	53.5(41)			440.7(232)

A, AA, and AAA indicates accessibility errors in the three levels of conformance, while W indicated the total accessibility warnings.

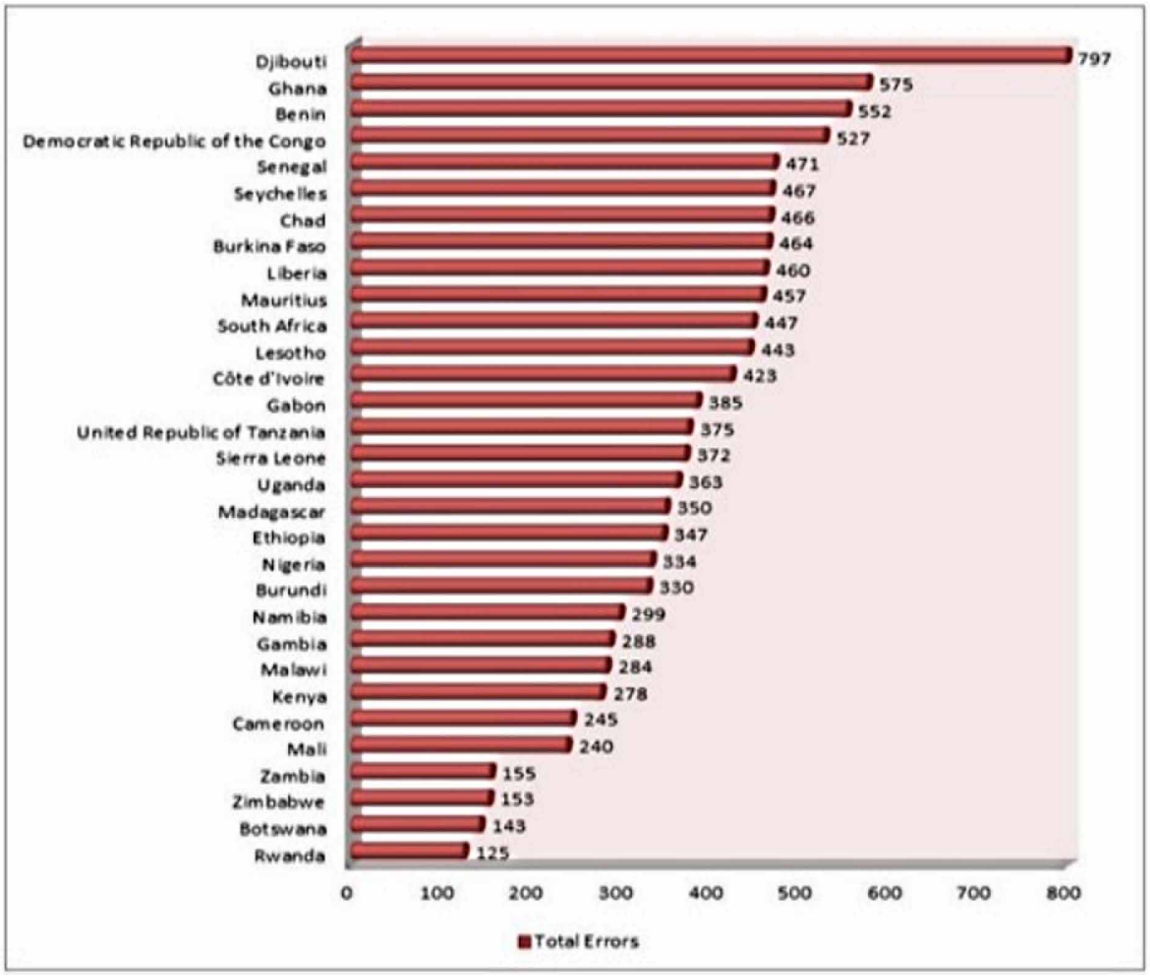
Country Level Analysis

Figure 1 depicts the total number of errors for all seven websites in each of the 31 SSA countries.

Rwanda, Botswana, and Zimbabwe were the top scoring countries with the least accessibility errors. On the other end, Djibouti, Ghana, and Benin were the worst in terms of government website accessibility. It is not surprising to see Rwanda and Zimbabwe at the top of accessibility in SSA, as they were part of the countries that have fully ratified the UN Convention on the Rights of Persons with Disabilities. This suggests that these countries are practicing what they signed up for. Even though Botswana is not a signatory of the convention, the country has a national policy on care for people with disabilities and has implemented several programs focused on improving accessibility in government institutions. However, it is surprising that the three worst scoring countries in terms of accessibility have all ratified the UN convention. Ghana, Benin, and Djibouti ratified the convention in 2012, yet to date; they are still to enforce accessibility of government websites. Next, we examined the country level factors that depict the differences in government website accessibility.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Accessibility errors among SSA countries



Association with Macro Factors

The results in Table 4 indicate that the HDI, active population, and CPI are significant indicators of the state of e-government accessibility in SSA countries. The significant negative association of HDI indicates that countries with higher HDIs had fewer accessibility errors. This is in line with the findings of the 2014 UN e-government survey (UN, 2014) that concluded that countries with a higher HDI paid greater attention in providing services to vulnerable groups like persons with disabilities. In terms of e-inclusion, accessibility is one of the ways to ensure that vulnerable groups can gain access to e-government services. As such, this increased attention to e-inclusion from countries with a higher HDI is evident in SSA. High HDI countries are seen to have government websites with fewer accessibility errors. The significant positive association of percentage of active population depicts that countries with a high population of active citizens who have a high demand for e-government services resulted in high accessibility errors. Since the active population prefers the internet and have a high demand for e-government services, governments in SSA with a high percentage of active citizens might focus more

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Regression analysis of macro factors and E-government accessibility

Variables	Regression Results		
	Beta	T-Value	Significance
Intercept		-1.139	0.266
Human Development (HDI)	-0.773	-3.743	0.001***
National Income (GNI)	-0.090	-0.309	0.760
Percentage Elderly Population	0.354	1.177	0.251
Percentage Active Population	0.847	2.467	0.021**
Corruption (CPI)	-0.470	-2.247	0.034**
Commitment to Disability	0.104	0.712	0.483
Model Parameters			
R^2	0.523		
Adjusted R^2	0.404		
F-Value (Sig.)	4.392 (0.004)***		

***sig at 1%, ** sig. at 5%

on providing different kinds of e-government services without putting enough effort in their accessibility. This could result from the fact that the weak demand for e-government services from the elderly population does not signal the need for e-inclusion. Lastly, the significant negative beta for CPI indicates that countries that are less corrupt (i.e. countries with a high CPI) tend to have fewer accessibility errors. This is possibly because less corrupt countries are more likely to be transparent in awarding contracts for government website development, thus selecting the most qualified team to develop the websites. On the other hand, highly corrupt countries can award contracts based on who knows who, thus hiring poorly qualified developers who might not have the necessarily skills to develop highly accessible websites. Additionally, the misappropriation of funds required for the development of government websites can significantly hinder the project, resulting in the development of poorly accessible websites. With corruption noted to significantly hinder the maturity of e-government initiatives (Signh et al., 2007) and to contribute to their failures (Aladwani, 2016), it is, therefore, not surprising that corrupt nations develop poorly accessible websites. Without the development of highly accessible government websites, these websites are likely to stifle and fail due to lower user adoption and usage.

Limitations and Directions for Future Studies

This study had three fundamental limitations. Firstly, the scope of government websites covered in the study is limited to ensure full generalisation of the findings to all of SSA. The eight SSA countries that were eliminated from the sample, because their websites were not in English or French are a significant number that if included in this study could change the outcome of the findings. However, evidence from two of these countries (Angola, Mozambique) as presented by Costa et al. (2013), shows similarities with data from the SSA countries represented in this study. Nonetheless, it is imperative to acknowledge the fact that the findings in this study best represent the state of government website accessibility in French and English speaking SSA countries. Future accessibility studies in SSA could include countries with non-English or French websites.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Secondly, the study only focused on automated accessibility evaluation. This provided limited results as a detailed accessibility evaluation requires a combination of both manual and automated evaluation (Abanumy et al., 2005; Adepoju et al., 2016; Al Mourad & Kamoun, 2013). Additionally, the evaluation only focused on WCAG 2.0 criteria as it is one of the popular testable criteria that can be evaluated via automated testing. Future studies in SSA should incorporate both evaluation methods to provide an optimal assessment of the accessibility of government websites in the region. Also, evaluation of accessibility based on other standards such as the Section 508 should be considered.

Lastly, the study was limited in its evaluation scope of the websites, as only the homepages were evaluated. While there is support for the view that evaluation of homepages provides valuable insights on the accessibility of a website (Akgul, 2015; Al Mourad & Kamoun, 2013; Olalere & Lazar, 2011; Youngblood & Mackiewicz, 2012), evaluations that focus on the entire website are likely to provide a more thorough picture of the state of accessibility, as many more accessibility guidelines can be tested. This is one angle that future studies in SSA can examine and also determine if the accessibility evaluation of homepages in the region provides an adequate representation of the accessibility errors throughout the website.

CONCLUSION

As e-government continues to gain momentum as a key means of dissemination of government information and services to citizens, there is an ever increasing need to ensure the accessibility of government websites so that all citizens can experience the benefits of e-government. In the study, the accessibility of e-government websites in SSA was examined based on WCAG 2.0 standards. The key objective was to determine conformance levels with WCAG 2.0 and also examine which macro factors were associated with government websites' accessibility in SSA.

The findings indicated that the majority of websites in SSA still have a lot to do to become accessible websites based on the WCAG 2.0 standards. This indicates the need for governments in SSA to adopt appropriate strategies for advancing the accessibility of their government websites. These findings reiterate the view that government website accessibility in SSA countries remains poor (Adepoju et al., 2016; Costa et al., 2013; Kuzma et al., 2009; Makoza & Chigona, 2013). The most violated WCAG 2.0 guidelines by government websites in SSA were: user navigation (guideline 2.4), providing text alternatives to non-text content (guideline 1.1), the creation of content that can be presented in different ways, including use by assistive technologies, without losing its meaning (guideline 1.3), compatibility with current and future tools (guideline 4.1), and helping users to avoid and correct mistakes (guideline 3.3). This is more concerning as most of the websites do not meet level A compliance, which is the most basic level of compliance that needs to be met by all websites (Lightner, 2014). It is, therefore, imperative for governments in SSA to enforce measures to improve the accessibility of government websites in their countries. Many governments, especially in developed countries have already mandated WCAG 2.0 for all government websites (Rogers, 2016). SSA governments can also follow the same approach and mandate as well as train its IT staff to update the current websites in accordance with WCAG 2.0 guidelines. It is also vital for web developers responsible for government websites in SSA to take special note of these commonly violated accessibility guidelines and to ensure that they are addressed. Similarly, accessibility workshops for web developers, similar to the one conducted by UNESCO in Rwanda

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(UNESCO, 2015), could also ensure that web developers are trained on how to address these common accessibility barriers in SSA.

Additionally, Cross country analysis showed that three macro factors that were associated with the accessibility of government websites in SSA. These factors were the HDI, CPI, and percentage of active population. Countries that have a high HDI or that are less corrupt tend to have fewer accessibility errors, while countries with a high percentage of active population have more accessibility errors. Kerbing corruption in SSA countries remains a priority if governments are to advance e-government development and create high-quality accessible websites. Corruption is already contributing to the failure of e-government projects in developing countries (Aladwani, 2016), and so is a serious macro factor to consider when working towards enforcing accessibility standards for government websites. Similarly, SSA governments need to promote human development in order to stimulate both the demand and supply for e-government services (Stier, 2015), which is likely to result in the development of high-quality government websites that meet accessibility standards.

This study provides both practical and theoretical contributions. For the practical contributions, the study highlights the current state of government website compliance with WCAG 2.0 standards is most SSA countries from which evaluations have not been documented to date. This provides a knowledge base for government officials and developers in these countries to understand possible accessibility issues plaguing their e-government websites. This not only creates awareness of the problem but can also stimulate further examination of other e-government websites in SSA countries. The study also provides practical recommendations that can be useful for governments in implementing or enforcing accessibility standards. Regarding the theoretical contributions, the study advanced knowledge on the accessibility of government websites in developing countries by providing evidence from 31 SSA countries. This adds to the currently limited work on accessibility of government websites in the region. Additionally, researchers (Dias & Costa, 2013; Huang, 2007; Ifinedo, 2012) have suggested the need to consider the role that macro environmental factors play in e-government development as such knowledge holds significant policy implications. This study provided a contribution in this domain by identifying three macro factors associated with the accessibility of government websites in SSA. Future studies can further explore these associations to provide a deeper understanding of how governments can better use macro environmental resources for advancing e-government as a whole and the development of quality and accessible government websites in particular.

REFERENCES

W3C. (2008). Web Content Accessibility Guidelines (WCAG) 2.0. Retrieved from https://www.w3.org/TR/WCAG20/

W3C (2010). Accessibility — W3C. Retrieved from http://www.w3.org/standards/webdesign/accessibility

Abanumy, A., Al-Badi, A., & Mayhew, P. (2005). E-Government Website Accessibility: In-Depth Evaluation of Saudi Arabia and Oman. *The Electronic Journal of E-Government*, *3*(3), 99–106.

Adepoju, S., Shehu, I., & Baker, P. (2016). Accessibility Evaluation and Performance Analysis of e-Government Websites in Nigeria. *Journal of Advances in Information Technology*, *7*(1), 49–53. doi:10.12720/jait.7.1.49-53

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Akgul, Y. (2015). Web Content Accessibility of Municipal Websites in Turkey. In C. Addams (Ed). *Proceedings of the 15th European Conference on eGovernment ECEG '15* (pp. 1- 8). University of Portsmouth, UK.

Al Mourad, B., & Kamoun, F. (2013). Accessibility Evaluation of Dubai e-Government Websites: Findings and Implications. *Journal of E-Government Studies and Best Practices, 2013*. doi:10.5171/2013

Aladwani, A. (2016). Corruption as a source of e-Government projects failure in developing countries: A theoretical exposition. *International Journal of Information Management*, *31*(1), 105–112. doi:10.1016/j.ijinfomgt.2015.10.005

Arbour, L. (2007). Record number of countries sign UN treaty on disabilities on opening day. *UN.org*. Retrieved from http://www.un.org/apps/news/story.asp?NewsID=22085&Cr=disab&Cr1

Baker, E., Al-Gahtani, S., & Hubona, G. (2007). The effects of gender and age on new technology implementation in a developing country: Testing the theory of Planned Behaviour (TPB). *Information Technology & People*, *20*(4), 352–375. doi:10.1108/09593840710839798

Bakhsh, M., & Mehmood, A. (2012). Web Accessibility for Disabled: A Case Study of Government Websites in Pakistan. *Proceedings of the 10th International Conference on Frontiers of Information Technology* (pp. 342-347). 10.1109/FIT.2012.68

Butt, M. (2015). Result-Oriented Approach for Websites Accessibility Evaluation: Approach tested for three Dutch government websites. *International Journal of Computer Science and Information Security*, *12*(7), 22–30.

Cloete, F. (2012). E-Government lessons from South Africa 2001- 2011: Institutions, state of progress and measurement. *The African Journal of Information and Communication*, *12*, 128–142.

Corojan, A., & Criado, J. I. (2012). E-government for transparency, anti-corruption, and accountability: challenges and opportunities for central American countries. In K. J. Bwalya & S. F. C. Zulu (Eds.), *Handbook of research on e-government in emerging economies: adoption, e-participation, and legal frameworks* (pp. 328–350). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-0324-0.ch016

Costa, D., Fernandes, N., Neves, S., Duarte, C., Hijón-Neira, R., & Carriço, L. (2013, September 2-6). Web Accessibility in Africa: A Study of Three African Domains. *Proceedings of the 14th IFIP TC 13 International Conference*, Cape Town, South Africa (pp. 331-338). 10.1007/978-3-642-40483-2_23

Deneulin, S., & Shahani, L. (2009). *An Introduction to the Human Development and Capability Approach: Freedomand Agency*. London: Earthscan.

Dias, G. P., & Costa, M. (2013). Significant socio-economic factors for local e-government development in Portugal. *Electronic Government*, *10*(3-4), 284–309. doi:10.1504/EG.2013.058785

Elbahnasawy, N. (2014). E-government, internet adoption, and corruption: An empirical investigation. *World Development*, *57*, 114–126. doi:10.1016/j.worlddev.2013.12.005

Eliassen, K. A., & Sitter, N. (2007). *Understanding Public Management*. London: Sage publications.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gaulė, E., & Žilinskas, G. (2013). E-Governance Development Factors In Lithuania: The Study Of Municipal Websites. *Viešoji politika ir administravimas, 12*(1), 80-93.

Holzer, M., & Manoharan, A. (2009). E-Governance and Quality of Life: Associating Municipal E-Governance with Quality of Life Worldwide. In C. G. Reddick (Ed.), *Handbook of Research on Strategies for Local E-Government Adoption and Implementation: Comparative Studies* (pp. 408–418). Hershey, PA: IGI Global. doi:10.4018/978-1-60566-282-4.ch021

Huang, Z. (2007). A comprehensive analysis of U.S. counties e-government portals: Development status and functionalities. *European Journal of Information Systems*, *16*(2), 149–164. doi:10.1057/palgrave.ejis.3000675

Hui, Z., Xiaolin, X., & Jianying, X. (2014). Diffusion of e-government: A literature review and directions for future directions. *Government Information Quarterly*, *31*(4), 631–636. doi:10.1016/j.giq.2013.10.013

Ifinedo, P. (2012). Drivers of e-government maturity in two developing regions: Focus on Latin America and Sub-Saharan Africa. *Journal of Information Systems and Technology Management*, *9*(1), 5–22. doi:10.4301/S1807-17752012000100001

Ifinedo, P., & Singh, M. (2011). Determinants of eGovernment Maturity in the Transition Economies of Central and Eastern Europe. *Electronic*. *Journal of E-Government*, *9*(2), 166–182.

Jaeger, P. T. (2006). Assessing Section 508 compliance on federal e-government web sites: A multi-method, user-centered evaluation of accessibility for persons with disabilities. *Government Information Quarterly*, *23*(2), 169–190. doi:10.1016/j.giq.2006.03.002

Jun, K., Wang, F., & Wang, D. (2014). E-Government Use and Perceived Government Transparency and Service Capacity. *Public Performance & Management Review*, *38*(1), 125–151. doi:10.2753/PMR1530-9576380106

Kim, C. K. (2014). Anti-corruption initiatives and e-government: A cross-national study. *Public Organization Review*, *14*(3), 385–396. doi:10.100711115-013-0223-1

Kirui, E., & Kemei, K. (2014). Usability of E-Government Services in Developing Countries. [IJCTT]. *International Journal of Computer Trends and Technology*, *15*(3), 102–107. doi:10.14445/22312803/IJCTT-V15P123

Kuzma, J., Dorothy, Y., & Oestreicher, K. (2009). Global e-government Web Accessibility: An Empirical Examination of EU, Asian and African Sites. Retrieved from https://eprints.worc.ac.uk/591/1/Global_e-government_Web_Accessibility.pdf

Kuzma, J. M. (2010). Accessibility design issues with UK e-government sites. *Government Information Quarterly*, *27*(2), 141–146. doi:10.1016/j.giq.2009.10.004

Latif, M., & Masrek, M. (2010). Accessibility Evaluation on Malaysian E-Government Websites. Journal of e-Government Studies and Best Practices.

Lazar, J., Goldstein, D., & Taylor, A. (2015). *Ensuring Digital Accessibility through Process and Policy*. Waltham, MA: Morgan Kaufmann.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Leist, E., & Smith, D. (2014). Accessibility Issues in E-Government. *Electronic Government and the Information Systems Perspective*, *8650*, 12–25.

Leist, E., & Smith, D. (2014). Accessibility Issues in E-government. *Lecture Notes in Computer Science*, *8650*, 15–25. doi:10.1007/978-3-319-10178-1_2

Makoza, F., & Chigona, W. (2013, Sept 10-13). Accessibility of e-Government websites: case of Malawi. *Proceedings of the 15th Annual Conference on World Wide Web Applications,* Cape Town: South Africa(pp. 4 -15).

Olalere, A., & Lazar, J. (2011). Accessibility of U.S. federal government home pages: Section 508 compliance and site accessibility statements. *Government Information Quarterly*, *28*(3), 303–309. doi:10.1016/j.giq.2011.02.002

Potter, A. (2002). Accessibility of Alabama government web sites. *Journal of Government Information*, *29*(5), 303–317. doi:10.1016/S1352-0237(03)00053-4

Ray, S. (2011). Identifying Barriers to E-Government Services for Citizens in Developing Countries: An Exploratory Study. *International Journal of Electronic Government Research*, *7*(3), 79–91. doi:10.4018/jegr.2011070105

Reis, A., Barroso, J., & Goncalves, R. (2013). Supporting Accessibility in Higher Education Information Systems. Universal Access in Human-Computer Interaction. *Applications and Services for Quality of Life*, *8011*, 250–255.

Schuppan, T. (2009). E-Government in developing countries: Experiences from sub-Saharan Africa. *Government Information Quarterly*, *26*(1), 118–127. doi:10.1016/j.giq.2008.01.006

Seifert, J. W., & Chung, J. (2009). Using e-government to reinforce government-citizen relationships: Comparing government reform in the United States and China. *Social Science Computer Review*, *27*(3), 3–23.

Shi, Y. (2007). The accessibility of Chinese local government Web sites: An exploratory study. *Government Information Quarterly*, *24*(2), 377–403. doi:10.1016/j.giq.2006.05.004

Sorrentino, M., & De Marco, M. (2013). Implementing e-government in hard times: When the past is wildly at variance with the future. Information Polity. *The International Journal Of Government & Democracy In The Information Age*, *18*(4), 331–342. doi:10.3233/IP-130319

Sun, Z., & Chen, H. (2010). An accessibility study of Chinese local government websites. *Proc. International Conference on Networking and Digital Society* (pp. 270-273).

Transparency International. (2015). Corruption Perception Index, 2015. Retrieved from: http://www.transparency.org/cpi2015

UNDP. (2015). Human Development Report 2015. Retrieved from: http://hdr.undp.org/sites/default/files/2015_human_development_report.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

UNESCO. (2015). Making Rwandese educational portals accessible to people with disabilities. Retrieved from: http://www.unesco.org/new/en/communication-and-information/resources/news-and-in-focus-articles/all-news/news/making_rwandese_educational_portals_accessible_to_people_with_disabilities/

United Nations. (2016). Convention on the Rights of Persons with Disabilities. Retrieved from https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=IV-15&chapter=4&lang=en

United Nations Development Program (UNDP). (2008). *Tackling corruption, transforming lives: Accelerating human development in Asia and the Pacific*. New Delhi, India: Macmillan Publishers.

United States Access Board. (n. d.). Comparison Table of WCAG 2.0 to Existing 508 Standards. Retrieved from https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/background/comparison-table-of-wcag2-to-existing-508-standards

Vigo, M., Abascal, J., Aizpurua, A., & Arrue, M. (2009). Tool Independence for the Web Accessibility Quantitative Metric. *Disability and Rehabilitation. Assistive Technology*, *4*(4), 248–263. doi:10.1080/17483100902903291 PMID:19565386

West, D. M. (2008). State and federal electronic government in the United States, 2008. The Brookings Institution Retrieved from http://www.brookings.edu/~/media/Files/rc/reports/2008/0826_egovernment_west/0826_egovernment_west.pdf

Wigand, D. L. (2011). A Framework for Citizen Centric Websites. In E. Downey & ... (Eds.), *E-Government Website Development: Future Trends and Strategic Models: Future Trends and Strategic Models*. Hershey, PA: IGI Global. doi:10.4018/978-1-61692-018-0.ch002

World Bank. (2015). Population, ages 15-64 (% of total). Retrieved from http://data.worldbank.org/indicator/SP.POP.1564.TO.ZS

World Bank. (2016). Disability: Overview. Retrieved from http://www.worldbank.org/en/topic/disability/overview

World Bank. (2016). GNI per capita ranking, Atlas method and PPP based. Retrieved from http://data.worldbank.org/data-catalog/GNI-per-capita-Atlas-and-PPP-table

World Health Organization (WHO). (2011). World Report on Disability. Retrieved from http://www.who.int/disabilities/world_report/2011/report.pdf?ua=1

Xu, H., & Asencio, H. (2015). E-government in U.S Local government: Disparities, Obstacles and Development Strategies. In A. Monoharan (Ed.), *E-Government and Websites: A Public Solutions Handbook*. New York, NY: Routledge.

Youngblood, M. E., & Youngblood, S. A. (2013). User Experience and Accessibility: An Analysis of County Web Portals. *Journal of Usability Studies*, *9*(1), 25–41.

Youngblood, N. E. (2014). Revisiting Alabama state website accessibility. *Government Information Quarterly*, *31*(3), 476–487. doi:10.1016/j.giq.2014.02.007

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Youngblood, N. E. (2015). The digital inclusiveness of state library websites. In B. Wentz, P. T. Jaeger, & J. C. Bertot (Eds.), *Accessibility for Persons with Disabilities and the Inclusive Future of libraries* (pp. 193–212). United Kingdom, UK: Emerald Group Publishing Limited. doi:10.1108/S0065-283020150000040018

Youngblood, N. E., & Mackiewicz, J. (2012). A usability analysis of municipal government website home pages in Alabama. *Government Information Quarterly*, *29*(4), 582–588. doi:10.1016/j.giq.2011.12.010

This research was previously published in the International Journal of Electronic Government Research (IJEGR), 13(1); pages 52-68, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 70
Workplace Social Support and Attitude toward Enterprise Resource Planning System: A Perspective of Organizational Change

Paul Chou
Minghsin University of Science & Technology, Xinfen, Taiwan

ABSTRACT

To respond to competitive environment, many organizations have invested in enterprise resource planning system in order to improve workflow and increase the efficiency of shared services for the last two decades. Nevertheless, most organizations often fail to utilize and explore the new information system's functionalities to achieve their expected objectives as promised. This brutal fact reveals implicitly that there is an urgent need to improve the knowledge of understanding why and how employees accept and use new information systems. Particularly, in many cases, the reasons for the new information system's failure are neglecting social factors and a lack of change management. In view of such, the main aim of this study is to investigate the relationship between workplace social support and employee's attitude toward enterprise resource planning system from the perspective of organizational change. Results from a sample of 334 respondents in Taiwan revealed that workplace social support not only influences employee's attitude towards enterprise resource planning system directly, but also exerts its influences indirectly via affective commitment to organization and affective commitment to change.

INTRODUCTION

Modern organizations face the severe challenge of expanding market, reducing operation cost and rising customer expectations. To respond to competitive environment in a business world, many organizations have invested in new information system (IS) in the hope to reduce operation cost and increase productivity (Avgerou, 2001; Chung & Snyder, 2000). Specifically, for the last two decades, enterprise resourcing planning (ERP) system has been introduced by many organizations in order to improve workflow and

DOI: 10.4018/978-1-7998-7297-9.ch070

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

increase the efficiency of shared services and single database operations with streamlined processing, reporting, and access across operating units (Jacobson, Shepherd, D'Aquila, & Carter, 2007; kogetsidis, Hokkinaki, & Soteriou, 2008; Lee, Lee, Olson, & Chung, 2010; Momoh, Roy & Shehab, 2010; Rao, 2000).

In essence, ERP system is a software solution integrating the various functional spheres in an organization – a link through the entire supply chain, aimed at best industry and management practices for providing the right product/service at the right time, at the right place, at least cost (Rao, 2000). From a business standpoint, the benefits that a properly implemented ERP system can offer an organization include time and cost reduction in business process, faster transaction processing, improvement of operational performance, financial management and customer service, web-based interfaces and more effective communication (Kogetsidis et al., 2008).

Despite the benefits of implementing ERP system, numerous studies have reported unusually high failure rate in implementing it due to variety of challenges (Ho, Wu, & Tai, 2004; Razmi et al., 2009; Momoh et al., 2010). This brutal fact reveals that understanding how to implement ERP system successfully is a high priority for both researchers and practitioners (Cho, Park, & Michel, 2011; Momoh et al., 2010; Razmi, Sangari, & Ghodsi, 2009; Venkatesh, 2000). In this regard, Davis' (1986) technology acceptance model (TAM) and its extended model (TAM2; Davis, Bagozzi, & Warshaw, 1989) are widely applied in exploring the inner working mechanism of users' acceptance and usage of new IS (Bhattacherjee & premkumar, 2004).

Indeed, there is a large body of research on successful adoption of ERP system supporting the impact of such perceived ease of use on initial user acceptance and sustained usage of new IS (Bhattacherjee & premkumar, 2004); Nevertheless, TAM's universality to predict across all situations has recently been called into question (Greenfield & Rohde, 2011). Specifically, it is pointed out that fewer efforts have been devoted to understanding the determinants of attitude toward ERP from the perspective of the social fabric/effects (Venkatesh, 2000; Avgerou, 2001; Kotlarsky & Oshri, 2005). For example, as Koh, Simpson, Padmore, Dimitriadis, and Misopoulos, (2006) and Kotlarsky and Oshri (2005) argued, neglecting human and social factors constituted a major problem while implementing ERP system. Further, in many cases, the reason for new IS implementation failure is a lack of change management (McAdam and Galloway, 2005; Momoh et al., 2010; Ziemba & Obłak, 2015).

In practice, ERP adoption itself is a complex project (Markus & Tanis, 2000; Ghosh & Skibniewski, 2010) and change is an inevitable consequence of ERP adoption (Hornstein, 2015; Serra & Kunc, 2014). In general, organizational change has been identified as a formidable stressor in organizational life (Judge, Thoresen, Pucik, & Welbourne,1999; Allen, Jimmieson, Bordia, & Irmer, 2007). In that case, workplace social support may play an important role during implementing ERP system because social support implies an enduring pattern of continuous or intermittent ties that play a significant part in maintaining the psychological and physical integrity of the individual over time and it has been identified as a factor to buffer job stress (Kossek, Pichler, Bodner, & Hammer,2011; Sosik & Godshalk, 2000).

In summary, to make up for such deficiency aforementioned, this study aims at understanding the relationship between social support and employees' attitude towards ERP system from the perspective of organizational change. More clearly, this study hypothesizes that workplace social support enhances employees' affective commitment to organization which, in turn, promotes their affective commitment to change and, ultimately, influences their attitude toward ERP system.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

LITERATURE REVIEW

ERP Adoption and Organizational Change

Conceptually, organizational change refers an attempt or series of attempts to modify an organization's structure, goals, technologies, systems, or work tasks (Carnall, 1986), and is the movement of an organization away from it its present state and toward some desired future state to increase its effectiveness (Lunenburg, 2010). Following these definitions, introducing ERP system into an organization is definitely one form of organizational change.

In general, information and communication technology is closely related to organizational change, as far as strategies and their organizational structures are concerned (Adamides & Karacapilidis, 2013). Consequently, the change results from implementing ERP system is essentially stressful because it not only creates fear, uncertainty and doubt (Jaskyte, 2003; Vakola & Nikolaou, 2005), but also leads to changes in and demands the readjustment of an average employee's normal routine (Leana & Barry, 2000).

Workplace Social Support and Attitude Toward ERP

Social support is defined as the "actions of others that are either helpful or intended to be helpful" (Deelstra et al., 2003, p. 324) and is conceived to be information leading an individual to believe that he/she is cared for, loved, esteemed and valued, and that he/she belongs to a network of communication and mutual obligation (Cobb, 1976). According to this definition, an important feature of social support is social interaction and the process between the provider and the recipients of social support (Sundin, Bildt, Lisspers, Hochwalder, & Setterkubd,2006).

Conceptually, social support is usually defined as the existence or availability of people upon whom we can rely, people who let us know that they care about, value, and love us (Sarason, Levine, Basham, & Sarason,1983). Specifically, social support at workplace is defined as the "overall levels of helpful social interaction available on the job from coworkers and supervisors" (Karasek & Theorell, 1990, p. 69). Thus, this study focuses supervisor support and coworker support as social support at workplace.

It is suggested that the social interaction between an employee and his/her immediate supervisor is the primary determinant of an employee's attitude in the workplace (Wayne, Shore & Liden, 1997). In practice, supervisors play an important role in structuring the work environment, providing information and feedback to employees (Griffin, Patterson, & West, 2001) and controlling the powerful rewards that recognize the employee's personal worth (Doby & Caplan, 1995). In essence, supervisor support is characterized by the human relations ability of supervisors, and is displayed in terms of trust, respect, friendship and a deep concern for subordinates' needs (Iverson, 1996).

In addition to supervisor support, coworker support also involves the interpersonal transfer of instrumental or emotional resources (House, 1981). Coworker support generally refers to having close friends at work who are willing to listen to job-related problems, are helpful in assisting with the job and who can be relied upon when things become stressful at work (Iverson, 1996). In this case, as Hobfoll (1988) argued, coworker support also serves as a key resource at workplace in the process of organizational change (adopting ERP systems, in this case).

By and large, social support can be seen as a flow of emotional concern, instrumental aid, information and/or appraisal between people (i.e., supervisor and coworkers) (Sundin et al., 2006). Specifically, social support functions to help reduce one's stress (House, 1981; Sosik & Godshalk, 2000) through the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

exchange of verbal and non-verbal messages that convey emotion, information, or referral (Joe, 2010). In short, social support makes a work environment seem more pleasant or less stressful.

Empirically, individuals with high levels of social support have been found to have a more optimistic view of the future than those with low levels of support (Sarason et al., 1983; Karademas, 2006) . From this perspective, employees who with high levels of social support are likely to have a positive perception toward the potential outcomes of the ERP and, further, tend to demonstrate positive attitude toward ERP system.

Therefore, this study assumes that employees who perceive social support at workplace, because of felt obligation and optimistic view of the future, tend to perceive adopting ERP positively. Accordingly, Hypothesis 1 is stated as follows.

- **H1:** Employees who receive social support at workplace will demonstrate positive attitude toward ERP system.

Social Support and Affective Commitment to Organization

Organizational commitment was defined as a strong belief in the organization's goal and values, a willingness to exert considerable effort on behalf of the organization, and a strong desire to remain a member of the organization (Mowday, Porter, & Steers,1982). In this study, we focus on affective commitment, because most measures of organizational commitment assess affective commitment (Colquitt, Conlon, Wesson, Porter, & Ng, 2001) which has been refers to the degree to which employees identify with the company and make the company's goals their own (Colquitt et al., 2001) and defined as an emotional attachment (Meyer & Allen, 1991).

With respect to supervisor support, according to the concept of personification of organization (Levinson, 1965), the immediate supervisor's behaviors are likely to be perceived by employees as representative of organizational decisions (Griffin, Patterson, & West, 2001). More specifically, supportive treatment provided by supervisors is interpreted as the organization's benevolent or malevolent orientation towards them. That is, to some extent, employee's perception of supervisor can be converted into perceived organizational support (POS), which refers to employees' global beliefs that the firm cares about them personally (Eisenberger, Huntington, Hutchison, & Sowa,1986; Eisenberger, Fasolo, & David-LaMastro, 1990).

According to the organizational support theory (Eisenberger et al., 1986) and the norm of reciprocity (Gouldner, 1960), employees who perceive organizational support will feel obligated to reciprocate the firm's supportive orientation with voluntary contributions that benefit the firm (Organ, 1990). In other words, once employees have perceived organizational support via supervisor support, they tend to develop a generalized felt obligation to care about the organization's welfare and help the organization achieve its objectives (in this study, successful ERP adoption) (Eisenberger et al., 1990; Lind, Tyler, & Huo, 1997; Wayne et al., 1997; Eisenberger, Armeli, Rexwinkel, Lynch, & Rhoades,2001; Wayne, Shore, Bommer, & Tetrick, 2002; Aselage & Eisenberger, 2003).

In summary, social support can create a sense of belonging for an individual at the emotional level (Sundin et al., 2006) and tend to interpret the organization's gains and losses as their own. Consequently, when individuals perceive social support at workplace, according to social exchange theory (SET) (Blau, 1964) and the norm of reciprocity (Gouldner, 1960), they might feel obligated to repay the organization by becoming affectively committed (Witt, Kacmar, & Andrews, 2001). On the other hand, as

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

mentioned above, since social interaction between individuals' supervisors and their co-workers is an important feature of social support, their re-examination of their ongoing commitment to the organization are expected to be based on their interaction and experience with their immediate supervisors and their co-workers during the process of change. Thus, it is plausible to assume that social support fosters employees to derive their identity form association with the organization (i.e., affective commitment to organization). Thus, hypothesis 2 is stated as:

- **H2:** Employees who receive social support at workplace will demonstrate affective commitment to organization.

Affective Commitment to Organization and Affective Commitment to Change

Conceptually, individuals who identify with their organizations are more likely to engage in favor of the collective goals (Michel, Stemaier, & Salvador, 2010), as an employee with high emotional attachment to an organization would strongly identify with the vision of the organization and the goals and values of change initiatives. In that event, when individuals perceive a change initiative is consistent with an organization's vision would enable them to commit to that change (Dvir, Bagozzi, & Warshaw, 2004). In other words, employees with strong affective commitment to an organization are likely to see the value of organizational change (Meyer, Srinivas, Lai, & Topolnytsky, 2007) which, in turn, would enhance their affective commitment to change.

Further, empirical evidence from previous research shows that affective commitment to an organization plays a vital role in employees' acceptance of change (Iverson, 1996; Yousef, 2000). In this case, it is likely that affective commitment to organization is positively related to affective commitment to change because employees who identify with their organizations may take the organization's perspective and integrate organizational goals and interests with their self-concept and are likely to assess the change efforts as necessary and beneficial (Michel et al., 2010).

In sum, based on inferences discussed above, it is reasonable to believe that employees with strong affective commitment to organization would be more likely to demonstrate affective commitment to change. Thus, hypothesis 3 is stated as:

- **H3:** Employees with strong affective commitment to an organization will demonstrate affective commitment to change.

Affective Commitment to Change and Attitude Toward ERP System

Affective commitment to change is defined as 'a desire to provide support for the change based on a belief in its inherent benefits' (Herscovitch & Meyer, 2002, p. 475). Conceptually, commitment to change is distinctive from commitment to an organization (Fedor, Caldwell, & Herold, 2006) and, more importantly, commitment to a change is a better predictor of behavioral support for a change than is organizational commitment (Herscovitch & Meyer, 2002). In particular, those who buy-in to the change and want to make efforts to ensure its success (i.e., strong affective commitment to change) should be willing to do more than is required of them, even if it involves some personal sacrifice (Meyer & Herscovitch, 2001; Meyer et al., 2007).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

It is asserted that employees' affective commitment to change is critical to the successful implementation of organizational change (Meyer et al., 2007). For instance, some researchers (e.g., Kotter, 1995; Armenakis & Bedeian, 1999) had pointed out the importance of employees' commitment to change in carrying out successful change efforts. Furthermore, commitment to change has been found empirically to be a better predictor of specific change-related behaviors (Herscovitch & Meyer, 2002; Fedor et al., 2006; Meyer et al., 2007; Chou, 2015; Chou, 2016).

In summary, as mentioned earlier, most human behavior can be predicted from intentions alone (Fishbein & Ajzen, 1975) and intention is assumed to be the immediate antecedent of behavior (Ajzen, 1991). In that case, it is plausible to assume that employees with strong affective commitment to change are prone to demonstrate positive attitudes toward ERP system. Accordingly, hypothesis 4 is stated as:

- **H4:** Employees with strong affective commitment to change will demonstrate positive attitude towards ERP system.

Mediating Roles of Affective Commitment to Organization and Affective Commitment to Change

Social Support and Affective Commitment to Change

Practically speaking, organizational change is intended to alter key organizational variables that then affect the members of the organization and their work-related attitudes and behaviors (Jimmieson, Terry, & Callan, 2004). In general, the changes experienced by employees are best represented by the new situations affecting their current jobs, which are governed by their immediate supervisors, and influenced by their co-workers. In other words, the impact of organizational change on employees' commitment to such change is expected to be based on their interaction and experience with their immediate supervisors and their co-workers.

Moreover, as noted, high-social-support individuals not only might have a more optimistic view of the future, but also enhanced capacity to withstand and overcome frustrations and problem-solving challenges (Sarason et al., 1983). In that event, employees who received social support would have positive perceptions of the outcomes of organizational change and tend to increase their commitment to change (Fedor et al., 2006). Accordingly, it is plausible to assume that there is a positive relationship between social support and affective commitment to change.

Affective Commitment to Organization and Attitude Toward ERP System

Conceptually, organizational commitment involves manifesting strong desire to remain a member of the organization and entails a high level of identification with the goals of the organization and the values it stands for (Allen & Meyer, 1990). Specifically, it is suggested that individuals with high affective commitment to organization would strongly identify with the vision of the organization and the goals/values of change initiatives (Dvir et al., 2004).

Further, employees with a strong affective commitment to an organization are likely to value the course of action that is necessary for successful organizational change (in this study, adopting ERP system) and are therefore willing to do whatever is required to achieve the target of that action (Meyer et al., 2007). In other words, those who identify strongly with the company and perceive the company's goals (in this

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

study, successful implementation of ERP) as their own (Fedor et al., 2006) are willing to do more than is required of them during adopting ERP system (Vakola & Nikolaou, 2005).

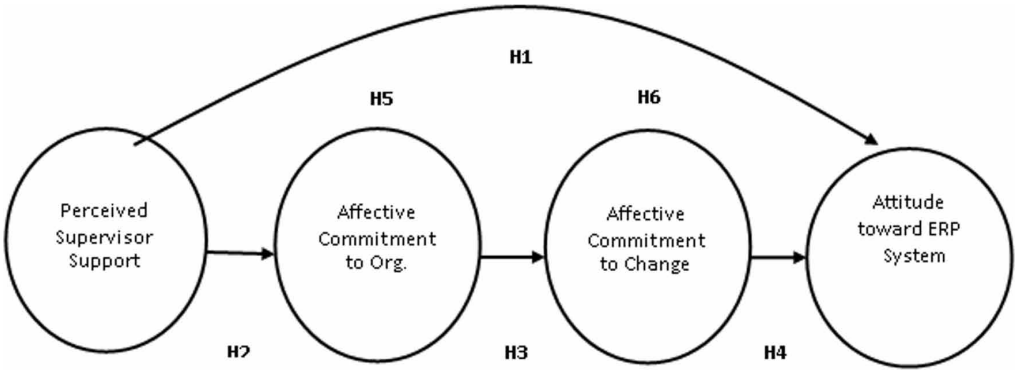
Prior studies evidenced empirically that affective commitment to organization plays a vital role in employees' acceptance of change initiatives (Iverson, 1996; Yousef, 2000). For example, Yousef's (2000) findings reveal a positive relationship between affective commitment and behavioral tendency attitudes toward organizational change. In particular, Iverson's (1996), findings confirm that affective commitment to organization can predict behavioral intention towards change initiatives. In that case, it is reasonable to expect a positive relationship between affective commitment to organization and attitude towards new Information system.

According to Baron and Kenny's (1986) assertion, the role of the mediator of an independent variable–dependent variable relationship is supported, in part, by the links between: (1) independent variable and mediator, (2) independent variable and dependent variable and (3) mediator and dependent variable. In accordance with this assertion and along with all the inferences discussed above and after incorporating the simple bivariate associations into the initial hypotheses, Hypotheses 5 and 6 are stated as follows.

- **H5:** Affective commitment to organization mediates the relationship between social support and affective commitment to change.
- **H6:** Affective commitment to change mediates the relationship between affective commitment to organization and attitude toward ERP system.

In summary, with respect to research framework, Figure 1 depicts the research framework of this study.

Figure 1. Research framework



METHODS

Participants

Invitations for participation were sent to three companies located at Hsinchu County which are undergoing ERP project less than 8 months. Procedure-wise, a total of 600 questionnaires with a cover letter explaining the purpose of the survey were sent to the head of the Human Resource Department of the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

three surveyed companies along with a return envelope for each participant to ensure that participants could send back the completed questionnaire on their own. A total of 350 questionnaires were returned (58% response rate), with 334 valid questionnaires after screening (56%).

Descriptive statistics for the valid respondents are presented in Table 1.

Table 1. Descriptive profile of respondents

Gender	Male	63%
	Female	37%
Job Rank	Managerial position	17%
	Non- managerial position	83%
Age(years)	<30	30%
	31-40	44%
	41-50	21%
	>50	5%
Seniority(years)	>15	47%
	11-15	23%
	5-10	12%
	<5 years	18%
Education Level	Master	18%
	University Degree	48%
	Diploma	17%
	High School	17%
Annual Income(NT$)	>1,200,000	3%
	800,001-1,200,000	3%
	400,001-800,000	32%
	<400,000	62%

Measures

Unless otherwise stated, all responses were made on a 6-point scale ranging from (1) strongly disagree to (6) strongly agree.

Social Support (SS)

Social support was assessed by using ten items including 7 items of perceived supervisor support (PSS) which were developed by Cummings and Oldham (1997); 3 items of perceived coworker support (PCS) which were developed by Yoon and Thye (2000). The internal consistency of this 10-item scale was .91 in the current sample.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Affective Commitment to Organization (ACO)

Affective commitment to the organization was measured using the six items developed by Meyer, Allen and Smith (1993) (e.g., "I really feel that this organization's problems are my own."). The internal consistency of this six-item scale was 0.88 for this sample.

Affective Commitment to Change (ACC)

Affective commitment to change was measured with the six items developed by Herscovitch and Meyer (2002). The internal consistency of this six-item scale was .81 for this sample.

Attitude toward ERP System (ATE)

Attitude towards ERP System was measured using three items adopted from Porter and Donthu (2006) (e.g., "I am positive toward the ERP system". The internal consistency of this three-item scale was .89 in the current sample.

Overall, the strength of the internal consistency estimates of the variables in this study suggests homogeneity of the scale items.

ANALYSIS AND RESULTS

Analysis

Before testing the study hypotheses, confirmatory factor analysis (CFA) was conducted with the AMOS software (Arbuckle, 2003) to examine the convergent and discriminant validity of the study measures. Given the large number of items (25) relative to the sample size (334), the procedures recommended by Mathieu and Farr (1991) were followed by creating two dimensions (perceived supervisor support and perceived coworker support) for social support, and three composite indicators for affective commitment to organization and affective commitment to change, in order to maintain an adequate sample-size-to-parameter ratio (Landis, Beal, & Tesluk, 2000).

Following the approach suggested by Andersen and Gerbing (1988), convergent validity is demonstrated when the path loading (λ) from an item to its latent construct is significant and exceeds 0.50. As shown in Table 2, all path loading (λ) in this study was above 0.50 (0.70-0.95). In addition, convergent validity is also adequate when the constructs have an average variance extracted (AVE) of at least 0.50 and composite reliability (CR) greater than 0.6 (Hair, Anderson, Tatham & Black, 2006). As shown in Table 2, the AVEs of all four constructs in this study exceed 0.50 (0.60-0.74) and the CRs of all four constructs are also above 0.6 (0.76-.90). Thus, all constructs in this study demonstrate adequate convergent validity.

To assess discriminant validity, the procedures outlined by Fornell and Larcker (1981) were employed to examine whether the square root of AVE for the two constructs exceeds their correlation. As shown in Table 2, the square root of AVE for the two constructs is greater than their correlation. Thus, all tests of reliability and validity lead to the conclusion that the measures used in the subsequent statistical analyses are of acceptable reliability and validity.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Descriptive statistics and correlations among study variables

Variable	Mean	SD	Cronbach α	CR	Item Loading(λ) (min-max)	1	2	3	4
1. SS	4.46	.75	.91	.76	(.72-.84)	(.79)			
2. ACO	4.43	.88	.88	.88	(.84-.85)	.68**	(.85)		
3. ACC	4.24	.69	.81	.82	(.70-.83	.55**	.54**	(.77)	
4. ATE	4.56	.90	.89	.90	(.80-.95)	.51**	.38**	.44**	(.86)

Note:
SS=Social Support
ACO= Affective Commitment to Organization
ACC=Affective Commitment to Change
ATE=Attitudes towards ERP
CR=Composite reliability
Item Loading (λ) is standardized.
Values along the diagonal represent the square root f average variance extracted (AVE)

In addition, given that the data were collected from a single source, the procedures recommended by Podsakoff, Mackenzie, Lee and Podsakoff (2003) were employed to examine whether the hypothesized four-factor model was influenced by the common-method bias. The result shows that the hypothesized four-factor model (GFI = .97; CFI = .99; TLI = .98; RMSEA = .048) had a better fit than the single-factor model (GFI = .68; CFI = .67; TLI = .59; RMSEA = .22). Thus, although the present data may have common-method variance, the common-method bias does not seem to be a serious problem in this study.

Hypothesis Testing

Means, standard deviations, internal reliabilities, and inter-correlations among the variables are reported in Table 2. All measures show high internal reliabilities, with coefficient alphas ranging from .81 to .91. In addition, social support has a statistically significant positive relationship with the potential mediators, affective commitment to organization (0.68, $p < 0.01$); affective commitment to change (.55, $p < .01$), and with the outcome variable of attitude toward ERP system (0.51, $p < 0.01$). Moreover, affective commitment to organization has a statistically significant positive relationship with affective commitment to change (0.54, $p < 0.01$) and attitude toward ERP system (0.38, $p < 0.01$). In addition, affective commitment to change has a statistically significant positive relationship with attitude toward ERP system (0.44, $p < 0.01$). By and large, the pattern of correlations is consistent with the hypothesized relationships.

Next, structural equation modeling was performed using AMOS 5.0 (Arbukle, 2003). According to Anderson and Gerbing's (1988) recommendation, the measurement model was tested before actually examining the hypothesized model. The full measurement model was tested whereby all latent variables in this study were allowed to correlate. The fit, according to Hu and Bentler (1999), was a good fit, with relative fit indices of 0.99 for CFI, 0.98 for TLI and 0.048 for RMSEA ($X^2 = 67.394$. df = 38, CMIN/

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

DF=1.774, $p < 0.000$). With the fitness of the measurement model confirmed, the hypothesized model was then tested.

The last step is to test the mediating roles of affective commitment to organization in the relation between social support and affective commitment to organization, and affective commitment to change in the relation between affective commitment to organization and attitude toward ERP system. With respect to the testing method, bootstrapping was employed to test directly for the mediators with the AMOS software since it is currently regarded as a more powerful tool for testing the mediating effects in comparison with Baron and Kenny's (1986) approach (Preacher & Hayes, 2008).

As a result, the standard estimated indirect effect of social support on affective commitment to change thus obtained was 0.56 (95% CI: 0.434 - 0.689), and the standard estimated indirect effect of affective commitment to organization on attitude towards new Information systems was 0.35 (95% CI: 0.253-0.483). These results confirm the mediating roles of affective commitment to organization in the hypothesized relations.

Further, in order to test whether a full mediating relationship exists between perceived organizational support and attitude toward ERP system, a competitive modeling test was conducted. Table 3 presents fit indices for the hypothesized model, along with three alternative models. Results of comparison show that although the three alternative models show a better improvement in model fit when compared with the hypothesized model, Alternative Model 2 indicates no significant relationship between affective commitment to organization and affective commitment to change, whereas alternative Model 3 indicates there is no significant relationship between affective commitment to organization and affective commitment to change and between affective commitment to organization and attitude toward ERP system. As a result of comparison, the alternative Model 3 is the most adequate for explaining the data as indicated by a RMSEA of 0.048, a CFI of 0.99, a GFI of 0.98, and a TLI of 0.97.

Table 3. Competitive model test

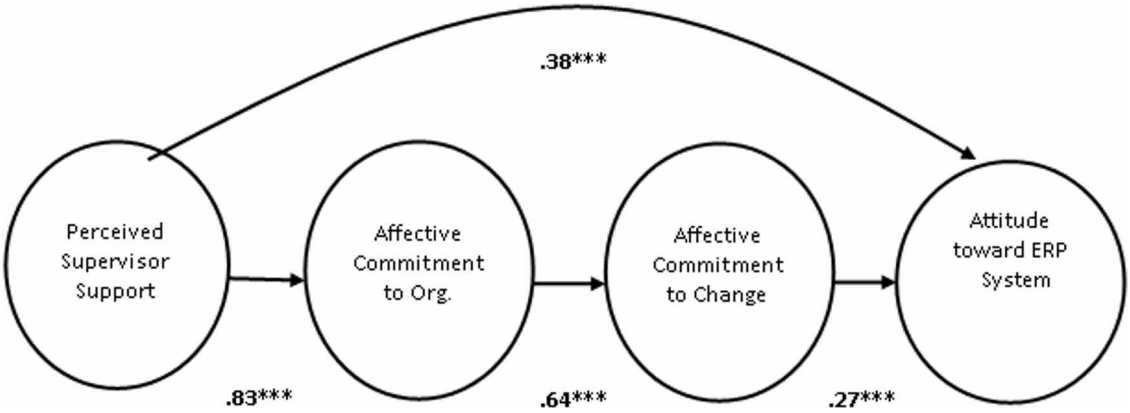
	X^2	df	X^2/df	ΔX^2	RMSEA	CFI	TLI	GFI
Hypothesized Model	110.829	41	2.703		.072	.97	.95	.96
Alternative Model 1[a]	85.232	40	2.131		.058	.98	.96	.97
Alternative Model 2[b]	71.023	39	1.821		.050	.99	.96	.98
Alternative Model 3[c]	67.394	38	1.774		.048	.99	.97	.98

[a] Alternative Model 1 only added the direct path from social support to attitude toward ERP.
[b] Alternative Model 2added the direct path (1) from social support to attitude toward ERP and (2) from social support to affective commitment to change.
[c] Alternative Model 3 added the direct path (1) from social support to attitude towardERP; (2)from social support to affective commitment to change and (3) the direct path from affective commitment to organization to attitude toward ERP.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Standardized parameter estimates for the alternative Model 3 are shown in Figure 2. For ease of presentation, only the structural model is presented rather than the full measurement model. Examining the path coefficients reveals that social support is uniquely related to affective commitment to organization in the positive direction; affective commitment to organization has significant direct association with attitude toward ERP system. Thus, all hypotheses are supported in this study. Figure 2 depicts the final results from test of hypothesized Model.

Figure 2. Research results



DISCUSSION

Summary of Findings

The results of hypotheses testing are presented in Table 4:

This study proposes an integration of two of the dominant streams in organizational behavior – workplace social support and organizational change. The results of this study indicate that workplace social support has positive association with attitude toward ERP system, whereas affective commitment to organization fully mediated the relationship between social support and affective commitment to change, and affective commitment to change fully mediated the relationship between affective commitment to organization and attitude toward ERP.

Also, the present findings are consistent with social support theory that employee's attitudinal and behavioral intent are primarily driven by employees' evaluation of favorable treatment (e.g., being valued and cared for) provided by his/her supervisor and coworkers. Specifically, given that organizational participants typically engage in multiple exchange relationships, findings of this study reveal that perceived social support at workplace can function as a mean of enhancing affective commitment to organization which, in turn, motivates employees' affective commitment to change and, eventually, influences employees' attitude toward ERP system.

In addition, the results of this study are also consistent with the assertions of Herscovitch and Meyer (2002) and Fedor et al., (2006), which suggested that commitment to change is conceptually and empirically distinct from commitment to an organization. Moreover, the results are in agreement with the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Hypotheses testing results

H1	Employees who receive social support at workplace will demonstrate positive attitude toward ERP system.	Supported
H2	Employees who receive social support at workplace will demonstrate affective commitment to organization.	Supported
H3	Employees with strong affective commitment to an organization will demonstrate affective commitment to change.	Supported
H4	Employees with strong affective commitment to change will demonstrate positive attitude towards ERP system.	Supported
H5	Affective commitment to organization mediates the relationship between social support and affective commitment to change.	Supported
H6	Affective commitment to change mediates the relationship between affective commitment to organization and attitude toward ERP system.	Supported

findings of Iverson (1996) and Yousef (2000) that there is a positive relationship between affective commitment to organization and affective commitment to change ($r = .54$, $p < .01$, Table 2). In short, the more the employees are loyal to the organization, the greater their willingness to accept change (i.e., implementing ERP system).

Practical Implications

With respect to practical implications of this study, this study has several practical implications for organizations whilst implementing ERP system. First, this finding demonstrates the efficacy of workplace social support in developing employees' positive attitudes toward ERP system. In other words, the success of ERP adoption, to a certain extent, lies in workplace social support. Proving such linkages exist implies that management and HR practitioners should focus their efforts on developing a climate of social support within their organizations (Graetz & Smith, 2010).

Second, the proof of the importance of social support during implementing ERP system encourages management and HRM practitioners to focus on certain leadership development programs to trigger employees' "felt obligation" to benefit the organization. For example, it is found that employees led by transformational leaders are likely to develop a generalized felt obligation to care about the organization's welfare and help the organization achieve its objectives (Eisenberger et al., 2001). Specifically, considerable research has identified that leadership as one of the most critical success factors in adopting ERP system (Law & Ngai, 2007; Rai, et al., 2009). For example, empirical findings support that there is a positive relationship between leadership and successful ERP adoption (Cho, et al., 2011).

Third, affective commitment to organization, in this study, was found acting as a determinant of affective commitment to change and a mediator between social support and affective commitment to change. In that event, organizations, while implementing ERP system, should also pay particular attention on how to enhance employees' affective commitment to organization. To this end, management and HRM practitioners, for the sake of enhancing employees' affective commitment to change, should

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

devote their efforts to establish a fair and supportive working environment (Eisenberger et al., 2001; Meyer et al., 2002).

Finally, as Hornstein (2008; 2015) suggested, it is not the technology that provides an organization with a successful implementation of new information system, but the integration of technology into an organizational change management process. More clearly, ERP project success depends, at least in part, on change management which focuses on human factors (Ziemba & Obłak, 2015). The findings of this study reveal that a successful ERP adoption requires employees' affective commitment to change. Specifically speaking, affective commitment to change plays a critical role in the successful implementation of change (implementing ERP system, in this case) (Parish et al., 2007), and does a better job of predicting specific change-related attitude (acceptance of ERP system, in this case) In that case, management and HRM practitioners should devote efforts to enhance affective commitment to change via change management practices such as effective communication (Ziemba & Obłak, 2015).

Limitations and Directions for Future Research

Like previous research, this study also has certain limitations. First, the sample is confined to a limited number of companies which might in turn limit the generalizability of its findings and conclusions to other enterprises. Second, this approach introduces potential problems of common-method bias as the research variables were gathered from the same source, although a Harmon single-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) shows that common-method bias is not a serious problem in this study. Third, one must be cautious when interpreting the findings of this study due to the possible constraint of non-response bias, such that non-respondents might hold different views with respect to the variables in question, leading to possible bias in survey estimates. Finally, this study suffers from the common limitations of cross-sectional field research. In this regard, caution is necessary for its inability to make causal inferences with confidence between the variables examined in the study.

Regarding the directions for future research, as noted by Podsakoff et al. (2003), using self-reported measures for both constructs may inflate their correlations due to self-reporting bias. Thus, future research should focus on others' ratings to reduce common-method variance. For example, the use of immediate supervisors or coworkers' assessments of affective commitment to organization, affective commitment to change and attitude towards ERP system would further validate the results of research. Further, given that perceived usefulness and ease of use are central elements of TAM which is most widely used model in the research on IS literature, it would be interesting avenue to explore if future research integrate the notion of workplace social support and TAM examine whether social support contribute to perceptions of usefulness and ease of use.

Contribution

In spite of the above-mentioned limitations, this study has a couple of unique contributions. First, as noted above, although TAM has been and still is extensively used, its universality to predict across all situations has recently been called into question (Greenfield & Rohde, 2011). In this regard, this study sheds new light on understanding the key determinants of employee's attitude toward ERP system from the perspectives of organizational change and workplace social support. Such understanding can assist in the proactive planning of intervention mechanisms for maximizing the possibility of success in implementing ERP system in addition to TAM's knowledge. In other words, the findings of this study

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

contribute as a supplement of TAM, which focuses on "ration" (i.e., ease of use and perceived usefulness), by providing an alternative approach with focus on "human emotion" (i.e. social support) to gain a deeper understanding of employee's attitude toward ERP.

Second, in regard to organizational change management, this study confirms that individuals' attitude toward ERP system as a function of affective commitment to change with social support. Given that the available knowledge of how HR professionals perform effectively as "change agents" is relatively limited (Alfes, Truss, & Gill, 2010), results of this study provide confirm workplace social support's effects on employee's attitude towards ERP system partly via enhancing affective commitment to the organization and affective commitment to change.

CONCLUSION

As noted earlier, many organizations were not successful in reaping the potential benefits as it promised. Hence, many experts and researchers have investigated this issue (high failure rate) from various perspectives. For example, some provide valuable insights in the process of ERP implementation (e.g., Kumar, et al., 2003) and others identify a variety of factors critical to the success and failure of an ERP implementation project (e.g., Akkermans & Helden, 2002; Ehie & Madsen, 2005; Woo, 2007; Momoh et al., 2010).

In particular, as Hong and Kim (2002) identified, employee's resistance to this new IS as a critical failure factor while adopting ERP system. In this regard, improving our understanding of the inner working mechanism associated with attitude toward ERP system through the perspective of organizational change has become increasingly important while adopting ERP system.

REFERENCES

Adamides, E. D., & Karacapilidis, N. (2013). Understanding the Role of Computer-Supported Argumentation in the Strategic Change Process. *International Journal of Information Systems and Social Change*, *4*(4), 45–61. doi:10.4018/jissc.2013100103

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. doi:10.1016/0749-5978(91)90020-T

Alfes, K., Truss, C., & Gill, J. (2010). The HR manager as change agent: Evidence from the public sector. *Journal of Change Management*, *10*(1), 109–127. doi:10.1080/14697010903549465

Allen, J., Jimmieson, N. L., Bordia, P., & Irmer, B. (2007). Uncertainty during organizational change: Managing perceptions through communication. *Journal of Change Management*, *7*(2), 187–210. doi:10.1080/14697010701563379

Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *Journal of Organizational Psychology*, *63*, 1–18.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411–423. doi:10.1037/0033-2909.103.3.411

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Arbukle, J. L. (2003). *AMOS 5.0 update to the AMOS user's guide*. Chicago, IL: SPSS.

Armenakis, A. A., & Bedeian, A. G. (1999). Organizational change: A review of theory and research in the 1990s. *Journal of Management*, *25*(3), 293–315. doi:10.1177/014920639902500303

Aselage, J., & Eisenberger, R. (2003). Perceived organizational support and psychological contract: A theoretical integration. *Journal of Organizational Behavior*, *24*(5), 491–509. doi:10.1002/job.211

Avgerou, C. (2001). The significance of context in information systems and organizational change. *Information Systems Journal*, *11*(1), 43–63. doi:10.1046/j.1365-2575.2001.00095.x

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. doi:10.1037/0022-3514.51.6.1173 PMID:3806354

Beekman, M., Chenhall, R. H., & Eudke, K. J. (2007). Management control systems as a tool for planned organizational change. *Coastal Management*, *21*, 15–25.

Bhattacherjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *Management Information Systems Quarterly*, *28*(2), 229–254.

Blau, P. M. (1964). *Exchange and power in social life*. New York: John Wiley.

Carnall, C. A. (1986). Toward a theory for the evaluation of organizational change. *Human Relations*, *39*(8), 745–766. doi:10.1177/001872678603900803

Cho, J., Park, I., & Michel, J. W. (2011). How does leadership affect information systems success? the role of transformational leadership. *Information & Management*, *48*(7), 270–277. doi:10.1016/j.im.2011.07.003

Chou, P. (2015). Transformational leadership and employee's behavioral support for organizational change. *European Journal of Business and Management*, *7*(3), 110–122.

Chou, P. (2016). The effects of social support on employee's behavioral support for organizational change. *International Journal of Economics*. *Commerce and Management*, *4*(2), 22–41.

Chung, S. H., & Snyder, C. A. (2000). ERP adoption: A technological evolution approach. *International Journal of Agile Management Systems*, *2*(1), 373–382.

Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine*, *38*(5), 300–314. doi:10.1097/00006842-197609000-00003 PMID:981490

Colquitt, J. A., Conlon, D. E., Wesson, M. J., Porter, O. L., & Ng, K. Y. (2001). Justice at the millennium: A meta-analytic review of 25 years of organizational justice research. *The Journal of Applied Psychology*, *86*(3), 425–445. doi:10.1037/0021-9010.86.3.425 PMID:11419803

Cummings, A., & Oldham, G. R. (1997). Enhancing creativity: Managing work contexts for the high potential employee. *California Management Review*, *40*(1), 22–38. doi:10.2307/41165920

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Davis, F., Bagozzi, R., & Warshaw, P. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982–1003. doi:10.1287/mnsc.35.8.982

Davis, F. D. (1986). A technology acceptance model for empirically testing new end-user information systems: Theory and practice [Doctoral dissertation]. Slone School of Management, Massachusetts Institute of Technology, Cambridge, MA.

Dawson, P. (1994). *Organizational Change: A Processual Approach*. London: Paul Chapman.

Deelstra, J. T., Peeters, M. C. W., Schaufeli, W. B., Stroebe, W., Zijlstra, F. R. H., & Van Doornen, L. P. (2003). Receiving instrumental support at work: When help is not welcome. *The Journal of Applied Psychology*, *88*(2), 324–331. doi:10.1037/0021-9010.88.2.324 PMID:12731716

Doby, V. J., & Caplan, R. D. (1995). Organizational stress as threat to reputation: Effects on anxiety at work and at home. *Academy of Management Journal*, *38*(4), 1105–1123. doi:10.2307/256622

Dvir, T., Kass, N., & Shamir, B. (2004). The emotional bond: Vision and organizational commitment among high-tech employees. *Journal of Organizational Change Management*, *17*(2), 126–143. doi:10.1108/09534810410530575

Eisenberger, R., Armeli, S., Rexwinkel, B., Lynch, D., & Rhoades, L. (2001). Reciprocation of perceived organizational support. *The Journal of Applied Psychology*, *86*(1), 42–51. doi:10.1037/0021-9010.86.1.42 PMID:11302232

Eisenberger, R., Fasolo, P., & David-LaMastro, V. (1990). Percived organizational support and employee deligence, commitment, and innovation. *The Journal of Applied Psychology*, *75*(1), 51–59. doi:10.1037/0021-9010.75.1.51

Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. *The Journal of Applied Psychology*, *71*(3), 975–991. doi:10.1037/0021-9010.71.3.500

Fedor, D. B., Caldwell, S., & Herold, D. M. (2006). The effects of organizational changes on employee commitment: A multilevel investigation. *Personnel Psychology*, *59*(1), 1–19. doi:10.1111/j.1744-6570.2006.00852.x

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison Wesley.

Ford, J. K., Weissbein, D. A., & Plamondon, K. E. (2003). Distinguishing organizational from strategy commitment: Linking officerscommitment to community policing to job behaviors and satisfaction. *Justice Quarterly*, *20*(1), 159–185. doi:10.1080/07418820300095491

Fornell, C. R., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error. *JMR, Journal of Marketing Research*, *18*(1), 39–50. doi:10.2307/3151312

Ghosh, S., & Skibniewski, M. (2010). Enterprise resource planning systems implementation as a complex project: A conceptual framework. *Journal of Business Economics and Management*, *11*(4), 533–549. doi:10.3846/jbem.2010.26

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. *American Sociological Review*, *25*(2), 161–178. doi:10.2307/2092623

Graetz, F., & Smith, A. C. T. (2010). Managing organizational change: A philosophies of change approach. *Journal of Change Management*, *10*(2), 135–154. doi:10.1080/14697011003795602

Graham, J. W. (1991). An essay on organizational citizenship behavior. *Employee Respond Rights Journal*, *4*(4), 249–270. doi:10.1007/BF01385031

Greenfield, G., & Rohde, F. H. (2011). Technology Acceptance: Are NFPs or their workers different? *International Journal of Information Systems and Social Change*, *2*(2), 26–36. doi:10.4018/jissc.2011040102

Griffin, M. A., Patterson, M. G., & West, M. A. (2001). Job satisfaction and teamwork: The role of supervisor support. *Journal of Organizational Behavior*, *22*(5), 537–550. doi:10.1002/job.101

Hair, J. J. F., Anderson, R., Tatham, R. L., & Black, W. C. (2006). *Multivariate data analysis -international editions* (6th ed.). Englewood Cliffs, NJ: Prentice Hall.

Herscovitch, L., & Meyer, J. P. (2002). Commitment to organizational change: Extension of a three-component model. *The Journal of Applied Psychology*, *87*(3), 474–487. doi:10.1037/0021-9010.87.3.474 PMID:12090605

Ho, C. F., Wu, W. H., & Tai, Y. M. (2004). Strategies for the adaption of ERP systems. *Industrial Management & Data Systems*, *104*(3), 234–251. doi:10.1108/02635570410525780

Hobfoll, S. E. (1988). *The ecology of stress*. New York: Hemisphere.

Hong, K., & Kim, Y. (2002). The critical success factors for ERP implementation: An organisational fit perspective. *Information & Management*, *40*(1), 25–40. doi:10.1016/S0378-7206(01)00134-3

Hornstein, H. A. (2008). Using a change management approach to implement IT programs. *Ivey Business Journal online, 72*(1). Retrieved from http://iveybusinessjournal.com/publication/using-a-change-management-approach-to-implement-it-programs

Hornstein, H. A. (2015). The integration of project management and organizational change management is now a necessity. *International Journal of Project Management*, *33*(2), 291–298. doi:10.1016/j.ijproman.2014.08.005

House, J. S. (1981). *Work stress and social support*. MA: Addison-Wesley.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. doi:10.1080/10705519909540118

Iverson, R. D. (1996). Employee acceptance of organizational change: The role of organizational commitment. *International Journal of Human Resource Management*, *7*(1), 122–149. doi:10.1080/09585199600000121

Jacobson, S., Shepherd, J., D'Aquila, M., & Carter, K. (2007). *The ERP market sizing report (2006-2011), AMR Research*. Retrieved from http:// www.sap.com/uk/solutions/business-suite/ erp/pdf/ AMR_ERP_Market_Sizing_2006-2011.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Jaskyte, K. (2003). Assessing changes in employees perceptions of leadership behavior, job design, and organizational arrangements and their job satisfaction and commitment. *Administration in Social Work*, *27*(4), 25–39. doi:10.1300/J147v27n04_03

Jimmieson, N. L., Terry, D. J., & Callan, V. J. (2004). A Longitudinal study of employee adaptation to organizational change: The role of change-related information and change-related self-efficacy. *Journal of Occupational Health Psychology*, *9*(1), 11–27. doi:10.1037/1076-8998.9.1.11 PMID:14700455

Joe, S. W. (2010). Assessing job self-efficacy and organizational commitment considering a mediating role of information asymmetry. *The Social Science Journal*, *47*(3), 541–559. doi:10.1016/j.soscij.2010.01.011

Judge, T. A., Thoresen, C. J., Pucik, V., & Welbourne, T. M. (1999). Managerial coping with organizational change: A dispositional perspective. *The Journal of Applied Psychology*, *84*(1), 107–122. doi:10.1037/0021-9010.84.1.107

Karademas, E. C. (2006). Self-efficacy, social support and well-being: The mediating role of optimism. *Personality and Individual Differences*, *40*(6), 1281–1290. doi:10.1016/j.paid.2005.10.019

Karasek, R. A., & Theorell, T. (1990). *Healthy work: stress, productivity, and the reconstruction of working life*. New York: Basic Books.

Kogetsidis, H., Hokkinaki, A., & Soteriou, V. (2008). Enterprise resource planning implementation in the retail sector: A case study on the effects of the implementation of an ERP system in Cyprus. *Journal of international Business and Entrepreneurship Development, 3*(3/4), 270-283.

Koh, S. C. L., Simpson, M., Padmore, J., Dimitriadis, N., & Misopoulos, F. (2006). An exploratory study of enterprise resource planning adoption in Greek companies. *Industrial Management & Data Systems*, *106*(7), 1033–1059. doi:10.1108/02635570610688913

Kossek, E. E., Pichler, S., Bodner, T., & Hammer, L. B. (2011). Workplace social Support and work-Family conflict: A meta-analysis clarifying the influence of general and work-family-specific supervisor and organizational support. *Personnel Psychology*, *64*(2), 289–313. doi:10.1111/j.1744-6570.2011.01211.x PMID:21691415

Kotlarsky, J., & Oshri, I. (2005). Social ties, knowledge sharing and successful collaboration in globally distributed system development projects. *European Journal of Information Systems*, *14*(1), 37–48. doi:10.1057/palgrave.ejis.3000520

Kotter, J. P. (1995). Leading change: Why transformational efforts fail. *Harvard Business Review*, *57*, 59–67.

Landis, R. S., Beal, D. J., & Tesluk, P. E. (2000). A comparison of approaches to forming composite measures in structural equation models. *Organizational Research Methods*, *3*(2), 186–207. doi:10.1177/109442810032003

Leana, C. R., & Barry, B. (2000). Stability and change as simultaneous experiences in organizational life. *Academy of Management Review*, *25*, 753–759.

Lee, D. H., Lee, S. M., Olson, D. L., & Chung, S. H. (2010). The effect of organizational support on ERP implementation. *Industrial Management & Data*, *110*(2), 269–283. doi:10.1108/02635571011020340

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Levinson, H. (1965). Reciprocation: The relationship between man and organization. *Administrative Science Quarterly*, *9*(4), 370–390. doi:10.2307/2391032

Lind, E. A., Tyler, T. R., & Huo, Y. J. (1997). Procedural context and culture: Variation in the antecedents of procedural justice judgments. *Journal of Personality and Social Psychology*, *73*(4), 767–780. doi:10.1037/0022-3514.73.4.767

Lunenburg, F. C. (2010). Forces for and Resistance to organizational change. *National Forum of Educational Administration and Supervision Journal, 27*(4), 1-10.

Markus, M. L., & Tanis, C. (2000). The enterprise system experience: From adoption to success. In R. Zmud (Ed.), *Framing the domains of IT management: Projecting the future through the past* (pp. 173–207). Cincinnati: Pinnaflex Educational Resources Inc.

Mathieu, J. E., & Farr, J. L. (1991). Further evidence for the discriminant validity of measures of organizational commitment, job involvement, and job satisfaction. *The Journal of Applied Psychology*, *76*(1), 127–133. doi:10.1037/0021-9010.76.1.127

McAdam, R., & Galloway, A. (2005). Enterprise resource planning and organizational innovation: A management perspective. *Industrial Management & Data Systems*, *105*(3), 319–334. doi:10.1108/02635570510590110

Melon, N. P. (1990). A theoretical assessment of the user satisfaction construct. *Management Science*, *36*(1), 76–92. doi:10.1287/mnsc.36.1.76

Meyer, J. P., & Allen, N. J. (1991). A three-component conceptualization of organizational commitment. *Human Resource Management Review*, *1*(1), 61–89. doi:10.1016/1053-4822(91)90011-Z

Meyer, J. P., Allen, N. J., & Smith, C. A. (1993). Commitment to organizations and occupations: Extension and test of a three-component conception. *The Journal of Applied Psychology*, *78*(4), 538–552. doi:10.1037/0021-9010.78.4.538

Meyer, J. P., & Herscovitch, L. (2001). Commitment in the workplace toward a general model. *Human Resource Management Review*, *11*(3), 299–326. doi:10.1016/S1053-4822(00)00053-X

Meyer, J. P., Srinivas, E. S., Lai, J. B., & Topolnytsky, L. (2007). Employee commitment and support for an organizational change: Test of the three-component model in tow culture. *Journal of Occupational and Organizational Psychology*, *80*(2), 185–211. doi:10.1348/096317906X118685

Michel, A., Stemaier, R., & Salvador, R. (2010). I Scratch Your Back - You Scratch Mine. Do procedural justice and organizational identification matter for employee's cooperation during change? *Journal of Change Management*, *10*(1), 41–59. doi:10.1080/14697010903549432

Miller, V. D., Johnson, J. R., & Grau, J. (1994). Antecedents to willingness to participate in a planned organizational change. *Journal of Applied Communication Research*, *22*(1), 59–80. doi:10.1080/00909889409365387

Momoh, A., Roy, R., & Shehab, E. (2010). Challenges in enterprise resource planning implementation: State-of-the-art. *Business Process Management*, *16*(4), 537–565. doi:10.1108/14637151011065919

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mowday, R. T., Porter, L. W., & Steers, R. M. (1982). *Employee-organization linkages*. New York: Academic Press.

Organ, D. W. (1990). The motivational basis of organizational citizenship behavior. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior* (Vol. 12, pp. 43–72). Greenwich, CT: JAI Press.

Parish, J. T., Cadwallader, S., & Busch, P. (2007). Want, need to.ought to: Employee commitment to organizational change. *Journal of Organizational Change Management*, *21*(1), 32–52. doi:10.1108/09534810810847020

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *The Journal of Applied Psychology*, *88*(5), 879–903. doi:10.1037/0021-9010.88.5.879 PMID:14516251

Porter, C. E., & Donthu, N. (2006). Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of Business Research*, *59*(9), 999–1007. doi:10.1016/j.jbusres.2006.06.003

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891. doi:10.3758/BRM.40.3.879 PMID:18697684

Rai, A., Brown, P., & Tang, X. (2009). Organizational assimilation of electronic procurement innovations. *Journal of Management Information Systems*, *26*(1), 257–296. doi:10.2753/MIS0742-1222260110

Rai, A., Lang, S., & Welker, R. B. (2002). Assessing the validity of IS success model: An empirical test and theoretical analysis. *Information Systems Research*, *13*(1), 50–69. doi:10.1287/isre.13.1.50.96

Rao, S. S. (2000). Enterprise resource planning in reengineering business. *Business Process Management Journal*, *6*(5), 376–391. doi:10.1108/14637150010352390

Razmi, J., Sangari, M. S., & Ghodsi, R. (2009). Developing a practical framework for ERP readiness using fuzzy analytic network process. *Advances in Engineering Software*, *40*(11), 1168–1178. doi:10.1016/j.advengsoft.2009.05.002

Sarason, I. G., Levine, H. M., Basham, R. B., & Sarason, B. R. (1983). Assessing social support: The social support questionnaire. *Journal of Personality and Social Psychology*, *44*(1), 127–139. doi:10.1037/0022-3514.44.1.127 PMID:6886964

Serra, C. E. M., & Kunc, M. (2015). Benefits realisation management and its influence on project success and on the execution of business strategies. *International Journal of Project Management*, *33*(1), 53–66. doi:10.1016/j.ijproman.2014.03.011

Sosik, J. J., & Godshalk, V. M. (2000). Leadership styles, mentoring functions received, and job-related stress: A conceptual model and preliminary study. *Journal of Organizational Behavior*, *21*(4), 365–390. doi:10.1002/(SICI)1099-1379(200006)21:4<365::AID-JOB14>3.0.CO;2-H

Sundin, L., Bildt, C., Lisspers, J., Hochwalder, J., & Setterkubd, S. (2006). Organisational factors,individual characteristics and social support: What determines the levels of social support. *Work (Reading, Mass.)*, *27*(1), 45–55. PMID:16873980

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Tan, V., & Tan, N. T. (2005). Change management in times of economic uncertainty. *Singapore Management Review*, *27*(1), 49–68.

Vakola, M., & Nikolaou, I. (2005). Attitudes towards organizational change: What is the role of employees stress and commitment? *Employee Relations*, *27*(2), 160–174. doi:10.1108/01425450510572685

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, *11*(4), 342–365. doi:10.1287/isre.11.4.342.11872

Wayne, S. J., Shore, L. M., Bommer, W. H., & Tetrick, L. E. (2002). The role of fair treatment and rewards in perceptions of organizational support and leader-member exchange. *The Journal of Applied Psychology*, *87*(3), 590–598. doi:10.1037/0021-9010.87.3.590 PMID:12090617

Wayne, S. J., Shore, L. M., & Liden, R. C. (1997). Perceived organizational support and leader-member exchange: A social exchange perspective. *Academy of Management Journal*, *40*(1), 82–111. doi:10.2307/257021

Witt, L. A., Kacmar, K. M., & Andrews, M. C. (2001). The interactive effects of procedural justice and exchange ideology on supervisor-rated commitment. *Journal of Organizational Behavior*, *22*(5), 505–515. doi:10.1002/job.99

Yoon, J., & Thye, S. (2000). Supervisor support in the work place: Legitimacy and positive affectivity. *The Journal of Social Psychology*, *140*(3), 295–316. doi:10.1080/00224540009600472 PMID:10902372

Yousef, D. A. (2000). Organizational commitment and job satisfaction as predictors of attitudes toward organizational change in a non-western setting. *Personnel Review*, *29*(5), 567–592. doi:10.1108/00483480010296401

Ziemba, E., & Obłak, I. (2015). Change management in information systems projects for public organizations in Poland. *Interdisciplinary Journal of Information, Knowledge, and Management*, *10*, 47–62.

This research was previously published in the International Journal of Information Systems and Social Change (IJISSC), 9(1); pages 58-76, copyright year 2018 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 71
Factors Contributing to Organizational Change Success or Failure:
A Qualitative Meta-Analysis of 200 Reflective Case Studies

Jenni Jones
University of Wolverhampton, UK

Janet Firth
University of Wolverhampton, UK

Claire Hannibal
https://orcid.org/0000-0001-6840-9097
Manchester Metropolitan University, UK

Michael Ogunseyin
University of Wolverhampton, UK

ABSTRACT

Change, and changing, exercise the minds of most managers most of the time. In consequence, leadership development and change management tend to be top priorities for many human resource development (HRD) professionals today. Despite this, much academic and practitioner literature suggests that 70% of all change programs fail. Through analyzing 200 organizational change case studies, this chapter examines this high failure rate, investigates leadership styles and their relationship to change, and explores the key factors that either enable or hinder successful change. The key findings of this examination were that the majority of the 200 studied change initiatives were considered successful and that using Kotter's change model, which has been long established, does not necessarily mean success; nor does the use of a democratic/participative leadership style. The most significant hindering factors and the key critical success factors are also acknowledged.

DOI: 10.4018/978-1-7998-7297-9.ch071

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

According to Bawany (2016) "we live in a world where 'business as usual' IS change" (p. 32). Change is a normal, natural response to variable, uncertain, internal and/or external conditions (Leifer, 1989). Change is complex, constant, ever-present, increasing in pace, and open-ended and comes in many shapes and sizes. This is true for both change within individuals and change within organizations. Change is something that exists in all individuals, in all organizations, and in all sectors (Todnem By, 2005). We are living and working in a volatile, uncertain, complex and ambiguous (VUCA) world (Rodriguez & Rodriguez, 2015).

Due to globalisation, the fast pace of technological and digital changes, the developing and differing expectations of the workforce, shifting demographics and increasing competition to survive in the workplace, organizations need to recognise the uncertain and unpredictable environment in which they operate. They need to find ways to successfully navigate through the complexity and ambiguity brought about by ongoing change. In short, the rate of change is accelerating, and so organizations must demonstrate that they are up the challenge of moving quickly and adapting continuously and successfully to keep up.

Much is written about organizational change, leadership, and the popular frameworks and models to consider in times of change. We are aware through a plethora of change management books and journals that change is constant (Coleman & Thomas, 2017), that change is complex (Senior & Swailes, 2016) and that change is inevitable (Daft, 2018). Furthermore, numerous leadership models and change management models have been offered as ways to best lead and manage change (Senior & Swailes, 2016). However, there are still gaps in understanding how to better ensure successful organizational change in today's VUCA world, not least because the validity of widely held assumptions about the scale of change programme failure, the best change leadership style to adopt, and the sufficiency of empirical evidence supporting many change management models, have been questioned.

The purpose of the study reported in this chapter was to generate empirical evidence that could contribute to current debates concerning the above assumptions by addressing the following research questions:

1. What is the 'reality' of change programme failure compared to the 70% failure rate 'rhetoric'?
2. What are the most frequently used leadership styles in times of change?
3. What are the key factors that enable or inhibit the effective application of change management models and the achievement of successful change?

The chapter starts with a review of organizational change and development (OCD) related literature which reports why over 70% of change initiatives fail. It then provides a brief discussion of current models of change with a focus on Kotter and a brief overview of leadership in the context of change. This is followed by details of the selected methodology and methods adopted for the current study, the results of the data analysis, and a discussion of the key findings. The chapter closes with consideration of the research limitations and implications for evidence-based OCD practitioners.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

LITERATURE REVIEW

Success and Failure of Organizational Change Programmes

It has been reported many times that 70% of all change programmes fail (Balogun & Hailey, 2004; Beer & Nohria, 2000; Bielinska-Kwapisz, 2014; Burnes, 2011; Burnes & Jackson, 2011; Kotter, 2008). According to Carnall and Todnem By (2014), and as discussed in earlier chapters, the key reasons for change failure are time, unplanned uncontrollable factors, inadequate coordination, competing demands on manager's time, insufficient change agency competence, inadequate training and uncontrollable external factors. The inference from this headline grabbing figure of 70% is that there cannot be a valid framework to successfully implement and manage change, otherwise we would be using it and the failure rate would be much reduced.

In this context, there is a lack of clarity as to what is meant by 'failure' i.e. a failure to achieve all the outcomes set? Or a failure to engage all employees with the change? Or a need to make further changes once the initial change has been completed? A definition of failure is not made clear in the literature and so it is difficult to acknowledge whether 70% is a true and/or helpful figure to quote. Hughes (2001) suggests that there is a lack of empirical evidence to support the 70% failure rate rhetoric and suggests that the reality of organizational change may result in different and/or additional outcomes. These may not initially be seen as beneficial as those which were planned but potentially not achieved. Perceived failure may also not take into account the post change successes, nor account for the unique demands of different contexts; i.e. what may work for one organization may not completely work for another or may not produce the same outcomes but may still be considered a success if later embedded/consolidated.

In addition, change does not happen in isolation, so it may be difficult to individually measure change initiatives as separate from other activities that may help or hinder the change process, or indeed separate from the constraints of the context. There is research that suggests that changes in the public sector are more difficult to achieve than those in the private sector due to their political nature and bureaucratic role and rule-based culture (McAdam & Saulters, 2000). Also, perhaps it depends who you are asking to evaluate the change; i.e. if you are asking those who led the change, then perhaps their perceptions are going to be influenced by their own effort or the part they played, and as such this may differ from the expectations and perceptions of those on the receiving end. Stakeholder evaluations of the same initiative may be wholly different. For instance, employees may not feel satisfied with the change, yet from a senior management point of view the change may have met the outcomes and therefore it was considered successful; although we're not suggesting that the successful outcome was geared towards making the employees unhappy!

Hence, one part of our study seeks evidence that supports (or otherwise) commonly held assumptions and beliefs about the 70% failure rate of OCD programmes

Although there is limited evidence to suggest that the 70% figure is valid and reliable, or indeed an outcome of any empirical evidence, authors have continued to suggest alternative frameworks and models for managing change to reduce this high failure rate. And there are now available a wide range of somewhat contradictory, confusing and repetitive models to inform, shape and evaluate change management practices. However, it is still argued that we do not have an approach to change that is "theoretically holistic, universally applicable, and which can be practically applied" (Burnes, 2014, p. xiv).

Accepting the criticism that "all models are wrong, some models are useful" (Box as cited in Burnes, 2014, p. xii), it is surprising that change management education relies on models which suggest one best

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

approach to achieving successful organizational change (Kanter, Stein & Jick, 1992; Kotter, 1995; Lewin, 1947; Luecke, 2003; Pugh, 1993) and/or adopt a contingency approach to change (Stace & Dunphy, 2001; Storey, 1992). Current thinking suggests that these models do not fully explore or display the multitude of approaches to change (Burnes, 2014) and the multiple factors that influence organizational change.

Lewin (1947) is much quoted in respect of his 3-step planned approach to change involving *unfreezing* from the present state, *moving* towards a new state and *refreezing* at this new level. The suggestion is that once movement has occurred, the change has happened and is fixed and embedded in the organization. This approach to change does not permit influence from other variable factors, nor does it suggest there is an on-going process or flexibility once achieved. This model of planned change has been much criticised by those who support the more emergent approaches to change and who advocate a more practical approach, recognising the relationship between variables and context, for instance: Kanter et al.'s (1992) 10 Commandments; Kotter's (1995; 2014) 8 stages or phases of actions for leaders/managers of change to follow; and Luecke's 7 steps (2003). Kotter's work is much cited and considered to be the 'orthodoxy for change leadership' (Todnem By, Hughes & Ford, 2016, p. 11.) As a reminder, Kotter's model or framework draws attention to 8 phases;

1. Establish a sense of urgency
2. Create a guiding coalition
3. Develop a clear shared vision
4. Communicate the vision
5. Empower people to act on the vision
6. Create short term wins
7. Consolidate and build on the change
8. Institutionalise the change. Kotter (1995; 2014)

However, this and other change management frameworks and models have attracted criticism from those who propose a more contingency approach to change, stating that no one-size-fits-all, and all change situations are unique and so require a different, more flexible approach each time (Stace & Dunphy, 2001). More recently Kotter (2014) revised his thinking, suggesting now that his model is not to be taken as a rigid, linear, sequential model but more as a continuous set of steps that run concurrently.

In conclusion and suffice to say, as with the 70% failure rate figure, change management models too are considered lacking in empirical evidence and based on unchallenged hypotheses (Burnes & Jackson, 2011).

Leadership in Times of Change

Leadership is key to the success of any organization as it has a direct impact on organizational performance, and thus organizational survival (Daft, 2018).

A major factor in the failure of organizations to adapt to internal and external changes is their lack of effective leadership. It is recognised that managing change is not enough, but that leading change is what is required (Bawany, 2016). "The heart of the leadership challenge that confronts today's leaders is learning how to lead in a VUCA world" (Bawany, 2016, p. 31) and as such, leading and managing change is increasingly becoming a necessary leadership/management skill. Effective leaders see change as a way to strengthen the organization and not to disrupt it. A critical factor to understanding how to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

lead change is having an understanding of the positive and negative aspects of change, and the impact of these on others within the organization.

"Leadership deals with change, inspiration, motivation and influence" (DuBrin, 2010, p. 5). In short, leaders set the vision and strategy moving forward, align people towards the vision/strategy and then inspire, motivate and influence them towards making it happen (Kotter, 1996). According to the Chartered Institute of Personnel and Development-CIPD (2017) which is based in the United Kingdom (UK), leadership both creates and addresses challenges and goals at the strategic and cultural level of an organization. It involves influence over, and responsibility for, individuals (both internally and externally to the organization) and so a leader's ability to understand and enhance human behaviour is key. The CIPD also states that leadership is a continuous process and must be viewed within its context. There are a variety of schools of thought about leadership including trait theories (Kirkpatrick & Locke, 1991), behaviourist (Adair, 1989; 2007), situational/contingency (Hersey, 1984) and post-heroic (Bass, 1990). The work of Hersey and Blanchard on situational leadership theory (Buchanan, 2013) is considered particularly relevant to change leadership as it relates to the adaptability, willingness, and readiness of those being managed and the ability of the leader to lead change in different and diverse situations. Turnnidge and Cote (2017) identifies this as encompassing the motivational and empowering elements of transformational leadership. Bass and Riggio (2006) argue that transformational leaders set the vision, take an entrepreneurial/innovative approach to all aspects of the organization and are agents of change.

However, when all the debate and theory is stripped away, traditionally there are still considered to be 3 different leadership styles; autocratic, democratic/participative and laissez-faire/delegative (Hopen, 2015; Lewin, Lippit & White, 1939). Furthermore, there are those managers who adopt a more transactional and those who adopt a more transformational approach (Bass, Avolio, Jung & Berson, 2003; Bass & Riggio, 2006).

In addition, there are contemporary emergent leadership theories underpinning the knowledge and development of change leadership; but subtly they focus on the role of the individual in the process of being led: distributed, servant, authentic and relational leadership. These theories put people at the heart of leading change and focus on all the players as moral and ethical contributors to the change process, having self-awareness, openness, transparency, and consistency. They also acknowledge that all people have skills, knowledge and attributes that can be employed in the process of change. This in turn assists with the continuous professional development element of their working lives.

The literature suggests that 'distributed leadership' is a comparatively new concept and one used initially in academic environments to describe change leadership though latterly it has become more widely used and discussed. According to Bolden (2007) distributed leadership has become popular as an alternative to traditional models of leadership that concern themselves primarily with the behaviours and attributes of individual 'leaders' (e.g. trait, situational, style and transformational theories). The suggestion is that organizational change requires a different type of leadership at different times within a change intervention. Spillane (2006) asserts that distributed leadership is dissociated from specified organizational roles, and the action and influence of people at all levels is more important to the overall functioning of the organization. Spillane also suggests that a distributed perspective 'puts leadership practice centre stage', thereby encouraging a shift in focus from the traits and characteristics of 'leaders' to the shared activities and functions of 'leadership' in times of change.

In addition, there is still extensive discussion about the impact of distributed leadership and argument regarding its effectiveness, but both Cannatelli, Smith, Giudici, Jones and Conger (2017) and Harris and DeFlaminis (2016) argue that in spite of this, it can be a successful approach to leadership in a range of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

environments. Feng, Hao, Iles and Brown (2017) argue that distributed leadership requires a robust approach since it is applied in environments which are subject to frequent and significant change and are increasingly complex. In contrast, Lumby (2013) argues that it can be seen as a fad, that it is 'nebulous and difficult to define' and that the lack of adequate definition means it can neither be endorsed nor can its impact be measured.

Akin to distributed leadership theory and growing in popularity 'servant leadership' puts people at the heart of change management interventions in organizations. Servant leadership is based on the philosophy of service (Akdol & Arikboga, 2017). Therefore, it is a conduit for generating creativity among the people within organizations. Servant leadership is considered as the approach that transcends command and control leadership (Dierendonck & Patterson, 2015). It is a response to the generic practice of leadership that tends in many cases to inappropriately emphasise performance and results over process and morality. However, the extant literature of servant leadership is paradoxical. Originally the theory developed the 'dual being' concept of servant leadership as an elusive subject (Stoten, 2013). In literal terms, 'dual being' refers to the context that everyone in an organization is both servant and leader. This is, however, emphasised by Davis, (2017) and Yigit and Bozkurt, (2017). They have indicated that dual being is not only possible but also imperative for effective leadership practice. This is in line with the opinion of Moll and Kretzschmar (2017), who suggest that servant leadership requires leaders to serve the followers and meet their needs more; the challenges of organizational change that organizations face can be dealt with by servant leadership. This connects to the thinking of Brown and Treviño (2006) in examining the concept of 'authentic leadership'. The principal dimensions of authentic leadership are self-awareness, openness, transparency, and consistency. Avolio, Gardner, Walumbwa, Luthans and May (2004) describe authentic leaders as those who are deeply aware of how they think, feel and behave and are seen by others as doing so. Others also see them as being aware of their own and others' values/moral perspective; aware of the context in which they are operating; and who are confident, optimistic and resilient.

The concept of 'relational leadership', which was first introduced by Uhl-Bien (2006) and is considered new and original, goes even further with the idea that the individual's capacity to influence is the result of a social dynamic. According to Uhl-Bien (2006) "we need to move beyond a focus on the manager–subordinate dyad or a measure of relationship quality to address the question of, what are the relational dynamics by which leadership is developed throughout the workplace" (p. 672). At first sight, in the perspective of a relational analysis of leadership, the answer seems to be in the question. Essentially, Uhl-Bien (2006) defines relational leadership as a "social influence process" through which social order and change are constructed and produced (p. 655). In other words, the social aspect is at the heart of relational leadership; because changes are constructed and produced, and everybody participates in the process. Thus, as Uhl-Bien (2006) adds, relational leadership, especially in times of change, would not be dependent on role or hierarchical position.

Whilst it is recognised that "leadership and organizational change are inextricably intertwined" (Parry, 2011, p. 57), there is little empirical evidence to underpin our knowledge of change leadership; much is being said but little is being rigorously academically or empirically underpinned. Todnem By et al. (2016) suggest that there are three well established myths in relation to leadership of change; 1) that it is the individual that counts and not the multiple others who may well be taking on a leadership role as well; 2) that leadership is enough and is independent of other management activity; and 3) that one-size-fits-all rather than different types of leadership being needed at different times within the change process. Conversely, Grint (2000) suggests that leadership is an art and not a science, so it is not

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

possible to create a leadership formula that works and applies to every change situation because it very much depends on a number of factors. As stated in chapter 2, the Jones and Gross (1996) study showed that 2 quite different leadership styles (top down and bottom up) can still lead to organizational change success. Some time ago, Pettigrew and Whipp (1991) also concluded that there are no universal rules which guide the leadership of change, there are no universally good leaders, and leadership is sensitive to context. However, House and Aditya (1997) believe that several leadership functions generic to the exercise of leadership are likely to be effective across organizations, industries and cultures, but that this belief is theoretical speculation which needs to be developed theoretically and demonstrated empirically. More recently, Caldwell (2006) has argued that leading change is rarely a single, unified intervention by one transformational leader but more likely a series of disparate and fragmented activities at various levels, within an organization. As can be seen, there are considerable divergences of opinion in terms of the received wisdom about the relationship between leadership and organizational change.

RESEARCH METHODOLOGY

To address the research questions the study adopted a critical realist position and an interpretivist theoretical perspective; the central purpose being to understand the lived human experience and subjective world of those involved in change whether as recipients or as facilitators/agents of change (Cohen, Manion & Morrison, 2011).

Recognising the lack of literature providing real-life organizational case studies that inform thinking about change (Coleman & Thomas, 2017) the focus of our study was scholar-practitioner perceptions of their personal experience of effective and/or ineffective organizational change, as expressed in the form of case study reflections.

Notwithstanding the risk of 'participant error' (Robson, 2011), we still considered it most important that scholar practitioners should include in their case study reflections perceptions of their personal reality of change.

Sample of Research Participants

The research participants were all mature students attending management related postgraduate degree (PG) programmes in a UK business school. Creswell (2007) recommends a range of 20 to 40 participants within a sample for qualitative studies. The sample size for this study was determined by the number of PG students who had studied and submitted a reflective case study assessment for a core 20 credit module entitled 'Leading Transformation and Change' or 'Organizational Change and Development' as part of a UK Business School MBA programme, a Master in Public Health programme, or a CIPD/ Diploma in Human Resource Management programme. All these PG students were working managers or HR professionals, and their reflective case studies were 6000-word essays analysing a change programme in a workplace that they had experienced, either through leading it, supporting it, or being on the receiving end of it. Each case study had a common purpose in that it allowed its author to reflect on the success or failure of an organizational change project with which they were familiar. Only those case studies on programmes running during the 5-year academic period from 2012 to 2017 that had achieved a pass grade of 50% or above were included in the empirical data set.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The scholar practitioners were encouraged to adopt a retrospective perspective to locate the story of each change programme and the factors influencing it (Hitchcock & Hughes, 1989). In the reflective case studies the unit of analysis was the change process. Case reflections were thus developed to investigate the phenomenon of change in its real-world context (Creswell, 2007; Farquhar, 2012; Yin, 2014).

Data Collection and Analysis

Collecting an empirical data set comprised of 200 reflective case studies was consistent with Hughes's (2011, p. 462) call for "valid and reliable empirical evidence to support evidence-based change practices". A sample of this size permits comparisons to be drawn and to assess whether transferability between cases can be reached (Saunders, Lewis & Thornhill, 2016). With 200 cases there was sufficient data to triangulate and explore the findings further, and to strengthen the assumptions being made which in turn helped to ensure validity, reliability and credibility of the results (Farquhar, 2012).

The research team was comprised of four Faculty members at the UK University in which the modules were delivered; one teaching and research professor, two senior teaching and research staff, and one research assistant. The first stage of analysis commenced with the reading of a 10% sample of the same cases by each member of the research team who then came together to discuss and establish *a priori* codes to begin to sort the data. These codes comprised:

- Basic organization data; size of organization, industry, location
- Was the change considered successful – YES/NO
- Type of change e.g. planned, emergent, post-emergent
- Scale of change e.g. large scale change
- Triggers/drivers for change including internal (SWOT) and external (STEEPLE) factors
- Aims/objectives of the change programme/outcomes expected
- External Consultants used – YES/NO
- Key change models used e.g. Kotter, Lewin, Kanter et al., Luecke
- Leadership styles at both top/senior leadership level and lower leadership/manager levels
- Reflections on the biggest issues that hindered the change process
- Reflections on the lessons learnt from the change process/critical success factors

The second stage was the development of a database to capture coded data. The third stage involved the reading and coding of the case studies against the *a priori* codes by the research team. Members of the team coded independently, with coding corroborated at frequent intervals. This stage resulted in the capture and coding of raw data from the 200 case studies that could be sorted and further analysed. For the final stage of analysis, the codes were collapsed into key themes and comparisons were drawn between the success or otherwise of the change, the key leadership styles and the factors that helped or hindered successful change.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

More About the Reflective Case Histories

Type and Sector

Of the 200 reflective case studies, 117 were written by students from the United Kingdom (UK) and various European Union (EU) countries and 83 by international students from other countries. Of the 200 organizations where they were employed 119 were in the private sector, 81 in the public sector and none in the not-for-profit/third sector. Additionally, 157 were considered large (over 250 employees), 35 medium (between 50-249 employees), and 8 small (less than 50 employees).

Table 1. Breakdown of the number of case studies by industry type and sector

Industry Type	Number of Cases Studies	Private Sector	Public Sector
Aeronautics and Defence	4	2	2
Agriculture and Mining	1	0	1
Banking/ Finance/ Investment	8	5	3
Building and Construction	10	8	2
Chemical/Energy/ Oil and Gas	9	6	3
Education/ University/ College	26	2	24
Electricity	7	7	0
Engineering/Automotive	13	13	0
Health	39	12	27
Hotel/Leisure	11	11	0
Housing/Property	13	6	7
IT/ Telecommunication	7	6	1
Legal Services	2	1	1
Manufacturing	31	30	1
Media	1	1	0
Religious Activities	1	1	0
Retail	8	8	0
Security	3	1	2
Transport	6	4	2
Total Companies	200	124	76

As can be seen in Table 1, 76 (38%) of the case studies were from public-sector organizations and 124 (62%) from private companies respectively; and almost half of these cases were from just three sectors: health, education and manufacturing.

The reason for the high number from the health sector including hospitals, care homes and social/ community care was because one of the 3 PG programmes used for this study was the Masters in Public

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Health programme, and the high number from manufacturing organizations was because the Business School is based in the West Midlands Region; a major manufacturing area in the UK.

Type of Organizational Change

The case study writers were asked to note whether the change programmes they were reflecting upon were planned, emergent or post-emergent. As can be seen in Table 2, almost half of the change programmes (48%) were planned; additionally, 19 (9.5%) involved external change consultants.

Table 2. Type of organizational change discussed in the reflective case studies

The Types of Change	Number of Cases
Planned	96 (48%)
Emergent	63 (31.5%)
Post-Emergent	13 (6.5%)
Planned & Emergent	28 (14%)
Total	200

Organizational Wide Change Initiatives

Of the 200 case studies, 113 related to organization wide change initiatives of which 80 were in private sector organizations and 33 in public sector organizations. Of these, 49 were international and 64 UK based organizations; and in terms of size 92 were classed as 'large-scale', 15 as 'medium scale' and 6 as 'small scale' organizations.

Triggers/Drivers of the Change Initiatives

The cases studies showed that 113 (57%) of the change initiatives were perceived to be driven by internal forces only, 13 (6%) by external factors only, and 74 (37%) by both internal and external factors.

The key internal triggers were based around; making improvements to increase efficiency and profit; for instance, simplifying work processes, realigning the business structure, reducing error rates/wastage/costs, and addressing staffing issues. The key external triggers included: addressing what the competition were doing, keeping up with the change in customer needs, addressing fall-out from fraud and public scandal (in a small number of cases), public pressure, reduction in funding, embracing new technology and growth/decline in sales.

A SWOT (strengths, weakness, opportunities and threats) analysis and STEEPLE (social, technological, economic, environmental, political, legal and ethical) analysis were used consistently by the scholar practitioners to share their views on the organization's position before the change happened. A synthesis of the key common aspects and factors revealed by the respective SWOT analyses are shown in Table 3.

The first 2 aspects of the SWOT (SW) show the internal aspects and the second part (OT) summarises the key external factors mentioned previously and highlighted through the STEEPLE analysis. It is interesting to note that change in the law and (Government) funding was both an opportunity for

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Synthesis of the key common themes resulting from the SWOT analyses

Strengths	Weaknesses
• Employee training/employee support • Government support • Employee skills • Strong market position • Strong brand • Growing business/profitability	• Loss of staff/loss of skills • Outdated systems • Outdated technology • Low morale • Leadership • Falling sales
Opportunities	**Threats**
• Flexible employees • Restructuring • Change in laws • Change in (Government) funding • Change in customers • New markets • New technology • Save wastage/save money	• New competitors • Exchange rates • Funding cuts • Government/legal pressure • Rising costs • Declining sales • Union pressure • Weak leadership

some organizations and a threat for others; and that leadership was not mentioned as a strength in any of the 200 case studies but as a weakness and a threat.

FINDINGS

The results of addressing the three research questions are as follows:

Results Addressing RQ 1: What is the 'reality' of change programme failure compared to the 70% failure rate 'rhetoric'?

At the end of the case study essay, each case study writer was asked to declare whether they thought the change programme that they had reflected on was successful or not. It was not made clear how success should be decided; it was left to their own personal perceptions. The results of their decisions are below;

- **Successful Change:** 145 (72.5%)
- **Unsuccessful Change:** 55 (27.5%)

This table shows that there was no significant difference between success or failure between the two sectors, suggesting that change in either sector is likely to be as successful or as unsuccessful as each

Table 4. Breakdown of the number of successful and unsuccessful case studies by sector

Sector	Successful Cases	Unsuccessful Cases	Total
Private	89 (72%)	35 (28%)	124
Public	56 (73.5%)	20 (26.5%)	76
Total	145	55	200

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

other. This is counter to the suggestion earlier that successful change is more difficult to achieve in the public sector. However, the most interesting statistic here is that the 72.5% success rate is completely counter to the notion that 70% of all change programmes fail.

A variety of key models were used by the scholar practitioners to describe, reflect on and critique the change programmes to decide if the change programme was successful or not, including Kanter et al., (1992), Kotter (1995; 2014), Kubler-Ross (1973), Lewin (1947) and Luecke (2003). All lecturers presented all these models. Therefore, it was not surprising that they were chosen regularly to be used within the case study reflections, but by far the most used was Kotter's model.

It has already been established that Kotter's work is much cited (Todnem By et al., 2016) and is one of the most popular change management frameworks. This model was discussed in 100% of all the case studies, but this is not a surprise as there was an expectation, written into the assessment briefs, to help secure that this happened. This finding was not of interest in itself; but rather it was how the various stages/phases of the model were applied or not that gave insights. Interestingly, only 12.5% (n=25) of the case studies mentioned all 8 phases of Kotter's model having been applied. If this statistic was the way to measure the success of change programmes, then it would suggest an 87.5% failure rate but this contrasts sharply against the reported 72.5% success rate.

Here are several quotes taken directly from some of the successful organizational change case studies which refer to the importance of using the Kotter framework.

With these case study writers suggesting that applying Kotter ensured success;

Kotter's stages were well applied by the company. Overall implementation of change was relatively effective with minimal collateral damage. Due to the size and investment of the transfer, there was little opportunity for reversal and it was clearly re-frozen once implemented. The change agents were well selected and key to the project's success. (MBA/international student/private sector/successful change)

Kotter eight step model of successful change within the organization has significantly helped in avoiding the mistake that may likely frustrate the change and make it unrealistic. Also, transformational leaders in the organization that has contributed to the vision of moving the organization forward has help make the change successful. (MBA/international student/public sector/successful change)

Another recognising that among others, Kotter's model was most applicable;

There is no single model useful to the change process. Amongst the models of change, Kotter's 8 stages model has been more applicable to the organizational change. (HR/home student/public sector/successful change).

Another case study writer reflected they will use Kotter now to consolidate current changes;

It is evident that the initial stages of the merger failed to consider and address Kotter's eight stage process. There is an opportunity now to ensure that each stage is fully considered and appropriately addressed before beginning the next round of changes. The few short-term wins and gains that have been generated but remain hidden, critically need to be shared or communicated. (HR/home student/public sector/successful change.)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Here is a quote taken directly from one of the unsuccessful organizational change case studies which refers to the importance of using the Kotter framework;

The change would have been successful if the applied stages of Kotter's model were followed step by step. (HR/home student/private sector/unsuccessful change).

And another unsuccessful case study which suggests even Kotter was not useful;

None of the change models were applicable in describing the change process that the organization undertook. (HR/international student/private sector/unsuccessful change).

Results Addressing RQ 2: What are the most frequently used leadership styles in times of change?

Leadership of the change was recorded both at the higher, senior levels and at the lower, junior manager levels. Some different terms were used to describe the types of leadership and management involved in the change process, but these were categorised as either autocratic, democratic/participative or laissez-faire/delegative as indicated in Table 5.

Table 5. Different leadership styles mentioned in the case studies

Leadership Style	Higher/Senior Levels of Leadership	Lower/Junior Levels of Leadership/ Management
Autocratic	55	37
Democratic/participative	111	112
Laissez-faire/delegative	33	45
Unclear	1	6
Total	200	200

As can be seen, democratic/participative leadership is the predominant style of leadership mentioned and is twice as prevalent as the autocratic style or a laissez-faire/delegative style of leadership. Interestingly, in 111 of the case studies a transformational leadership style (Bass & Riggio, 2006) was mentioned, with 87% (n=98) of these organizations manifesting transformational leadership at the top management level, and the same leadership style dominant further down into the lower levels of leadership/management. As the majority of change initiatives discussed in these case studies were considered to be successful, the findings suggest that a transformational leadership approach is more likely to lead to a successful change. This is not a new insight, but it helps to reaffirm what we already know.

However, higher level managers in 27.5% (n=55) of the case study organizations were using the autocratic/top down style and 16.5% (n=33) using the laissez-faire/delegative type approach too, thus accounting for 44% (n=88) of all the case studies. This suggests that change can be successful whilst using these different leadership styles too.

Interestingly, reviewing the leadership in unsuccessful cases reveals that in approximately half of these cases (26 out of 55) the higher levels of management involved in managing the change were using

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a transformational leadership style, and over half (30 out of 55) at the lower levels of management were also using a transformational style of leadership. Again this shows a connection between the transformational approach being mirrored between the higher and lower levels of management.

It is interesting to note that the findings of this study do not support the widely held assumption that a more autocratic style of leadership in times of change is partly responsible for the lack of success of change programmes.

Results Addressing RQ 3: What are the key factors that enable or inhibit the effective application of change management models and the achievement of successful change?

Each scholar-practitioner was asked to reflect at the end of their case study write up about the key issues affecting their change programmes and the lessons they had learnt in relation to what should be done more of/less of for future change programmes.

Table 6. Issues mentioned in the case studies and the related lessons learnt

Hindering Factors Mentioned (With the Most Mentioned at the Top, Highlighted in Bold)	Lessons Learnt (With the Most Mentioned at the Top, Highlighted in Bold)
• **Lack of communication** • **Ineffective leadership** • **Employee resistance** • Customer satisfaction • Loss of skilled staff • IT • Legislation • Unions • Budget • Bad publicity • Pace of change	• **Need for effective communication 4)** • **Need for effective leadership 5)** • **Importance of team work 2)** • **Need to involve employees and managers 3)** • Importance of culture • Involve other stakeholders more • Need resources • Stick to a systematic approach/model

Note: The numbers in brackets relate to Kotter's 8 phases of change

Those highlighted in bold were the most mentioned throughout the 200 case studies. The lack of communication was overwhelmingly the biggest hindering factor and the biggest learning referred to at the end within both successful and unsuccessful cases. This finding again is not new but reiterates the importance of communicating change. The need for a more effective leadership style was also considered to be one of the biggest hindering factors, and is also reflected in lessons learnt. Employee resistance was also mentioned as a big issue together with recognition in the lessons learnt, that employees and other key stakeholders needed to be involved and working together for future change programme success. Interestingly it was also mentioned that managers needed to be involved more too; in the decision making and towards encouraging the employees to be more engaged too. Perhaps this helps to advocate the need for a more distributed or relational leadership approach (Cannatelli et al., 2017; Harris & DeFlaminis, 2016) whereby a more shared, team working type approach would better encourage the involvement and engagement of others (Spillane, 2006).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The following are a selection of quotes taken from some of the successful and unsuccessful organizational change case studies which refer to the top 3 themes in respect of leadership, communication and employee involvement;

Need for Effective Communication

These quotes demonstrate the importance of communication and the issues that occur if it is not done or not handled effectively.

This quote suggests progress will be hampered;

Communication is important, and without it, there will be obstacles which will cause disruption and either stop the transition, or severely hamper progress. Change required careful planning, support, and cooperation from all stakeholders. (MBA/home student/private sector/successful change)

That mistrust can develop;

Although the change process was successful through the application of the step by step stages of Kotter's model, communication in the process was very poor. This led to trust issues amongst employee, leading to a dissatisfaction of the change program. (HR/home student/public sector/successful change)

And a lack of confidence ensues;

Communication induces confidence in the team. (Health/international student/public sector/successful change)

Need for Effective Leadership

These quotes show the need for an effective leadership style that considers and includes all stakeholders, particularly employees, so they can all get involved and work together, and not against each other; again perhaps advocating the need for a more distributed leadership type approach.

Successful change management requires a large commitment from executives and senior managers, whether the change is occurring in a department or in a complete organization. (MBA/home student/public sector/successful change)

Factors such as effective management, strong leadership, structure in the organization, and closely considering the demands of stakeholders are important to the process of change. (MBA/international student/public sector/unsuccessful change)

It is interesting to note that in the next 2 quotes, leaders did not actively involve the employees, by taking a more autocratic leadership approach, but the change was still considered to have been successful;

While final consumers or end users were considered when executing change, the role of other stakeholders such as the employees was not considered. The change leadership process was autocratic and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

employees would have worked better towards the change if it was more democratic. (MBA/home student/private sector/successful change).

Resistance to change from employees, lack of employees involvement in the change process (i.e. participative leadership was not applied). (Health/international student/private sector/successful change)

Importance of Team Work/Employee Involvement

Following on from comments made about leaders not involving or communicating well enough to the employees, there were some specific comments made about the lack of involvement of employees. Lack of consideration of the impact;

There was an overemphasis on achieving change and success with little consideration of the impact on employees. (HR/home student/private sector/unsuccessful change)

And the (differing) perspectives of employees;

The main lesson learnt from this particular restructure was that proper and thorough consideration was not given to the cultural and social perspective of the employees. (HR/home student/private sector/successful change)

This case study writer suggested a culture of togetherness was needed;

Importance of team work…It is important for managers to create a safe environment for honest, straightforward dialogue. We needed a culture of togetherness and well-being, together with a captivating vision. (MBA/international student/private sector/successful change)

These quotes help to confirm that even in successful change, the needs of the employees were not always recognised or met, and that a more 'distributed' or shared approach would create a more productive change environment.

Here is a helpful case study quote which sums up all of the 3 essential critical success factors discussed;

The organization has learned many valuable lessons from the change efforts that clear communication is vital, a hierarchical leadership is not suitable in the process, and employee engagement is vital into the success of the change. (Health/home student/private sector/successful change)

It is interesting to note that other factors, for instance; employee resistance, loss of skilled staff, unions and bad publicity were also mentioned as hindering factors; perhaps if the leaders and managers had involved employees more and the communication had been effective too, some of these secondary issues may well have been reduced.

Also, the importance of culture has been mentioned as a lesson learnt. There was little mentioned in the majority of the organizational case studies about organizational culture, so it has not been possible to make any generalisations about more or less effective organizational cultures within these change programmes, but this is certainly an area for further research.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

DISCUSSION

A most surprising finding from our meta-analysis of the 200 reflective case studies was that the majority (72.5%) of the change initiatives was considered to be successful, which is counter to the widely held assumption and belief that 70% of all change programmes fail (Balogun & Hailey, 2004; Beer & Nohria, 2000; Bielinska-Kwapisz, 2014; Burnes & Jackson, 2011; Kotter, 2008). This finding supports Hughes (2001) who suggests reality may be somewhat different from the rhetoric and that there is a lack of empirical evidence to support the 70% failure rate. Our large empirical study suggests that the reality of organizational change programme success, as perceived by scholar-practitioners, is different to the common discourse on this issue.

The key criticism from Hughes (2011) is that there is a lack of clarity about what is meant by failure and certainly (unhelpfully) for this study, no clarity was given about what would constitute failure or success. The scholar practitioners made up their own minds based on their own experiences and the information they had discussed and debated in their reflective case studies. As instructed by the lecturers, all 200 case studies referred to Kotter's 8 phase framework, as well as to other models, but not to the extent to which Kotter's framework had been applied. The 100% mention of Kotter is not surprising as reference to Kotter was an expectation in the assessment. But what was a surprise was that, even though for many the full Kotter model had not been followed, the change was still considered to have been successful. This suggests that using or not (fully) using the models does not necessarily determine change success.

It is possible that individual perceptions of how successful or not the change programme may have been skewed by their involvement in the change and as such, the impact of the outcomes to them personally. Perhaps as managers and HR practitioners they are more likely to have been heavily involved in the change, maybe even led the change, so perhaps they are more likely to have perceived the change positively, due to the effort they put into managing or leading it towards a successful end (Doyle, 2001; Hughes, 2011.) Or perhaps as this was part of an assessment, did these scholar practitioners feel pressure to make out the change was more successful than it was, in the hope of a more favourable mark? This may have been their initial perception, but there was a strong steer from all the lecturers for both modules and with all cohorts that the change programme which they chose to discuss was not expected to be wholly successful. The consistent steer from within the classroom was to be as critical as possible.

The application of Kotter's 8 phases was mentioned within all the case studies but not necessarily in the order it has been prescribed, nor it seems does it predict success. Some successful case studies did not apply any of Kotter's model, and others that did were not always successful. It is also interesting to note that of the 146 organizations that did apply Kotter's 8 phases, they did not always do this in the order that Kotter prescribes. Yet, typically Kotter's model and other change models prescribe various stages or phases that are to be carried out in sequential order. This finding suggests that using Kotter's model or other established change models may not necessarily lead to success. Hughes (2016) suggests that rarely is leadership and change 'rational, linear and unambiguous' (p.9).

One of the case study writers sums this up well;

Whilst change models can provide useful frameworks for understanding and approaching change, no model, regardless of its standing and reputation, will be fully effective and is likely to fail (to be effective) if it does not meet an organization's needs. (HR/home student/Public sector/successful change)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

This perhaps reflects the need for models to be seen as tools to be used in a fluid and flexible way, which is consistent with Kotter's (2014) updated thinking towards a more continuous model of concurrent steps. In reality, change programmes may well be planned in a particular way from the outset, but very often do not play out in the order they may have hoped. Perhaps this fits with the notion of a more blended or holistic approach that works better (Burnes, 2014)? Clearly, some organizations did not follow the steps within the models at all, or when they did they did not follow them step by step, but the scholar practitioners still considered their change programmes to be successful.

As can be seen in Table 5, the most discussed leadership style was a democratic/participative approach (Bass & Riggio, 2006; Hopen, 2015) at both senior and lower management/leadership levels, which suggests this style could be a predictor of success.

This is an interesting finding; but because leadership was perceived to be a weakness, a threat, and a hindering factor (see Table 3 & 6), it suggests a transformational leadership style is not always effective in times of change. As revealed by this study, other change programmes have been successful where an autocratic and a laissez-faire style was used. These findings potentially show that there is not one leadership style that always has a positive effect on the outcomes of the change programme, and that perhaps a more mixed approach is needed. These findings indicate that different types of leadership style are required at different stages of the change programme. This fits with Grint's (2000) suggestion that it is not possible to create a leadership formula that works and applies to every change situation, it very much depends on a number of factors.

The biggest factors which were perceived to hinder change were: lack of communication, lack of effective leadership and employee resistance. The key critical success factors were: effective communication, effective leadership and team working, and employee involvement.

Comparison of Findings Against Common Insights and Lessons Identified by Hamlin (2001)

Hamlin (2001) created 10 common insights and lessons (CILs) learnt from a multiple cross-case comparative analysis of 18 OCD reflective case histories published in Hamlin, Keep and Ash (2001). These 10 CILs have been used by the co-editors of this handbook for conducting a *multiple cross-case comparative analysis* (MCCCA) of all the reflective case histories contributed to Volume II (see chapter "53")"

Using the same CILs, it was decided to explore the extent to which the 200 case studies examined in this chapter contain the same 'key factors that enable successful change.'

The results of the comparison identified in the 200 reflective case studies that lend empirical support for Hamlin's (2001) 10 CILs are shown in Table 7. As can be seen, all 10 CILs are supported to a greater or lesser extent. This provides additional validation to that resulting from the MCCCA of Section III reflective case histories reported in Chapter 53 in Volume II.

Limitations

We acknowledge six limitations to this study. First, all the scholar practitioner (case study) writers involved were taught by different lecturers on different postgraduate programmes. This may have meant that certain lectures may have put certain emphasis on certain models or the application of certain models which could have created different emphasis in the write up.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. Showing the 10 factors most discussed when reflecting on change

Common Insights and Lessons (CILs) Identified by Hamlin (2001)	No. of Organizations Lending Support
1. Communicating with all stakeholders the purpose of securing common ownership, commitment and involvement.	85 (42.5%)
2. Securing the active commitment, involvement, and participation of senior to middle managers is pivotal	39 (14.5%)
3. Securing top management support.	29 (14.5%)
4. Being clear, consistent and open with regard to what you are seeking to achieve, setting clear strategic objectives and sharing the vision.	28 (14%)
5. Recognising and addressing the real problems or root causes of change agency problems, including the cultural dimensions	26 (13%)
6. Giving enough time for the OCD program to take root and succeed	13 (6.5%)
7. Recognising the relevant contributions that the HR function can make and the strategic role it can play in bringing about transformational change.	28 (14%)
8. The role of learning in the change management process and the need for a no-blame culture	23 (11.5%)
9. The importance of being reflective as a change agent	6 (3%)
10. The value of conducting internal research as part of the change agency	15 (7.5%)

Second, the teaching materials, supporting documentation and assessment brief were the same to ensure as much as possible consistency in delivery. Although this encouraged case study writers to understand the theory/models in the same way, it tended not to allow for additional models to be introduced or a more innovative approach to be taken for the write up. Hence, what may have been gained with having the consistency that allowed clearer comparison may not have encouraged a more creative reflective analysis.

Third, there may have been some misunderstanding of the models, frameworks and terms used (e.g. transformational is not just about transforming/changing something) or indeed the success or otherwise of the change programmes by the student case study writers, even though this may have been minimised by using only those case studies that achieved a 50% pass rate or higher.

Fourth, there is the potential for participant error or bias (Robson, 2011) as these case study writers were discussing the organizations in which they worked; and because of organizational loyalty they may not have wanted to highlight too many ‘failure’ issues to avoid any incriminations later. Furthermore, if they had been heavily involved with the change (e.g. as a designated change agent), they could have perceived the initiative to be more successful than others in their organization.

Fifth, there were no reflective case studies on the management of change within not-for-profit/third sector organizations which means the findings have yet to be generalised to that organizational sector.

Sixth, from a methodological point of view, it would have been helpful to have had some universally agreed upon criteria to determine success or failure so that direct comparisons could be made.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

The purpose of this chapter was to highlight and share insights and learning from real world reflective case studies from the single viewpoint of HR, Health and Management scholar-practitioners and to look for experiences held in common across these differing organizational change programmes.

As a result of our study we have found clear commonalities and key differences in their perceptions and experiences of change.

Of greatest surprise is the absence of identified empirical evidence to lend support for the widely held belief that over 70% of all organizational change programmes fail. The most significant finding is that change models and leadership styles differ depending on context and that effective leadership, effective communication, and effective team working as well as employee engagement are key factors that enable successful change.

We conclude with some thoughts for evidence-based OCD practitioners:

1. Don't believe everything you read in popular change management books! Our findings suggest that 'organizational failure' depends on who you ask, and that change models are meant to be fluid and not followed rigidly step by step.
2. A flexible organizational change approach is needed: The study findings suggest prescriptive change models are not always fit for purpose as change certainly does not always fit linear, rational, unambiguous models. Indeed, they tend to support the 'one size does not fit all' approach to change as discussed by Burnes (2014).
3. Communication, leadership and team working will enable change: Our findings suggest that those organizations with ongoing communication and a more open and flexible leadership style, which readily involves others, are more likely to achieve successful change.

Our sense is that we knew this already as evidence-based OCD practitioners, we just needed the evidence to prove it…

REFERENCES

Adair, J. (1989). *Great leaders*. London, UK: Kogan Page.

Adair, J. (2007). *Fundamentals of leadership*. London, UK: Palgrave Macmillan.

Akdol, B., & Arikboga, F. S. (2017). Leader member exchange as a mediator of the relationship between servant leadership and job satisfaction: A research on Turkish ICT companies. *International Journal of Organizational Leadership*, *6*(4), 525–535. doi:10.19236/IJOL.2017.04.09

Avolio, B. J., Gardner, W. L., Walumbwa, F. O., Luthans, F., & May, D. R. (2004). Unlocking the mask: A look at the process by which authentic leaders impact follower attitudes and behaviours. *The Leadership Quarterly*, *15*(6), 801–823. doi:10.1016/j.leaqua.2004.09.003

Balogun, J., & Hope Hailey, V. (2004). *Exploring strategic change* (2nd ed.). London, UK: Prentice Hall.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates Inc/Psychology Press.

Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology, 88*(2), 207-218. Doi:10.1037/0021-9010.88.2.207

Bawany, S. (2016). Leading change in today's VUCA world leadership. *Excellence Essentials*, *33*(2), 31-32. Retrieved from: http://search.proquest.com/docview/1766801192/

Beer, M., & Nohria, N. (2000). Cracking the code of change. *Harvard Business Review*, *78*(8), 133–141. Retrieved from https://hbr.org/2000/05/cracking-the-code-of-change PMID:11183975

Bielinska-Kwapisz, A. (2014). Triggers of organizational change: Duration, previous changes, and environment. *Journal of Change Management*, *14*(3), 405–424. doi:10.1080/14697017.2014.885461

Bolden, R. (2007). Distributed leadership. In *Discussion Papers in Management*. University of Exeter. Retrieved from: http://business-school.exeter.ac.uk/documents/discussion_papers/management/2007/0702.pdf

Brown, M. E., & Trevino, L. K. (2006). Ethical leadership: A review and future directions. *The Leadership Quarterly*, *17*(6), 595–616. doi:10.1016/j.leaqua.2006.10.004

Buchanan, D. A. (2013). Middle managers: the front line of change. *Think Cranfield.* Retrieved from: http://www.som.cranfield.ac.uk/som/p19128/Think-Cranfield/Think-Cranfield-2013

Burnes, B. (2011). Introduction: Why does change fail and what can we do about it? *Journal of Change Management*, *11*(4), 445–450. doi:10.1080/14697017.2011.630507

Burnes, B., & Jackson, P. (2011). Success and failure in organizational change: An exploration of the role of values. *Journal of Change Management*, *11*(2), 133–162. doi:10.1080/14697017.2010.524655

Caldwell, R. (2006). *Agency and change*. London, UK: Routledge. doi:10.4324/9780203087565

Cannatelli, B., Smith, B., Giudici, A., Jones, J., & Conger, M. (2017). An expanded model of distributed leadership in organizational knowledge creation. *Long Range Planning*, *50*(5), 582–602. doi:10.1016/j.lrp.2016.10.002

Carnall, C., & Todnem By, T. (2014). *Managing change in organizations* (6th ed.). Harlow, UK: Pearson.

Chartered Institute of Personnel and Development. (2017). Leadership in the workplace. *CIPD Factsheet.* Retrieved from: https://www.cipd.co.uk/knowledge/strategy/leadership/factsheet

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). London, UK: Routledge.

Coleman, S., & Thomas, B. (2017). *Organizational change explained – Case studies on transformational change in organizations*. London, UK: Kogan Page.

Creswell, J. W. (2007). *Qualitative inquiry & research design – Choosing among five approaches* (2nd ed.). London, UK: Sage.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Daft, R. (2018). *The Leadership Experience* (7th ed.). Boston, MA: Cengage.

Davis, H. J. (2017). Discerning the Servant's Path: Applying Pre-Committal Questioning to Greenleaf's Servant Leadership. *The Journal of Values Based Leadership*, *10*(2), 1–14. doi:10.22543/0733.102.1190

DeFlaminis, J. (2016). Distributed Leadership in Practice: Evidence, Misconceptions, and Possibilities. *Management in Education*, *30*(4), 141–146. doi:10.1177/0892020616656734

Dierendonck, D. V., & Patterson, K. (2015). Compassionate Love as a Cornerstone of Servant Leadership: An Integration of Previous Theorizing and Research. *Journal of Business Ethics*, *128*(1), 119–131. doi:10.100710551-014-2085-z

Doyle, M. (2001). Dispersing change agency in high velocity change organisations: Issues and implications. *Leadership and Organization Development Journal*, *22*(7), 321–329. doi:10.1108/01437730110404951

DuBrin, A. (2010). Principles of Leadership (6th ed.). Cengage.

Farquhar, J. D. (2012). *Case Study Research for Business*. London, UK: Sage. doi:10.4135/9781446287910

Feng, Y., Hao, B., Iles, P., & Brown, N. (2017). Rethinking Distributed Leadership: Dimensions, Antecedents and Team Effectiveness. *Leadership and Organization Development Journal*, *38*(2), 1–31. doi:10.1108/LODJ-07-2015-0147

Grint, K. (2000). *The Arts of Leadership*. Oxford Uni Press.

Hamlin, R. G. (2001). A reflection upon the practitioner 'reflections on practice'. In R. G. Hamlin, J. Keep., & K. Ash (Eds.), Organizational change and development: A reflective guide for managers, trainers and developers (pp. 283-296). Harlow, UK: FT Prentice Hall.

Harris, A., & DeFlaminis, J. (2016). Evidence, misconceptions and possibilities. *Management in Education, 30*(4), 141-146 DOI: Show all authors doi:10.1177/0892020616656734

Hersey, P. (1984). *The situational leader*. Escondido, CA: Center for Leadership Studies.

Hersey, P., & Blanchard, K. H. (1977). *Management of organisational Behaviour* (3rd ed.). Prentice Hall.

Hitchcock, G., & Hughes, D. (1989). *Research and the teacher – a qualitative introduction to school-based research*. London: Routledge.

Hopen, D. (2015). Editors Notebook: Finding Your Leadership Style. *Journal for Quality and Participation*, *38*(3), 3. Retrieved from http://search.proquest.com/docview/1762299221/

House, R. J., & Aditya, R. N. (1997). The social scientific study of leadership: Quo Vadis? *Journal of Management*, *23*(3), 409–473. doi:10.1177/014920639702300306

Hughes, M. (2011). Do 70 per cent of all organizational change initiatives really fail? *Journal of Change Management*, *11*(4), 451–464. doi:10.1080/14697017.2011.630506

Hughes, M. (2015). *The leadership of organizational change*. London, UK: Routledge. doi:10.4324/9781315762425

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Jones, R., & Gross, B. (1996). Decision making during organisational change: Observations on disjointed incrementalism in an Australian local government authority. *Management Decision*, *34*(7), 23–32. doi:10.1108/00251749610124873

Kanter, R. M., Stein, B. A., & Jick, T. D. (1992). *The Challenge of Organizational Change*. The Free Press.

Kirkpatrick, S. A., & Locke, D. A. (1991). Leadership: Do traits matter? *The Academy of Management Executive*, *5*(2), 48–60. doi:10.5465/ame.1991.4274679

Kotter, J. P. (1995). Leading Change: Why Transformation Efforts Fail. *Harvard Business Review*, *73*(2), 59–67. doi:10.1177/1742715015571393

Kotter, J. P. (1996). *Leading Change*. Boston, MA: Harvard Business School Press.

Kotter, J. P. (2008). *A Sense of Urgency*. Boston, MA: Harvard Business School Press.

Kotter, J. P. (2014). *Accelerate: Building Strategic Agility for a Faster-Moving World*. Boston, MA: Harvard Business School Press.

Kübler-Ross, E. (1973). *On Death and Dying*. London, UK: Routledge. doi:10.4324/9780203010495

Leifer, R. (1989). Understanding Organizational Transformation Using a Dissipative Structure Model. *Human Relations, 42*(10), 899-916. Doi:10.1177/001872678904201003

Lewin K. (1947). Frontiers in group dynamics: Concept, method and reality in social science; equilibrium and social change. *Human Relations, 1*(1), 5–41. DOI: org/ doi:10.1177/001872674700100103

Lewin, K., Lippitt, R., & White, R. K. (1939). Patterns of aggressive behavior in experimentally created "social climates.". *The Journal of Social Psychology*, *10*(2), 271–299. doi:10.1080/00224545.1939.9713366

Luecke, R. (2003). *Managing Change and Transition*. Boston, MA: Harvard Business School Press.

Lumby, J. (2013). Distributed Leadership; The Uses and Abuses of Power. *Educational Management Administration & Leadership*, *41*(5), 581–597. doi:10.1177/1741143213489288

McAdam, R., & Saulters, R. (2000). Quality measurement frameworks in the public sector. *Total Quality Management*, *11*(4-6), 652–656. doi:10.1080/09544120050008020

Moll, J., & Kretzschmar, L. (2017). An investigation of the suitability of a Servant Leadership model for academic Group Leaders at German universities. *Journal of Leadership Education*, *16*(2), 166–182. doi:10.12806/V16/I2/T1

Parry, K. W. (2011). Leadership and organization theory. In A. Bryman, D. Collinson, K. Grint, B. Jackson, & M. Uhl-Bien (Eds.), The Sage handbook of leadership (pp. 53-70). London, UK: Sage Publications Ltd.

Pettigrew, A., & Whipp, R. (1991). *Managing Change for Competitive Success*. Oxford, UK: Blackwell.

Pugh, D. (1993). Understanding and Managing Organizational Change. In C. Mabey & B. Mayon-White (Eds.), Managing Change (2nd ed.; pp. 108-112). London, UK: Paul Chapman Publishing Ltd in association with The Open University.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Robson, C. (2011). *Real World Research* (3rd ed.). Oxford, UK: Blackwell.

Rodriguez, A., & Rodriguez, Y. (2015). Metaphors for today's leadership: VUCA world, millennial and "Cloud Leaders." *Journal of Management Development*, *34*(7), 854–866. doi:10.1108/JMD-09-2013-0110

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research Methods for Business Students* (7th ed.). London, UK: Pearson.

Senior, B., & Swailes, S. (2016). *Organizational Change* (5th ed.). London, UK: Pearson.

Spillane, J. (2006). *Distributed Leadership*. San Francisco, CA: Jossey-Bass.

Stace, D., & Dunphy, D. C. (2001). Beyond the boundaries: Leading and re-creating the successful enterprise (2nd ed.). Sydney: McGraw Hill.

Storey, J. (1992). *Developments in the Management of Human Resources*. London, UK: Blackwell.

Stoten, D. W. (2013). Servant leadership in English sixth form colleges: What do teachers tell us? *International Journal of Educational Management*, *27*(4), 377–386. doi:10.1108/09513541311316313

Todnem By, R. (2005). Organisational Change Management: A Critical Review. *Journal of Change Management*, *5*(4), 369–380. doi:10.1080/14697010500359250

Todnem By, R., Hughes, M., & Ford, J. (2016). Change Leadership: Oxymoron and Myths. *Journal of Change Management*, *16*(1), 8–17. doi:10.1080/14697017.2016.1137425

Turnnidge, J., & Cote, J. (2016). Applying transformational leadership theory to coaching research in youth sport: A systematic literature review. *International Journal of Sport and Exercise Psychology*, *16*(3), 327–342. doi:10.1080/1612197X.2016.1189948

Uhl-Bien, M. (2006). Relational leadership theory: Exploring the social processes of leadership and organizing. *The Leadership Quarterly*, *17*(6), 654–676. doi:10.1016/j.leaqua.2006.10.007

Yigit, B., & Bozkurt, S. (2017). A content analysis of servant leadership studies. *International Journal of Organisational Leadership*, *6*(2), 190–196. doi:10.19236/IJOL.2017.02.04

Yin, R. K. (2014). *Case Study Research: Design and Methods* (5th ed.). London, UK: Sage.

This research was previously published in Evidence-Based Initiatives for Organizational Change and Development; pages 155-178, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 72
Resistance to Organizational Change in Academia:
A Case Study From Palestine Investigating the Under-Reflected Role of Change Agents

Devi Akella
Albany State University, USA

Grace Khoury
Birzeit Univeristy, Palestine

ABSTRACT

Resistance to change happens to be a phenomenon in which both the change agents and change recipients are equally responsible for all forms of resistance. Resistance and its various forms are an outcome of the change agents' observations and their interpretations of the conversations, behavior, and reactions of the change recipients. This chapter uses auto-ethnographic reflexive narratives of two change agents involved in the self-assessment process at a college planning to seek US-based business program accreditation to make sense of the change process. The purpose of this chapter is to emphasize the under-reflected role of the change agents and how they influence and affect the behavior of change recipients and thereby contribute towards employee resistance. The chapter also emphasizes the crucial role of reflection and introspection in the sensemaking activities of the change agents in the entire change initiative and thereby adds evidence-based organizational change and development initiatives in an academic setting where research is limited.

DOI: 10.4018/978-1-7998-7297-9.ch072

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Organizational change has become inevitable over the past few years. With globalization, competition, strategic alignment, introduction of new management theories and models, organizations and their employees are continuously being exposed to change in a variety of ways. Inspite of careful research and planning by organizational leaders, change initiatives are a major source of concern. Usually organizational change and development (OCD) efforts and interventions have a tendency to produce failure (Sorge & van Witteloostuijn, 2004). Resistance to change has been cited as the most common reason for the failure of majority change initiatives (Erwin & Garman, 2009). However, resistance to a large extent has been seen as a "psychological phenomenon located over there in the change recipients" (Anderson, 2016; Ford, Ford & D'Amelio, 2008, p.370) and "objectified as a socio-psychological phenomenon" (Dent & Goldberg, 1999 as cited in Ijaz & Vitalist, 2011, p.119).

This has minimized the development of OCD tools and methodologies to increase the success of change initiatives. Most of the efforts remain concentrated on showing change recipients "the error of their ways by dealing with the misunderstandings, fears and apprehensions believed to underlie their resistance" (Ford et al., 2008, p.370; Kulkarni, 2016), resulting in a lack of 'evidence based' organization development tools which assist change agents in repairing trust (Tomlinson, Dineen & Lewicki, 2004), resolve issues of injustice (Folger & Skarlicki, 1999) and restore credibility (Kouzes & Posner, 1993).

Therefore, to portray a more complete picture, resistance to organizational change should be reconstructed as a phenomenon where both the change agents and change recipients are equally responsible for its occurrence. Employees' resistance to change is observed, deconstructed, made sense of and given appropriate meanings by the change agents (Ford et al., 2008). Employees' actions, conversations and reactions are behavioral triggers which change agents make sense of and label as resistance. Studies which can "engage all forces of change, all contributions to change i.e., recipient action, agent sensemaking and organizational background and the dynamics of relationship" (Ford et al., 2008, p. 362), allow a more balanced picture of the entire change process. Studies which go beyond the "one-sided change agent centric view" (Ford et al., 2008, p.362; Kulkarni, 2016) by critically reflecting on the contributory role of the change agents and the agent-recipient relationships (Dent & Goldberg, 1999, Ford et al., 2008) are few. Further, "reflexivity has been identified as a useful method to support change agents" and assist them in understanding their role in the entire change process but "there is little to no clarity [on] how it should be executed" (Ostentoski, 2015, p.41).

The entire process constituted action, reflection and new action (Schon, 1987). Change agents reflect, consciously explore using their personal knowledge and experience to critique their actions, seek relevant evidence, learn and then apply this new knowledge to rectify the change resistant environment. Reflection and introspection may appear to be a time consuming, abstract and complex process but however it is also a rich experience. Reflection allows questioning of current evidence-based practices and their subsequent modification to increase the overall success of the entire change initiative (Thompson and Burns, 2008).

The focus of the chapter is on investigating the under-reflected role of the change agents in the entire change process and how they could contribute towards the change recipients' resistance practices. Also, how change agents by reflecting on their actions and behaviors and its effect on change recipients can minimize resistance. The chapter explores issues such as the various forms of employees' resistance which might occur within a college functioning under the umbrella of a university, planning to seek business accreditation offered by an American professional organization within the next few years. How do

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

change recipients react? How do the change agents feel and deal with these outward behavioral displays? How do the change recipients interact with the change agents? The chapter uses two auto-ethnographic reflexive narratives of change agents to demonstrate how their actions and inactions led to employee resistance and hindered the change process. However, through reflection and introspection during the entire change process the change agents were able to overcome this resistance and turn it into a force of change instead. To allow a more complete image of the change process to emerge, multiple versions of the same change process are used. An attempt was made to understand the entire change process from the perspectives of two change agents, that of the external consultant (i.e., the accreditation specialist) and the internal consultant (i.e., college Dean).

BACKGROUND

Organizational change and resistance to change has been a topic of research for decades. However, to a large extent views pertaining to resistance to change are predominantly one-sided, favoring change agents and their sponsors (Anderson, 2016; Dent & Goldberg, 1999; Ford et al., 2008; King & Anderson, 1995; Kulkarni, 2016; Meston & King, 1996). Resistance studies have presumed that change agents are "doing the right and proper things" and are the "undeserving victims" of the "irrational and dysfunctional responses of the change recipients" (Ford et al., 2008, p.362). This "change agent-centric" view perceives resistance as the negative and opposing actions of the change recipients as observed by the change agents (Ford et al., 2008, p.362). However, change agents are portrayed as outsiders in this entire change process instead of as active participants who interact with change environments and influence the behavior and actions of the change recipients. Change agents interpret the behaviors, actions and communications of the change recipients. And resistance is the aftermath of these interactions and the relationships between change agents and recipients. Change agents, in fact "contribute to the occurrence of resistance through their own actions and inactions and that resistance can be a resource for change" (Ford et al., 2008, p.362). Change agent sensemaking is a "key factor in organizational reconfiguration" (Tucker, Hendy & Barlow, 2015, p.1047) which allows rearranging the sequence of events as they may have occurred during the change process.

Employee resistance is not a phenomenon that exists independent of the change agents. On the contrary both change agents and the change recipients together make sense of the events, conversations and decisions which surround the change process with change agents trying to sensemake --"how will this get accomplished?" and change recipients trying to sensemake--"what will happen to me?" (Gioia, Thomas, Clark & Chittipeddi, 1994 as cited in Ford et al, 2008, p.363). Sensemaking involves seeking information, ascribing meanings, understanding behaviors and conversations and acting on these interpretations (Balogun & Johnson, 2004; Gioia & Chittipeddi, 1991; Maitlis & Sonenshein, 2010; Mills, Thurlow & Mills, 2010; Tucker et al., 2015; Weick, 1995; Weick, Sutcliffe & Obstfeld, 2005). And in organizations undergoing a change process it is not possible for a change agent to sensemake in a "reifying and objectifying" manner "as if it exists independent of them as if they had nothing to do with its creation" (Berger & Luckmann, 1966 as cited in Ford et al., 2008, p.64). Sensemaking would involve more than just reporting and interpreting the change process. It would also involve influencing and reacting to the organizational events taking place (Kuntz & Gomes, 2012; Mills, Thurlow & Mills, 2010; Weick, 1995; Weick, Sutcliffe & Obstfeld, 2005).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The entire change process is an interactive systemic phenomenon (Lewin, 1952) where the actions and reactions of the change recipient and change agent equally matter. Therefore, change agents along with change recipients are responsible for resistance and its various forms (Kuntz & Gomes, 2012). Change agents contribute to employee resistance through their own faulty sensemaking, violation of employee trust, communication breakdowns and misrepresentation of facts (Ford et al., 2008). Change agents influence employees' reactions by breaking agreements, failing to restore loss of trust, knowing or unknowingly reneging on promises (Andersson, 1996; Cobb, Wooten & Folger, 1995; Reichers, Wanous & Austin, 1997), thereby creating situations of resistance.

The role of change agents is to understand the entire organization and its culture and working environments, to design appropriate change strategies and regularly assess the effectiveness of these strategies (Hamlin, Keep, & Ash, 2001). Change agents both internal and external are faced with the challenge of supporting change recipients, understanding the organization and its members, their reactions and adapt their change initiatives accordingly (Hamlin & Davies, 2001; Handy, 1989). An important responsibility of the change agents in this entire change process is to critically reflect on the effectiveness of the change strategies and keep modifying them as needed to increase the overall effectiveness of the entire change process (Hamlin, Keep & Ash, 2001). Also, as argued in Chapter 2 of this book, critical reflection and introspection provide new insights on the OCD strategies chosen by the change agents and allows replacing or modifying those which are not working, thereby resulting in emergence of new strategies based on the lessons learned by the change agents. Therefore, critical reflection should become an integral aspect of all evidence-based practices used by change agents in all OCD programs.

Effective change agents are those who are "critically reflective, research-informed/evidence-based practitioners" (Hamlin, 2002; 2007). Change agents are to a large extent responsible for creating employee readiness to change and their acceptance to organizational changes (Barrett, Thomas & Hocevar, 1995; Boje, 1995; Czarniawska & Sevon, 1996; Fairclough, 1992; Ford, 1999). They need to understand the organization, its culture, structure, member roles and expectations and then interpret the entire change process within these parameters (Hamlin & Davies, 2001; Johnson, 1992).

Change agents who repair damaged relationships to restore trust during the change process are less likely to face resistance (Ford et al., 2008). Similarly, those agents who are cynical and critical, tend to lower employee motivation and commitments (Andersson, 1996; Dean, Brandes & Dharwadkar, 1998; Reichers et al., 1997). In the same manner, change agents can also be responsible for the occurrence of resistance through communications failures. Communication happens to be an important aspect of all organizational changes. Recipients overcome their doubts and fears through questioning, evaluating and clarifying their doubts. If the change agent misses this opportunity it increases the chances of recipients resisting change at a future date (Knowles & Linn, 2004; McGuire, 1964; McGuire & Papageorgis, 1961).

Also, sometimes change agents may unknowingly mislead the change recipients (DePaulo, Kashy, Kirkendol & Wyer, 1996) during negotiations and discussions. This could create a climate of optimism in the beginning which could prove to be misleading as the time unfolds resulting in feelings of violation, distrust and injustice (Folger & Skarlicki, 1999; Tomlinson et al., 2004) undermining the credibility of the change process. This increases the chances of resistance as well. Change agents need to be truthful, realistic and accurate about the change process and the need for it. Realistic and authentic previews are encouraged (Wanous, 1992).

Change is dependent on mobilizing employee support through talk and conversations with the employees (Ford et al., 2008). When change agents ignore this aspect it invariably leads to resistance (Ashkenas & Jick, 1992). Sometimes change agents themselves may be resistant to new ideas, critical

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

views, and recommendations. They may be defensive, unreceptive and discourage dialogue and two-way communication with the employees (Ford et al., 2008). The outcome of this defensiveness could be escalation in employee resistance (Powell & Posner, 1978).

Finally, employee resistance is not always dysfunctional in nature. In fact, it could assist the change agents in their change endeavors (Anderson, 2016; Ford et al., 2008). Change recipients' reactions and criticisms could lead to further reflection and introspection prior to implementation of the change initiatives (Knowles & Linn, 2004). Talking in a negative manner, has been labelled as resistance (Caruth, Middlebrook & Folger, 1985). However, it also provides an opportunity for the employees and the change agents to participate in conversations, leading to clarifications, exchange of views and perspectives and subsequent acceptance of the change process (Barrett, Thomas & Hocevar, 1995). People usually resist change because of fears, anxieties and inner worries. Change agents instead of considering these attitudes as resistance, should encourage employees to bring these feelings out in the open. Open communication in the form of voicing and listening to these complaints, fears and comments would allow change agent feedback and employee engagement (Amason, 1996; Anderson, 2016; Schweiger, Sandberg & Rechner, 1989).

This chapter will reconstruct employee resistance from the sensemaking perspective of the change agents. It will demonstrate how change agents could themselves be responsible for resistance through their own actions, reactions and conversations. Furthermore, how becoming aware of their role in the occurrence of resistant forces could convert that resistance into resources of change. This increases the chances of an effective change initiative.

MAIN FOCUS OF THE CHAPTER

This chapter investigates the under reflected role of change agents in the change process and examines how change agents themselves could contribute towards the overall resistance practices taking place within an organization during the entire change process. To allow maximum success in any form of change program, i.e., to minimize the occurrence of resistance, the change agent combines action research with sensemaking and reflection. Sensemaking allows the change agent to interpret and deconstruct the past sequence of events, s/he would then be able to reflect on them and take appropriate action.

Sensemaking as discussed earlier "is the discursive process of constructing and interpreting the social world" (Gephart, 1993, p. 1485). It revolves around the process of studying and interpreting how the actions of the actors influence and give meaning to the reality or external sequence of events. Sensemaking is primarily a process "grounded in identity construction, retrospection…ongoing…focused on and by extracted cues and driven by plausibility rather than accuracy" (Weick, 1995, p.17). As Rouleau (2005, p. 1415) further clarifies sensemaking is how managers "understand, interpret and create sense for themselves based on the information surrounding strategic change". It is a highly retrospective and prospective thinking process involved in constructing reality where the emphasis is laid on making sense of past events to influence the sequence of future events. In other words, sensemaking "is a process" (Balogun & Johnson, 2004; Cornelissen, 2012; Gephart, Topal & Zhang, 2010; Weick, 1995 as cited in Maitlis & Christianson, 2014, p. 66), "is a recurring cycle" (Louis, 1980 as cited in Maitlis & Christianson, 2014, p. 66) and "unfolds as a sequence" (Weick et al., 2005 as cited in Maitlis & Christianson, 2014, p. 66). Members confront events, issues and actions which they interpret and explain in the context of their environments using their past experiences and knowledge (Weick, 1995). The crux of sensemak-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ing is on its emphasis on "retrospective interpretation of the actual event" (Giogia et al., 1994, p. 623) to create a future perfect situation.

If the change agent adopts reflexivity when making sense of the organizational events, it provides more clarity to the events, roles and conversations. Reflexivity involves reflecting and understanding one's own personal feelings, emotions, behaviors, making it possible to locate oneself in research study and theory. Reflexivity means acknowledging the role of the researcher in the creation and interpretation of research data (Dubois, 1983; Harding, 1992; Maynard, 1994; Stanley & Wise, 1983; 1993).

While action research is the process of gathering data about groups, then intervene in the change process and evaluate the overall results of the intervention. "It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people…" (Reason & Bradbury, 2001, p. 1). Here there is a combination of both action and research in resolving current problems existing in the organization (Anderson, 2016) [see Table 1].

Table 1. Action research perspective

Action Frame of Reference Perspective
Organization: Consists of a network of actively constructed meanings.
Analysis: The focus of analysis is on the interactions between people and groups within organizations to identify the apparent and/or latent meaning of these interactions from the point of view of the interacting participants in order to understand the rules which govern organizational behavior.
Change: The aim is to change the rules which inform and shape behavior so as to change and transform the meaning of the organization for the individual.

Note: Adapted from Hamlin and Davies (2001, pp. 44-45).

Some of the established methods to study sensemaking and action research constitute case studies, ethnographies, and textual analysis and also qualitative methods like interviews, observations and secondary sources (Gephart, 1993; Gioia & Chittipeddi, 1991; Gioia et al., 1994; Weick, 1988; 1993). Methods which record first-hand accounts of the entire sensemaking process and experiences are also highly useful. Auto-ethnography is a data collection method which allows a structured self-examination by the change agent and his/her role as a change agent when leading the change process. In fact, it has been accepted as a legitimate method to make sense of past experiences (Boyle & Parry, 2007). Auto-ethnography possesses the ability to show "how the personal struggles of an individual are linked to the cultural and social meanings" (Mischenko, 2005 as cited in Osentoskli, 2015, p.52). While Haynes (2011) comments that auto-ethnography allows examination of self both from the theoretical stance and as a contributory factor within the social phenomenon. "Auto-ethnographical material provides a valuable resource for exploring, presenting and representing the self, encapsulates a personal, intuitive knowledge, deriving from a knowing subject situated in a specific social context" (Haynes, 2011, p. 134). It encompasses reflection on outward observation (Parry & Boyle, 2009). In fact, auto-ethnography can be effectively used to give voice to those events, situations and conversations which otherwise might have remained silent (Doloriet & Sambrook, 2012). "People seem to see past events as much more rationally ordered than current or future events, because retrospective sensemaking erases many of the casual sequences that complicate and obscure the present and future" (Starbuck & Miliken, 1988, p. 37). Sensemaking here would be concerned with picking out elements and incidents from the past and then reconnecting them to write a story "which makes present and future meaningful" (Degn, 2015, p. 1183).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Auto-ethnography inspite of its drawbacks, like becoming "too involved with the organization" (Leonard-Barton, 1990, p. 256), or lack of objectivity and biased accounts (Ellis & Bochner, 2000) "provides depth of ethnographic immersion and richness of data" (Van Maanen, 1988, p.18)**.** The authors therefore decided to choose the method of auto-ethnography. A case study in academia undergoing a change process was identified. Both the authors happened to be actively involved in the entire change process as internal and external change agents.

The authors compiled narrative accounts of their experiences of the change process in their roles as change agents. The authors recorded their observations during the entire change process within a range of pre-determined parameters consisting of organizational background, change agents' backgrounds, change agents' expectations, change agents' observations of the change environment.

The authors positioned their research study within the analytical framework of sensemaking and action research (Anderson, 2006) and auto-ethnography was used in combination with case study information consisting of document analysis and reports. In this situation, the auto-ethnographer follows a "(1) complete member researcher status (2) analytic reflexivity, (3) narrative visibility of the researcher's self (4) a dialogue with informants beyond the self and (5) a commitment to theoretical analysis" (Anderson, 2006, p. 378). The main crux of auto-ethnography however remains reflexivity (Perriton, 2001), but how it is done can be flexible dependent on the preferences of the researchers, the research topic and issues (Osentoski, 2015). The next section introduces the academic case study and the change agents and the issues they faced during the entire change process.

SENSEMAKING EMPLOYEE RESISTANCE: A CASE STUDY FROM ACADEMIA

The identified case study is a college, or Faculty of Business and Economics (FBE), planning on applying for US (United States of America) based business program accreditation in the next few years. The college is part of a larger university located in West Bank/Palestine. Palestine is part of the Arab world also known as The Occupied Palestinian Territories (OPT) which consists of two separated territories; the West Bank and Gaza. The university is a public university in Palestine. In Fall 2016, the students went on a major strike protesting, against the increase in tuition fees. Currently the students only pay 70 percent of the tuition fees and the rest is covered by the Palestinian Education Ministry and other independent donors who sponsor tuitions of needy students. The Palestinian government has been facing dwindling financial resources in the last few years and is unable to allocate the much-needed funds to universities in Palestine. The Palestinian universities lack sufficient funds, international faculty and student and faculty exchange programs are limited. The West Bank is isolated from the rest of the world due to checkpoints and other enforced security measures. As a result, Palestinian universities suffer from lack of diversity and opportunities to internationalize their curriculum and expose their students to multicultures. The Palestinian institutions are thus faced with the challenge of overcoming these problems while simultaneously ensuring their academic reputations continue to grow (Khoury & McNally, 2014). However, FBE had an advantage, it had the financial support of its student alumni and advisory board members in the form of donations, grants and

scholarships. For instance, FBE had organized various activities such as an annual career day which had been sponsored by several leading Palestinian corporations. In fact, some corporations had donated approximately $30,000 to FBE and had also sponsored a few doctoral scholars in their educational endeavors.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The college dean of FBE decided on pursuing US based business accreditation for her college. She is a well published female in her early fifties who had been working for the same institution for the past twenty-six years. She had occupied different administrative positions in the faculty as the chair of the department of business administration with two bachelor programs for two years and then as the MBA program coordinator for three terms each of two years' duration. The dean was also a member of a number of committees at a university level and the head of the steering committee for strategic planning few years ago with an emphasis on quality assurance and curriculum development.

She initiated the entire accreditation process by first inviting an official representative from the US based accreditation body to visit the faculty in September 2015. She invited faculty council members and the academic provost to attend the meeting. The representative mentioned that the University had a good reputation and that the business school might be ready for US based business accreditation. However, once the top-level management of the university heard that the faculty was planning to seek US based business accreditation, they expressed their concerns about the financial cost and the inappropriateness of the decision. The top-level management felt US based business accreditation was not as important as local Palestinian accreditation which the faculty already possessed. They also cited the example of another college within the university which had applied for US based program accreditation and it had taken them six years to receive the program accreditation. The dean was disappointed at this reaction. She felt with the university's high rankings in the Arab region, and it being the only Palestinian university currently mentioned in the QS World University rankings, US based business accreditation would prove to be a plus point for FBE. She therefore persisted in her efforts. After the university council and the president had made their views clear, the president formed a committee to discuss the pros and cons of accreditation and provide its recommendations to the university council. The committee submitted its report expressing that accreditation had more pros than cons. However, the top-level management of the university was not convinced about the need for US based business accreditation and did not want to take up unwanted additional expenses.

During this time, the dean received an email about country specific consulate scholarships, and thought it was a good idea to apply and secure a specialist who could evaluate the programs prior to applying for accreditation. The scholarship request was accepted. She invited an external consultant-an accreditation specialist- to assess the college and its readiness for US based business accreditation. The external consultant had to review the curriculum, faculty and staff, research and professional experience and suggest steps to overcome any existing limitations which might come in the way of a possible accreditation failure. The dean was interested in minimizing the risk of accreditation failure in the future. Inspite of lack of support from the top management, she was encouraged by the fact that the other college which had sought US based accreditation had managed to get accredited and she could seek financial assistance from student alumni and college advisory board members. She was confident a positive assessment by the accreditation specialist would overcome top-level management's current apprehension about seeking US based business accreditation. She was not aware at this time that the business faculty would also resist this decision during the accreditation specialist's visit.

The accreditation specialist received a grant for 42 days to visit FBE. The specialist was in her early forties and a faculty member herself at a business college in USA. This was her first visit to Palestine and the Middle East region. The purpose of her visit was to assist FBE in assessing themselves on the different quality standards of the US based business accreditation organization. As per the grant regulations she submitted a scope of work plan prior to her travel in Fall 2016. The scope of work detailed the items and deadlines to ensure work was completed within the time-period allocated. However, it was

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

not possible to strictly adhere to it because of lack of existing data and faculty's lack of cooperation in accumulating it for review purposes and for the finalization of the report.

The subsequent sub-sections analyze the narrative accounts of both the internal and external consultants (i.e., the college dean and the accreditation specialist).

Excerpts From the Sensemaking Narratives of the Change Agents

In this entire accreditation assessment process, the accreditation specialist (i.e., external change agent) and dean (i.e., internal change agent) came across numerous difficulties aside from the lack of quantitative data and evidence in the form of faculty non-cooperation, office politics and other forms of overt and covert resistance. The dean was aware of the opposition. Management at the university level did not feel the need for an US based business program accreditation and did not want to allocate the additional financial resources needed for this endeavor. Also, her faculty was not in favor of her decision to carry out US based business accreditation because they felt uneasy and anxious about its implications in terms of their job security. However, over the period of six weeks of review process things gradually improved.

The empirical data was analyzed in three phases: initial review, open coding and then development of themes. First, both the change agents' narratives were read, that of internal and external change agents to decipher commonalities and variations in their experiences as change agents. The narratives were then read again to relate observed employee resistance as reactions to change agents' behavior and conversations. The entire change process at FBE can be reconstructed as a three-stage process consisting of *action, reflection and introspection and new action*.

Action

In the last few years, the educational environment has become highly competitive due to globalization of the world economy. Universities across the world have been forced to reflect upon their quality, curriculum and schools' rankings. FBE is also facing a similar situation. The dean of FBE had realized the significance of US based business program accreditation for her college. She informed her senior management and the faculty and then subsequently invited the accreditation specialist. The entire accreditation self-assessment started with the external change agent collecting data about the faculty qualifications, business curriculum, promotion and tenure policies and advisement policies amongst a few needed items. The internal change agent informed the faculty about the arrival of the accreditation specialist and then introduced them to her on her first day of arrival. As explained in the change agents' narratives:

I first met the dean and faculty of FBE and got acclimatized to the college's environment. The entire college could be divided into the dean and her supporters, senior and older faculty members, junior faculty consisting of teaching assistants and administrative staff. I was assured of all support from the dean and her team of administrators. (External Change Agent)

…The selected specialist arrived and met with the department chairs, my assistant and all my faculty colleagues....(Internal Change Agent)

The above narratives reveal interesting insights about the college environment and its faculty members. The external change agent identified faculty members as either supporting the accreditation deci-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

sion and those against it. While the internal change agent had different views of the same situation. She considered the faculty members as her peers. People with whom she had worked with over the years and despite the differences now, were still her colleagues—*"…all my faculty colleagues…"*. This attitude, as later revealed, motivated the dean to constantly reach out to the faculty members, question them and try to make them understand her decision and its advantages.

Most of the change processes involved improving the educational quality of the business programs being offered and implementation of new learning and pedagogical standards. It is well known and reported in literature that reasons for employee resistance consist of a fear of unknown, a desire to maintain status quo and one's habits (Anderson, 2016). Change recipients therefore manifest behaviors like "push-back, not buying in, criticism, foot dragging, work around … not responding to requests in a timely manner, making critical or negative comments" (Anderson, 2016; Ford & Ford, 2010, p. 24) and other sabotaging actions. Similarly, the faculty of FBE was also anxious, nervous and uneasy about the new accreditation standards and quality requirements and how it would affect them. The faculty members of FBE were therefore against this initiative to carry out US based business accreditation. Consequently, they made their feelings apparent in different forms of actions and outward behavioral displays. They refused to cooperate with the change agents.

For instance, as recorded in the change agents' narratives:

The major issue which was noticeable from the very first day was Arabic language. All documents, programs of study, tenure and promotion policies, recruitment and orientation policies happened to be in Arabic. The MBA Director had all his program policies and goals and objectives in Arabic. His offer to get the information translated never materialized. (External Change Agent)

I asked the department chairs to assign someone from their departments to communicate and gather data from the departments for the specialist. The information requested by the specialist was not available in one place. The chairs had to request some of the information from the registrar's office, computer center, and institutional research unit. The information was requested by the chairs however there were numerous delays in obtaining the identified information…

Some faculty members did not cooperate with the chairs and did not provide them with the information they had requested like research output…. (Internal Change Agent)

The external change agent had to complete her assignment within forty-two days and was focused on that issue. She overcame the limitation of all documents being in Arabic by using Google Translate:

I finally took a faculty member's advice and used Google Translate. This helped me in gathering evidence on all academic policies and regulations. (External Change Agent)

As evident from the above narrative, some of the change recipients understood the external change agent's circumstances. They even tried to help her without openly assisting her. There also appears to be close collaboration and communication between both the external and internal change agents during the entire self-assessment process for preparation for the planned accreditation. The external change agent mentions the dean and her reactions in her narratives.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The dean was puzzled with this feedback because all documentation was always prepared in English and Arabic. (External Change Agent)

Other instances of faculty non-cooperation were also evident in the change agents' narratives. Some are open while others are subtle and insidious in nature.

Another limiting factor happened to be their online portal which housed all their syllabi, policies and advisement plans. Everything was there, the convenient answer to all inquiries—"it is on the online portal." Later at the end of the visit I finally realized that some of the information was not actually there at all. I heard comments on my last meeting like "it should have been there", "it is usually there", "really how strange it is not there!

I approached faculty members for their feedback on promotion and tenure policies, hiring policies and orientation processes in place. During these small meetings consisting of the specialist and 2-3 faculty members, I was told how the college was not ready for accreditation, the faculty was not qualified, none of the processes were in place, there was no need for accreditation—"we already have Palestinian accreditation", "the dean is always trying to enhance the quality of our college", "there is no need to be international, we are not seeking international students…".

In spite of deadlines and time schedules, there were always delays. In fact, information was submitted to me even after the report was submitted. Data submitted was not consistent across the entire college as well. Some departments submitted others did not. The person identified as data point, did not submit all the required information. He in fact jocularly remarked to me "I might give it to you in the last week what you had been waiting for the entire six weeks". (External Change Agent)

"in fact, one department chair had commented "we are working on too many requirements all at the same time" while another department chair had complained "the information is in Arabic and we don't have time to translate it to English." One faculty member mentioned that if the accreditation is obtained "it would be costly to maintain." A chair who was appointed just before the specialist arrived did not know where to obtain information from and asked, "how can I obtain information about the department students' accomplishments?" (Internal Change Agent)

There is also evidence in the form of some snide and cynical remarks to the external change agent. Unlike the internal change agent, the external change agent is an outsider, at their college for a short period of time. The overall impression was, obstructing her progress on the self-assessment review process would arrest the decision to seek US based business accreditation.

"Another faculty member accosted me on the way to the restroom and informed me "that she had not submitted her excel spreadsheet along with the rest of her department. I have not kept regular record of what I do. Sorry." Some others cheerfully chirped in as well, after giving a friendly wave or handshake "I have not submitted yet. So, busy teaching." I was also encouraged to visit tourist places, not come to campus every day and just give a good report and leave." (External Change Agent)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The change agents constantly sought faculty support during the entire self-assessment process in preparation to seek US based business program accreditation at a later date. They talked with them, discussed with them, and explained the documentation required and the need for it etc.

In some situations, the data was not formatted properly. For instance, one department head listed all her faculty members by names and the qualifications possessed by them. When requested to correct it, she modified it…. (External Change Agent)

I approached the heads of departments personally…. (External Change Agent)

I constantly requested the faculty to cooperate and commit to deadlines. But it was a noticeable fact that a number of faculty members had no appreciation for time and tried to ditch their obligation to help by saying that the information was only available in Arabic or that it wasn't available at all, when in fact it was available all the time. (Internal Change Agent)

Reflection and Introspection

The change agents need to make sense of their actions and their influence on the change recipients. This would elucidate the events taking place, reasons for resistant behavior and the change outcomes. Change agents' narratives show evidence of reflection and introspection. They reflected on their actions, the actions of the faculty members and attempted to deconstruct all outward behaviors of the change recipients.

I had numerous conversations with the dean usually at the end of the working day. The dean would give me an account of the office gossip going on. I heard conversations… (External Change Agent)

I felt like they were purposefully not giving information to their chairs, because they did not support my leadership and did not want me to show results during my tenure as the dean. I also happened to be a woman in a leadership position which was very rare in the Arab world. I also happened to be well qualified and published as well. This I felt had created jealousy and strong feelings of rivalry amongst my colleagues. (Internal Change Agent)

As evident from the above accounts, the change agents reflected on their actions and its effect on employee resistance. The external agent tried to seek feedback from the dean about the working environment of the college and its culture. She eagerly sought tidbits on the general climate of the college and office gossip to secure faculty cooperation. On the other hand, the internal change agent reflected if employees' resistance was due to her being a woman and emerging as a leader in a male dominated society, or her being well qualified and published, or her wanting to bring about change could be attributed to be the cause of rivalry and jealously amongst her colleagues.

There is also an effort to deconstruct the behavior of the change recipients. And these deconstructions reveal a genuine feeling of sympathy and empathy for them.

I was aware of the doubts and anxiety of my faculty members. They were worried because majority of them did not have PhD's and possessed limited published research…

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

…the older faculty members felt that the accreditation would put extra pressure on them because many of them had very low research output. (Internal Change Agent)

It was however noticeable that these feelings of concern were more prominent within the narrative of the internal change agent. This could be attributed to the fact that inspite of being the leader, a dean, she was also an academic who had worked with the faculty members at the institution for years.

New Action

It could be deduced that these introspective feelings ultimately resulted in change agents modifying their change strategies, their communication techniques and leadership styles.

I was invited for faculty meetings where the dean …sought faculty support on the decision to carry out US based business program accreditation…directly seeking clarifications for their behavior and non-cooperation. For instance, she questioned a department chair "…why did you say students have no accomplishments when they participated in this case study competition, published papers …"? Again "why did you inform…when there is survey data on the program participants feedback…"? (External Change Agent)

In this case study the change agents treated employee resistance as a plus point and confronted it. They offered further clarifications and opened up forums for debates and discussions. Sometimes "divergent opinions about direction are necessary in order for groups to make wise decisions and for organizations to change effectively" (Piderit, 2000, p. 790). Resistance could also be a reaction indicating that those resisting may want to know about the change process. By "listening keenly to comments, complaints and criticisms for cues to adjust the pace, scope or sequencing of change and/or its implementation" (Ford et.al., 2008, p. 369), better solutions can be created.

I was invited to the advisory board meetings and other committee meetings as well. This provided opportunities for open dialogue and conversations with new understandings and perceptions being created. The faculty members became aware of what I was doing, why I was collecting data that is to show where the college stood on each of the fifteen standards of the US based accreditation body. They understood this process of seeking US business accreditation was a slow and lengthy process which would take a few years to materialize (even in US it sometimes takes eight years). This would allow them to gradually increase their research output, work on their qualifications, or on any other existing deficiencies.

The farewell meeting consisted of a presentation before the faculty covering the outcome of the entire visit. This allowed faculty to get an idea of the report, ask questions and feel reassured about the purpose of the US based business program accreditation. (External Change Agent)

After carefully reviewing the faculty's environment I appointed two committees one for assurance of learning and another for accreditation to follow up …and work accordingly. I thought these committees would help …-- to believe in the importance of meeting the standards of US based accreditation body and reinforce a culture that would be supportive of the college's new strategic direction. (Internal Change Agent)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In the above situation, the change recipients were integrated into the entire change process. Communication and dialogue along with participation and collaboration between the change agent and change recipients were the new action techniques adopted by the leader. This paved the path for a college culture where the faculty realized the importance of US based business accreditation and supported the strategic decision of the college. In fact, at the end of the accreditation specialist visit, the top management based on the report findings felt more positive about the decision to seek US based business program accreditation and was willing to consider applying for it in the future. The top management also invited the external change agent to conduct two workshops emphasizing quality and learning assurance for the faculty and staff members at the university level to create awareness throughout the university, as this step was taking place at a university wide level as well.

Dialogue, open and honest communication and collaboration and participation techniques may not be new in overcoming employee resistance. But in this situation, an attempt was also made to identify with the change recipients instead of dividing the people involved in the change process into separate groups—the change agents and change recipients with the change agents trying to overcome employee resistance. In this case study, change agents especially the internal change agent identified themselves with the change recipients and made efforts to become 'in-group' and or one of them.

DISCUSSION AND CONCLUSION

The challenges faced by universities are different from those faced by organizations within the private and public sectors. The environmental pressures facing educational institutions consist of changing trends in the labor markets, changes in technology, new ways of design and delivery of learning services. Educational institutions also possess a more consensual form of governance involving faculty, administrators, students, parents and communities. The faculty is committed to their subjective disciplines and the vocation of teaching and learning while the administrators believe in responding to the external forces and developing the institution accordingly (Ruben, 2005; Torraco, Hoover, & Knippelmeyer, 2005). The conflict to any change process usually occurs at the faculty and administrative level (Torraco et al., 2005). However, not much is known about OD and change initiatives at the university level. There is a need to further thresh out issues such as "who initiates [the change process]? …what strategies are associated with the development and expansion of OD-based change? Why do some OD initiatives succeed while others fail?" (Torraco et al., 2005, p. 858) within an academic setting.

Further there are few studies which have examined change issues in higher education in the Arab context. This chapter examined a university college in Palestine which was planning to apply for US based business program accreditation in the next few semesters. So, this study contributes towards the limited OCD evidence-based literature. To continue with the case study, the dean, who was the internal change agent had decided on US based business program accreditation for her college, but she lacked the support of the university's top management and her faculty. To ensure college's readiness for accreditation before applying and thereby convince the top management about the soundness of her decision, she decided to invite a specialist to review the curriculum and faculty qualifications. She felt this was the least expensive available option. The entire review period duration was around six weeks. But these six weeks were not smooth, information was scattered, and faculty did not cooperate in compiling, locating or submitting it. The dean and specialist faced faculty opposition, overt and covert resistance and political maneuvers. The dean tried to overcome resistance through open dialogue and employee confrontation and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

involving them in the entire accreditation review process. She formed two committees for accreditation and assurance of learning to encourage and empower her faculty to think strategically as she was aware that this change process could take years before it gets accomplished successfully.

The chapter reconstructs employee resistance in a university college as a phenomenon which acknowledges that both change agents and change recipients are equally responsible for resistance. The actions, conversations and reactions of change recipients are behavioral triggers which the change agents need to make sense of to pave the path for the change initiatives. The study draws upon two auto-ethnographic reflexive narratives of change agents to demonstrate how change agents make or break the change process at their work place. The sensemaking narratives are correlated with different theoretical aspects of OCD evidence-based practices to provide insights on the change process and how introspection and reflection can lead to maximum success. The objective is to allow an understanding of how each change agent interpreted the change process and influenced the stakeholders in the change environment. It focuses on the importance of reflection, introspection and sensemaking activities of the change agents in the entire change initiative.

This study has implications within the higher education sector it provides insights on how successful change requires communication and involvement at all levels of organization. In addition, how this can be practically achieved through quality assurance and accreditation committees which allow collaboration between the faculty and administration. It also recognizes the importance of internal change agents who are aware of the culture of the organization, its problems, and trouble makers and yet are sympathetic to the fears and anxieties of the change recipients. It exhibits how a team of internal and external change agents who are communicating with each other throughout the entire change process, minimize employees' resistance and increase acceptance of change initiatives.

The empirical analysis reveals differences in interpretations and reactions of both the change agents regarding the change process. The internal change agent is more sympathetic to the change recipients and their internal tensions. While the external change agent is more bothered about completing her assignment and to achieve this she tries to overcome the opposition of the faculty and win the trust of the change recipients. These differences in the change agents' approaches could be attributed to their respective positions in the college i.e., paid employee vs. non-employee. Research studies on employee resistance to organizational change so far have concentrated on the resistance practices, the organizational leader or the top management. The influence of the change agents, internal and external, and how their personalities, culture and ideologies could affect the change process has been substantially neglected. This could be an issue worth further investigating. Turnbull and Edwards (2005) in fact demand further case studies in higher education of a cross-cultural nature such as the above, to provide insights about OD and the influence of national cultural values and characteristics.

The empirical findings generated by the auto-ethnographic narratives in this chapter should be further investigated through interviews and surveys to get the perspectives of the faculty and staff members at the college level and the higher-level administrators at the university level as well. This would provide a complete and comprehensive picture of the entire change process.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Amason, A. C. (1996). Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams. *Academy of Management Journal*, *39*, 123–148. doi:10.2307/256633

Anderson, D. L. (2016). *Organization development: The process of leading organizational change*. Los Angeles, CA: Sage Publications.

Anderson, L. (2006). Analytic autoethnography. *Journal of Contemporary Ethnography*, *35*(4), 373–395. doi:10.1177/0891241605280449

Andersson, L. M. (1996). Employee cynicism: An examination using a contract violation framework. *Human Relations*, *49*(11), 1395–1417. doi:10.1177/001872679604901102

Ashkenas, R., & Jick, T. (1992). From dialogue to action in GE work-out: Development learning in a change process. In W. Pasmore & R. Woodman (Eds.), Research in Organizational Change and Development (vol. 6, pp. 267-287). Greenwich, CT: JAI Press.

Balogun, J., & Johnson, G. (2004). Organizational restructuring and middle manager sensemaking. *Academy of Management Journal*, *47*(4), 523–549. doi:10.2307/20159600

Barrett, F., Thomas, G., & Hocevar, S. (1995). The central role of discourse in large-scale change: A social construction perspective. *The Journal of Applied Behavioral Science*, *31*(3), 352–372. doi:10.1177/0021886395313007

Boje, D. (1995). Stories of the storytelling organization: A postmodern analysis of Disney as Tamaraland. *Academy of Management Journal*, *38*, 997–1035. doi:10.2307/256618

Boyle, M., & Parry, K. (2007). Telling the whole story: The case for organizational autoethnography. *Culture and Organization Journal*, *13*(3), 185–190. doi:10.1080/14759550701486480

Caruth, D., Middlebrook, B., & Rachel, F. (1985). Overcoming resistance to change. *S.A.M. Advanced Management Journal*, *503*, 23–27. Retrieved from https://laurieford.com/wp-content/articles/2009. Resistance%20Reexamined.pdf

Cobb, A. T., Wooten, K. C., & Folger, R. (1995). Justice in the making: Toward understanding the theory and practice of justice in organizational change and development. In W. A. Pasmore & R. W. Woodman (Eds.), *Research in organizational change and development* (pp. 243–295). Greenwich, CT: JAI.

Cornelissen, J. (2012). Sensemaking under pressure: The influence of processional roles and social accountability on the creation of sense. *Organization Science*, *23*(1), 118–137. doi:10.1287/orsc.1100.0640

Czarniawska, B., & Sevon, G. (1996). *Translating organizational change*. Berlin: De Gruyter. doi:10.1515/9783110879735

Dean, J. W. Jr, Brandes, P., & Dharwadkar, R. (1998). Organizational cynicism. *Academy of Management Review*, *23*(2), 341–352. doi:10.5465/amr.1998.533230

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Degn, L. (2015). Identity construction and sensemaking in higher education-A case study of Danish higher education department heads. *Studies in Higher Education*, *40*(7), 1179–1193. doi:10.1080/03075079.2014.881345

Dent, E. B., & Goldberg, S. (1999). Challenging resistance to change. *The Journal of Applied Behavioral Science*, *35*(1), 25–41. doi:10.1177/0021886399351003

DePaulo, B. M., Kashy, D. A., Kirkendol, S. E., Wyer, M. M., & Epstein, J. A. (1996). Lying in everyday life. *Journal of Personality and Social Psychology*, *70*(5), 979–995. doi:10.1037/0022-3514.70.5.979 PMID:8656340

Doloriet, C., & Sambrook, S. (2012). Organizational autoethnography. *Journal of Organizational Ethnography*, *1*(1), 83–95. doi:10.1108/20466741211220688

Dubois, B. (1983). Passionate scholarship: Notes on values, knowing and method in feminist social science. In G. Bowles & R. Klein (Eds.), *Theories of women's studies*. New York: Routledge and Kegan Paul.

Ellis, C., & Bochener, A. (2000). Autoethnography, personal narrative, reflexivity: Researcher as subject. In N. Denzin & Y. Lincoln (Eds.), *Sage Handbook of Qualitative Research*. Thousand Oaks, CA: Sage.

Erwin, D. G., & Garman, A. N. (2009). Resistance to organizational change: Linking research and practice. *Leadership and Organization Development Journal*, *31*(1), 39–56. doi:10.1108/01437731011010371

Fairclogh, N. (1992). *Discourse and social change*. Cambridge, UK: Polity Press.

Folger, R., & Skarlicki, D. P. (1999). Unfairness and resistance to change: Hardship as mistreatment. *Journal of Organizational Change Management*, *12*(1), 35–50. doi:10.1108/09534819910255306

Ford, J. (1999). Organizational change as a shifting conversations. *Journal of Organizational Change Management*, *12*(6), 480–500. doi:10.1108/09534819910300855

Ford, J., Ford, L., & D'Amelio, A. (2008). Resistance to change: The rest of the story. *Academy of Management Review*, *33*(2), 362–377. doi:10.5465/amr.2008.31193235

Ford, J. D., & Ford, L. W. (2010). Stop blaming resistance to change and start using it. *Organizational Dynamics*, *39*(1), 24–36. doi:10.1016/j.orgdyn.2009.10.002

Gephart, R. P. (1993). The textual approach: Risk and blame in disaster sensemaking. *Academy of Management Journal*, *36*(6), 1465–1514. doi:10.2307/256819

Gephart, R. P., Topal, C., & Zhang, Z. (2010). Future-oriented sensemaking: Temporalities and institutional legitimation. In T. Hernes & S. Maitlis (Eds.), *Process, sensemaking and organizing* (pp. 275–312). Oxford, UK: Oxford University Press. doi:10.1093/acprof:oso/9780199594566.003.0013

Gioia, D. A., & Chittipeddi, K. (1991). Sensemaking and sensegiving in strategic initiative. *Strategic Management Journal*, *12*(6), 433–448. doi:10.1002mj.4250120604

Gioia, D. A., Thomas, J. B., Clark, S. M., & Chittipeddi, K. (1994). Symbolism and strategic change in academia: The dynamics and sensemaking and influence. *Organization Science*, *5*(3), 363–383. doi:10.1287/orsc.5.3.363

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hamlin, R. G., & Davies, G. (2001). Managers, trainers and developers as change agents. In R. G. Hamlin, J. Keep & K. Ash (Eds.), Organizational Change and Development: A Reflective Guide for Managers, Trainers and Developers (pp. 39-60). Harlow, UK: FT Prentice Hall.

Hamlin, R. G. (2002). Towards evidence-based HRD practice. In J. McGoldrick, J. Stewart, & S. Watson (Eds.), *Understanding human resource development: A research-based approach* (pp. 93–121). London: Routledge.

Hamlin, R. G. (2007). Generating HRD related 'general knowledge' from Mode 2 design science research: A cumulative study of manager and managerial leader effectiveness. In F.M. Nafukho, T. G. Chermack, & C. M. Graham (Eds.), *2007 AHRD International Research Conference*. Indianapolis, IN: Academic Press.

Hamlin, R. G., Keep, J. S., & Ash, K. (2001). *Organizational change and development: A reflective guide for managers, trainers and developers*. Harlow, UK: FT Prentice Hall.

Handy, C. (1989). *The age of unreason*. London: Random Century.

Harding, S. (1992). *Whose science? Whose knowledge?* Milton Keynes, UK: Open University Press.

Haynes, K. (2011). Tensions in (re)presenting the self in reflexive auto-ethnographical research. *Qualitative Research in Organizations and Management*, *6*(2), 134–149. doi:10.1108/17465641111159125

Ijaz, S., & Vitalist, A. (2011). Resistance to organizational change: Putting the jigsaw together. *International Review of Business Research Papers*, *7*(3), 112–121. Retrieved from https://www.bizresearchpapers.com/8.%20Saima-FINAL.pdf

Johnson, G. (1992). Managing strategic change: Strategy, culture and action. *Long Range Planning*, *25*(1), 28–36. doi:10.1016/0024-6301(92)90307-N PMID:10118379

Khoury, G., & McNally, B. (2014). Under pressure: The role of the external context in creating internal tensions-- A case study of a Palestinian university. In Cases on management and organizational behavior in an Arab context (pp. 128-145). IGI Global Publications.

King, N., & Anderson, N. (1995). *Innovation and change in organizations*. London: Routledge.

Knowles, E. S., & Linn, J. A. (2004). Approach-Avoidance model of persuasion: Alpha and omega strategies for change. In E.S. Knowles & J. A. Linn (Eds.), Resistance and persuasion (pp. 117-148). Mahwah, NJ: Lawrence Erlbaum Associates.

Kouzes, J., & Posner, B. (1993). *Credibility: How leaders gain and lose it, why people demand it*. San Francisco, CA: Jossey-Bass.

Kulkarni, V. (2016). Employee interpretations of change: Exploring the other side of resistance story. *Indian Journal of Industrial Relations*, *52*(2), 246–263. Retrieved from http://eds.a.ebscohost.com.proxy1.ncu.edu

Kuntz, J. R. C., & Gomes, J. F. S. (2012). Transformational change in organizations: A self-regulation approach. *Journal of Organizational Change Management*, *25*(1), 143–162. doi:10.1108/09534811211199637

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Leonard-Barton, D. (1990). A dual methodology for case studies: Synergistic use of a longitudinal single site with replicated multiple sites. *Organization Science*, *1*(3), 248–266. doi:10.1287/orsc.1.3.248

Lewin, K. (1952). *Field theory in social science: Selected theoretical papers*. London: Tavistock.

Louis, M. R. (1980). Surprise and sensemaking: What newcomers experience in entering unfamiliar settings. *Administrative Science Quarterly*, *25*(2), 226–251. doi:10.2307/2392453 PMID:10247029

Maitlis, S., & Christianson, M. (2014). Sensemaking in organizations: Taking stock and moving forward. *The Academy of Management Annals*, *8*(1), 57–125. doi:10.5465/19416520.2014.873177

Maitlis, S., & Sonenshein, S. (2010). Sensemaking in crisis and change: Inspiration and insight from Weick. *Journal of Management Studies*, *47*(3), 551–580. doi:10.1111/j.1467-6486.2010.00908.x

Maynard, M. (1994). Methods, practice and epistemology. In M. Maynard & J. Purvis (Eds.), *Researching women's lives from a feminist perspective*. London: Taylor and Francis.

McGuire, W. J. (1964). Inducing resistance to persuasion: Some contemporary approaches. In L. Berkowitz (Ed.), Advances in experimental and social psychology (Vol. 1, pp. 19–229). New York: Academic Press.

McGuire, W. J., & Papageorgia, D. (1961). The relative efficacy of various types of prior belief-defense in producing immunity against persuasion. *Journal of Abnormal and Social Psychology*, *62*(2), 327–337. doi:10.1037/h0042026 PMID:13773992

Meston, C., & King, N. (1996). Making sense of resistance: Responses to organizational change in a private nursing home for the elderly. *European Journal of Work and Organizational Psychology*, *62*(1), 91–102. doi:10.1080/13594329608414843

Mills, J. H., Thurlow, A., & Mills, A. J. (2010). Making sense of sensemaking: The critical sensemaking approach. *Qualitative Research in Organizations and Management*, *5*(2), 182–195. doi:10.1108/17465641011068857

Ostentoski, N. (2015). Changing from the inside out: Leading organizational change as an insider. *Journal of Positive Management*, *6*(3), 41–66. doi:10.12775/JPM.2015.015

Parry, K. W., & Boyle, M. (2009). Organizational autoethnography. In D. Buchanan & A. Bryman (Eds.), SAGE handbook of organizational research methods (pp. 690-702). London: Sage.

Perriton, L. (2001). Sleeping with the enemy? Exploiting the textual turn in management research. *International Journal of Social Research Methodology*, *4*(1), 35–50. doi:10.1080/13645570117299

Piderit, S. K. (2000). Rethinking resistance and recognizing ambivalence: A multidimensional view of attitudes toward organizational change. *Academy of Management Review*, *25*(4), 783–794. doi:10.5465/amr.2000.3707722

Powell, G., & Posner, B. Z. (1978). Resistance to change reconsidered: Implications for managers. *Human Resource Management*, *17*(1), 29–34. doi:10.1002/hrm.3930170107

Reason, P., & Bradbury, H. (2001). Introduction: Inquiry and participation in search of a world worthy of human aspiration. In P. Reason & H. Bradbury (Eds.), *Handbook of action research: Participative inquiry and practice* (pp. 1–14). London: Sage.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Reichers, A., Wanous, J., & Austin, J. (1997). Understanding and managing cynicism about organizational change. *The Academy of Management Executive*, *11*(1), 48–59. Retrieved from https://www.jstor.org/stable/4165371

Rouleau, L. (2005). Micro-practices of strategic sensemaking and sensegiving: How middle managers interpret and sell change every day. *Journal of Management Studies*, *42*(7), 1413–1441. doi:10.1111/j.1467-6486.2005.00549.x

Ruben, B. (2005). The center for organizational development and leadership at Rutgers University: A case study. *Advances in Developing Human Resources*, *7*(3), 368–395. doi:10.1177/1523422305277177

Scheniger, D. M., Sandberg, W. R., & Rechner, P. L. (1989). Experiential effects of dialectical inquiry: Devil's advocacy and consensus approaches to strategic decision making. *Academy of Management Journal*, *32*, 745–772. doi:10.2307/256567

Schon, D. A. (1987). *Educating the reflective practitioner*. San Francisco, CA: Jossey-Bass.

Sorge, A., & van Witteloostuijn, A. (2004). The (non)sense of organizational change: An essay about universal management hypes, sick consultancy metaphors and healthy organization theories. *Organization Studies*, *25*(7), 1205–1231. doi:10.1177/0170840604046360

Stanley, L., & Wise, S. (1983). *Breaking out*. London: Routledge and Kegan Paul.

Stanley, L., & Wise, S. (1993). *Breaking out again: Feminist consciousness and feminist research*. London: Routledge and Kegan Paul.

Starbuck, W. H., & Milliken, F. J. (1988). Executives' perceptual filters: What they notice and how they make sense. In D. C. Hambrick (Ed.), *In the executive effect: Concepts and methods for studying top managers*. Greenwich, CT: JAI Press.

Thompson, D., & Burns, H. K. (2008). Reflection: An essential element of evidence-based practice. *Journal of Emergency Nursing: JEN*, *34*(8), 246–248. doi:10.1016/j.jen.2008.02.024 PMID:18558263

Tomlinson, E. C., Dineen, B. R., & Lewicki, R. J. (2004). The road to reconciliation: Antecedents of victim willingness to reconcile following a broken promise. *Journal of Management*, *30*(2), 165–187. doi:10.1016/j.jm.2003.01.003

Torraco, R. J., Hoover, R. E., & Knippelmeyer, S. A. (2005). Organization development and change in univeristies: Implications for research and practice. *Advances in Developing Human Resources*, *7*(3), 422–437. doi:10.1177/1523422305277180

Tucker, D. A., Hendy, J., & Barlow, J. (2015). The importance of role sending in the sensemaking of change agent roles. *Journal of Health Organization and Management*, *29*(7), 1047–1064. doi:10.1108/JHOM-12-2013-0279 PMID:26556167

Turnbull, S., & Edwards, G. (2005). Leadership development for organizational change in a new U.K. university. *Advances in Developing Human Resources*, *7*(3), 396–413. doi:10.1177/1523422305277178

Van Maanen, J. (1988). *Tales of the field: On writing ethnography*. Chicago: University of Chicago Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wanous, J. (1992). *Organization entry: Recruitment, selection, orientation and socialization of newcomers.* Addison-Wesley.

Weick, K. E. (1988). Enacted sensemaking in crisis situations. *Journal of Management Studies*, *25*(4), 305–317. doi:10.1111/j.1467-6486.1988.tb00039.x

Weick, K. E. (1993). The collapse of sensemaking in organizations: The Mann gulch disaster. *Administrative Science Quarterly*, 571–593. Retrieved from http://www.cs.unibo.it/~ruffino/Letture%20TDPC/K.%20Weick%20-%20The%20collapse%20of%20sensemaking.pdf

Weick, K. E. (1995). *Sensemaking in organizations*. Beverly Hills, CA: Sage.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science*, *16*(4), 409–421. doi:10.1287/orsc.1050.0133

This research was previously published in Evidence-Based Initiatives for Organizational Change and Development; pages 361-381, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 73
Accessibility Improvement Interventions at Byzantine Monuments:
Use of Technology for Facilitating Accessibility of Visitors With Sensory Disabilities

Aristotelis Naniopoulos
Aristotle University of Thessaloniki, Greece

Panagiotis Tsalis
Aristotle University of Thessaloniki, Greece

ABSTRACT

The accessibility of monuments and archaeological sites by disabled persons and persons with restricted mobility in general, constitutes a social, financial and political demand. The project "PROSPELASIS" attempted to counter this problem by focusing on creating a methodology for facing monuments' accessibility and perceptibility problems for people with disabilities and testing its application at Byzantine monuments of Thessaloniki. In six major monuments included in UNESCO's World Heritage List, significant accessibility improvements were realized. A Wi-Fi information system was installed in all of them via which an audio and visual information system was created with audio information in three languages, description of visual information, text information, information in Greek and International Sign Language. Additionally, in Rotunda and Heptapyrgion monuments three dimensional models were developed. The successful validation of the proposed methodology constitute the results of this project not only pertinent to Thessaloniki or Greece, but worthy of a wider application.

DOI: 10.4018/978-1-7998-7297-9.ch073

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

A visit to an archaeological site or monument is a unique experience that also constitutes a main tourist attraction. A visit to a monument allows the composition of all stimuli into a unique experience, consisting of the following:

- **Visual Stimuli:** Shapes, colours, textures, images, sense of the real scale of the site.
- **Tactile Stimuli:** The floor's texture and the way in which it is perceived (e.g. gravel or stone) or the texture of the seats (e.g. wood, marble, metal).
- **Auditory Stimuli:** The soundscape of the surrounding area, either natural or artificial, the sound of interaction between man and the environment, walking, the swish of plants when walking through them.
- **Olfactory Stimuli:** Natural scents (depending on the season, time, weather) and artificial scents (e.g. scents of diverse materials or deliberately diffused scents and incenses).
- **Gustatory Stimuli:** Tastes referring to the site and underlining its uniqueness, such as fruits from the trees of a garden, the water of a fountain, the treat in a monastery.

In Thessaloniki, a city with rich heritage, monuments constitute isolated "islets", with the modern cityscape "drowning" them, allowing no visual connection between them, making their identification, their understanding, and physical access to them difficult for visitors in general and persons with restricted mobility in particular. This problem is exacerbated by the fact that the current city's ground level is often four to five meters above the level, where the entrance to the monuments is. Thus, any attempt to "socialize" the cultural heritage of the city has to pursue the following two objectives: a) to provide easy access to monuments for all visitors, including persons with disability and restricted mobility, and b) to help visitors through the provision of adequate information and the indication of ways of moving from one monument to another, connecting the" pieces of the puzzle" (Naniopoulos et al., 2011b.).

The present chapter describes the process of improvement of accessibility in selected Byzantine monuments of Thessaloniki using a methodology created in the frame of the "PROSPELASIS" project, financed by a grant from Iceland, Liechtenstein and Norway through the EEA Financial Mechanism 2004 – 2009 (50%) and from the public investments programme of the Hellenic Republic (50%). The project was realized by the cooperation of the Aristotle University of Thessaloniki (project leader) and the 9th Ephorate of Byzantine Antiquities. The chapter describes the background and the needs that lead to the development of the methodology, the methodology itself, its implementation and the accessibility improvement interventions carried out at selected Byzantine monuments of Thessaloniki. The authors aspire that the adoption of the proposed methodology can lead to further actions that will improve monuments' and archaeological sites' accessibility at national and international level.

BACKGROUND

Addressing, at an international level, the problems of protection, conservation, restoration and management of historical centres, archaeological sites, architectural aggregations, monuments and works of art, has been a major issue. Nowadays, we are not only interested in the monuments' past; we are also interested in their preservation, restoration and role in direct relation to their present and future environ-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ment, their integration into modern life and their connection with economic, educational, tourist and social aspects in particular.

Access to culture is a fundamental right of people with disabilities (EU Council, 1993; UN, 1993). Article 30 of the Convention for the Rights of Persons with Disabilities requires that States parties recognize the right of persons with disabilities to take part in cultural life on an equal basis with others. They are required to take all appropriate measures to ensure that persons with disabilities:

1. Enjoy access to cultural materials in accessible formats;
2. Enjoy access to television programmes, films, theatre and other cultural activities, in accessible formats; and
3. Enjoy access to places for cultural performances or services, such as theatres, museums, cinemas, libraries and tourism services, and, as far as possible, enjoy access to monuments and sites of national cultural importance. (UN, 2013)

Leisure experiences and participation provide unique and valuable opportunities that may result in a variety of positive physical, social and psychological benefits, as well as enhance one's overall quality of life. When people with disabilities participate in leisure experiences, they obtain benefits on a par with their non-disabled counterparts (Stumbo, Wang, & Pegg, 2011).

It should also be noted that making tourist attractions more accessible to people with disabilities, is considered a "golden opportunity" for businesses. In Europe it is estimated that at least 80 million people have a declared disability, a number due to increase because of demographic ageing and the correlation between disability and old age. Yet, this market appears not to be served properly (EC, 2014). Despite the existence of different legal provisions in the EU dealing with equal opportunities, there appears to be a general "inertia" among providers of tourism services in engaging in accessible tourism. (EC, 2014). This was the main reason that lead the World Tourism Day of 2016 to be dedicated to "Tourism for all – Promoting universal accessibility".

A visit to an archaeological site or monument in particular, is an original, unique experience, and constitutes a main attraction in Greece for tourists. Although there are movable findings from all historical periods of Greece in museums around the world, the main archaeological sites and monuments can be found only in their original place. A visit to an archaeological site provides direct contact with the area and the monument, an authentic experience which cannot be substituted by any representation and entails the use of one's senses allowing the composition of all stimuli in something unique.

Barriers that hinder disabled visitors form visiting archaeological sites and monuments exist at various levels, and are identified as:

- Organizational issues, such as lack of staff or lack of support for access improvements
- Physical issues, such as lack of accessible signage and information, narrow paths and entrances, loose or uneven path surfaces, steep slopes and long distances, steps, lack of seating and shelter, luck of accessible toilets and baby changing facilities
- Intellectual issues, e.g., complex or text-only information
- Social and cultural issues, e.g., publicity does not promote access, inaccessible website, lack of information shared with local community etc.
- Financial issues, such as charges for activities, like guided tours, cost of travelling to and from a site. (Ioannidis & Vozikis, 2007)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In order to grant accessibility to cultural environments, activities on two levels need to take place:

- Public awareness needs to be risen as far as cultural heritage is concerned, so that the public interest will start at younger ages and
- Necessary infrastructure needs to be provided, in order to guarantee accessibility to all population groups.

However, archaeological sites and monuments, by their nature, do not allow major interventions to their structure. There is an obvious need for balance between access rights and conservation of the archaeological sites, which demands the development of the relevant access legislation and technical standards. Any intervention to improve accessibility should be made carefully, so as not to alter the monument's character, or damage it visually or structurally (Naniopoulos & Marki, 2003; English Heritage, 2004; NDA, 2011).

The concept of accessibility, as used here, includes:

- Usability and possibility of independent physical access and movement; and
- Perceptibility, referring to the way one perceives, understands the environment (Fertier, 2003).

As far as monuments and archaeological sites in particular are concerned, some efforts have been made in order to improve physical access, focusing mostly on improving access to specific monuments. For example, in August 2004, just before the inauguration of Athens' Olympic Games, one of the most significant Monuments of the world cultural and architectural heritage, the Acropolis of Athens, became accessible to disabled persons via a lift on the north slope of the Sacred Rock. The lift, which was installed with the approval of the Greek Central Archaeological Council, can be reached by a special entrance just north of the main entrance to the archaeological site and the northwest section of the ancient promenade. The highest level of the lift concludes to a lightweight iron balcony-bridge which leads to a level space northwest of Erechtheum. From this point via specific routes, the visitor can tour the most significant Monuments of Acropolis and reach up to the old Acropolis Museum which can be accessed via a platform lift, which has been installed in its yard. (Hellenic Ministry of Culture, 2017)

Cases where monumental buildings are asked to house modern day activities are also of particular interest. This is the case of the National Archaeological Museum of Athens, which is the largest museum in Greece and one of the world's great museums. Although its original purpose was to secure all the findings from the nineteenth century excavations in and around Athens, it gradually became the central National Archaeological Museum and was enriched with finds from all over Greece. Its abundant collections, with more than 11,000 exhibits, provide a panorama of Greek civilization from the beginnings of Prehistory to Late Antiquity. The museum is housed in an imposing neoclassical building of the end of the nineteenth century, which was designed by L. Lange and remodelled by Ernst Ziller.

In order to facilitate visitors with disability and people with restricted mobility in general during the modernization of the Museum for the Olympic Games of 2004, the following interventions took place:

- A second entrance was created at the part of the building adjacent to Vasileos Irakleiou Str. which is accessible. It is connected to the street via a bridge, while access is also achieved via a 5% gradient ramp from the area in front of the Museum's main entrance. Close to the ramp's edge there are 5 allocated parking spaces for visitors with disability.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Two lifts were built at the museum's atriums. At one of these atriums, close to the staircase that leads to the exhibition areas, a large lift was installed facilitating movement on the floor and at the service yard. Right across the exit of the floor there is a vertical lift which covers a small height difference and allows access to the room where the exhibits from Thira are located. At the other atrium, which is located at the left of the of the main entrance, a smaller lift was installed in order to serve access from the ground floor to the public toilets, the canteen and the Museum's shop. Wheelchair users can also access these areas via a stair lift which is placed at the main entrance.
- Toilets for visitors with disability and ramps which cover small height differences were constructed
- Exhibits are placed so that they can be viewed by visitors with disabilities
- Guided tours and educational seminars are held in sign language (Naniopoulos et al., 2011a).

As far as access to information for visitors of monuments and heritage sites is concerned, various efforts have been made exploiting the advantages offered by ICT applications. One of the first examples of current possibilities for increased information access through digital technology was the ARCHEOGUIDE project, first developed at the site of Olympia in Greece. This offers heritage information to the visitor through an ICT system that links augmented reality, 3D-visualisation, mobile computing, and multi-modal interaction techniques. The ARCHEOGUIDE system consists of a site information server and a set of mobile units that are carried by visitors. A wireless local network allows the mobile units to communicate with the site information server. When in use, the visitor can access information about the specific areas he or she is walking through and gain a visual impression of the original appearance of the site through augmented reality reconstructions (Vlahakis et al., 2002).

Many applications also use ICT particularly for the benefit of visitors with sensory impairments. These include, for example, Manchester Museum Touch and Discover Systems. Access was achieved to a small number of objects that cannot be handled by developing a Haptic Interactive. The interface consists of a touch-enabled computer system which allows the user to investigate and explore the topography of an artefact within a 3-dimensional digital environment through a feedback stylus. The addition of sound associated object was another important element, giving vocal instructions and an indication of the objects material qualities and character. For example a broken ceramic gives a dull sound whereas a high-fired ceramic can give a musical ring. The haptic interface does not replace the handling experience, but it can augment a visitors understanding of an object and increase their knowledge and enjoyment on a visit (AMBAVis, 2015).

The PROSPELASIS project described in the current chapter combines the above, following a holistic approach to access of disabled visitors, with interventions carried out to improve both access to information for visitors with sensory impairments and access to infrastructure for visitors with physical impairments. The objective of the current chapter is to pinpoint the methodology for accessibility improvement carried out in Byzantine monuments of Thessaloniki, depicting the process followed, the obstacles encountered and the lessons learned in order to promote the concept of accessible monumental and cultural infrastructure through a combination of information provision (focusing mainly to visitors with sensory impairments) and infrastructure improvements (focusing mainly to visitors with physical impairments).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

METHODOLOGY

The research team's first step was the definition of a theoretical approach model for the improvement of accessibility in monuments, which has been further elaborated through its application to Byzantine monuments of Thessaloniki. This approach contained the following steps:

- Definition of parts of the monument that can become accessible
- Evaluation of existing accessibility level and identification of obstacles
- Definition of information provision needs
- Definition of alternative solutions at pre-study level
- Creation of final studies and implementation of accessibility improvement interventions
- Training of personnel involved

The ideal aim concerning accessibility of monuments is of course that all areas in a monument should become accessible. Thus, from the first stages of a study, the research team had to determine the parts of a monument that can be made accessible, as well as those that do not provide this possibility (English Heritage, 2005).

This process was followed by the evaluation of the existing accessibility level. Appropriate checklists were devised which cover both the monuments' physical access as well as their perceptibility and current use (it should be noted that most of the assessed monuments still host religious activities). In order to create the checklists, first the needs of visitors with disabilities at these particular surroundings had to be determined (Tsalis & Naniopoulos, 2008). This lead to the creation of a task model which was constructed through communication with people with disabilities, cooperation with associations of people with disabilities, in situ observation of the use of infrastructure, communication with experts specialised in accessibility as well as use of the results of relevant research concerning accessibility of the environment, including works by the Royal National Institute for the Blind, the Americans with Disabilities Act Accessibility Guidelines team and the British Department for Transport (RNIB, 1995; ADAAG, 1992; DfT, 2002). The checklists created in the PROSPELASIS project were structured so that the accessibility auditor would not have to be an engineer specialized in accessibility, thus ensuring the methodology's sustainability.

The implementation of the checklists lead to the construction of reports describing the existing situation for each monument, the identification of the visitors' needs and, next, to the definition of alternative solutions for the improvement of accessibility.

In the case of the Byzantine monuments examined in the frame of the project, the historic conservation was the utmost priority and, thus, any solution that did not respect this was rejected, despite the fact that it could be beneficial from the tourist image or economic development point of view. Thus the following principles were followed:

- All of the modern constructions which were necessary for improving the accessibility of monuments, and particularly large scale interventions such as ramps, corridors, lifts etc., were installed in a way which does not insult the aesthetical and archaeological values of the monument.
- These constructions were not projected on the monument and were not fixed on the monument in any permanent way. Bearing in mind that monuments of Thessaloniki are usually at a lower level than that of the street level, these constructions were fixed in the ground slopes of their sur-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

roundings and stand out as extension of the equipment of a modern city, rather than as part of the monuments.
- In order to avoid confusion, these constructions do not look like old ones, and their size and shape does not exceed what is required for functionality purposes.
- The use of modern technology is restricted to a degree that does not compromise the principles of monument restoration.

All the above were necessary in order to improve physical accessibility for visitors with mobility impairments. However, they did not provide direct benefits in improving perceptibility for visitors with sensory impairments, despite the fact that contemporary management of heritage resources aims to facilitate a broad public awareness and appreciation of cultural heritage sites and that ICOMOS (International Council on Monuments and Sites) recognizes that the accessibility of these sites should be of both physical and intellectual character, providing the public with the opportunity to visit a site, and to have the benefit of detailed, up-to-date historical information about it. (Brizard, Derde, & Silberman, 2007). This appears to be common practice in Greece since, in many cases, accessibility interventions take into account only the needs of persons with physical impairments and become synonymous with the installation of lifts and ramps, following a short-sighted approach.

Technology has much to offer to enhance visitors' in situ experience and digital models are used increasingly to:

- Provide access by making easier to view details and allow items that are physically inaccessible to be documented and viewed
- Provide insights and interpretations of the previous condition or states of site or object (e.g. impression of an artefact in its former pristine state)
- Contextualize artefacts (e.g. demonstrate how a tool was used)
- Present representations of tangible heritage as part of the narrative of in-tangible heritage with digital story-telling (Kaminski, Benson, & Arnold, 2013).

PROSPELASIS followed a holistic approach and focused at the inclusion of all potential users, by providing access to monuments with "intangible" characteristics for visitors with physical and sensory impairments.

REALIZATION OF INTERVENTIONS

In total 20 Byzantine – UNESCO monuments were evaluated in Thessaloniki and solutions for accessibility improvement were completed, in pre-study level, for each of them (Naniopoulos et al., 2010a, 2010b). In six of these monuments (Acheiropoietos, church of Saint Demetrios, church of Saint Nicholas Orphanos, church of Hagia Sofia, Rotunda, Heptapyrgion Fortress), which were selected based on their historic significance and interest to the potential visitor, final studies were made and accessibility improvement interventions, which are presented for each monument at the following, were completed (Naniopoulos et al., 2011b). It should also be noted that, in order to create solutions of high aesthetic quality, two well-known artists have been involved in this process, Constantin Xenakis, who was occupied

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

mainly with the signing of a route connecting three monuments, and Cris Giannakos who contributed to the design of ramps.

Interventions Aiming at the Improvement of Accessibility for Visitors With Sensory Disabilities

Development of a WiFi Information System

The research team's cooperation with local associations of persons with visual and hearing impairments resulted in a common belief that the creation and installation of an audio and visual guiding system is necessary for the perceptibility of monuments.

The reason disabled people and people with restricted mobility are not served adequately by the tourism industry is a combination of missing tourism product supply and inadequate information. The lack of reliable information is regarded as one of the major causes that prevent disabled people and others with access requirements from going on holiday (Buhalis et al., 2006).

Potential visitors with visual impairments identified as their main requirements and preferences in a visit to a monument the following:

- They would like to perceive the monuments via appropriate stimuli (audio, visual, olfactory, tactile)
- They consider a visit to a monument as both a recreational and educational activity
- The low level of light in most Byzantine monuments poses difficulties for visitors with reduced vision
- They would prefer something more "interactive", rather than a provision in Braille of the existing information material of monuments
- They did not consider tactile maps that useful, in those particular surroundings
- The creation of a three-dimensional model of the monuments, which visitors could touch, would allow them to perceive not only the monuments' shape and size, but also the different materials used for the monument's construction
- They considered that any accessibility improvement interventions would prove beneficial for the development of accessible tourism in Thessaloniki

The basic requirements of the realized system, according to potential users with visual impairments, were:

- To provide audio information in English, Greek and perhaps other languages depending on the origin of visitors who usually visit the monument
- To provide audio information similar to the one which will be provided in text
- To be easy to use
- To provide audio description of visual images
- To provide information about the monuments' form, size and shape to visitors with visual impairments
- To be compatible with any assistive technologies

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Potential visitors with hearing impairments identified as the main problems they face in a visit to a monument the following:

- Lack of available information
- Communication problems with the monuments' staff
- Even though most of the respondents had experienced visits to monuments, archaeological sites and museums, none of them had any experience of using assisting technologies in situ

The basic requirements of the system, according to potential users with hearing impairments, were:

- To provide clear text information
- To be easy to use
- To provide descriptions in sign language

Following these, a review of possible solutions was carried out, taking into account the demands of the Ephorate of Byzantine Antiquities for any intervention not to require the installation of equipment (antennas etc.) which could cause irreversible damages, or visual intrusion to the monuments. Thus, the creation of a Wi-Fi application, focusing in particular to visitors with sensory disabilities, was considered the most suitable solution.

1. The System Developed

The development of the proposed Wi-Fi network was predominantly performed according to two critical criteria: a) the minimum architectural and electromagnetic disturbance of the monuments and b) the optimum performance of the wireless network by means of the smallest number of utilized components.

Toward these objectives, all the items of the selected equipment have very limited dimensions and weight, while they concurrently embody the most up-to-date technological innovations in the area of wireless communications.

The system was developed through a cooperation of the Transport Systems Research Group of the Aristotle University of Thessaloniki and the Electrical and Computer Engineering Department of the Faculty of Technology of the Aristotle University of Thessaloniki.

The key concept of the infrastructure lies on the use of two Power-Over-Ethernet (POE) access points (AP). The AP encourage open source development and allow their developers to customize their operation, create their own mesh-networking applications. Moreover, they combine a hi-gain antenna system, advanced radio architecture, and highly researched and developed firmware technology allowing throughput, stability, and capacity performance rivaling even the highest-end WiMax networks. It is important to stress, that the specific APs require only one cable (CAT 6 FTP type) for power-supply and data exchange. These were connected through a gigabit 5-port switch to a powerful, yet small-sized server PC, which is responsible for the establishment of the entire Wi-Fi application.

2. Web-oriented Application Development

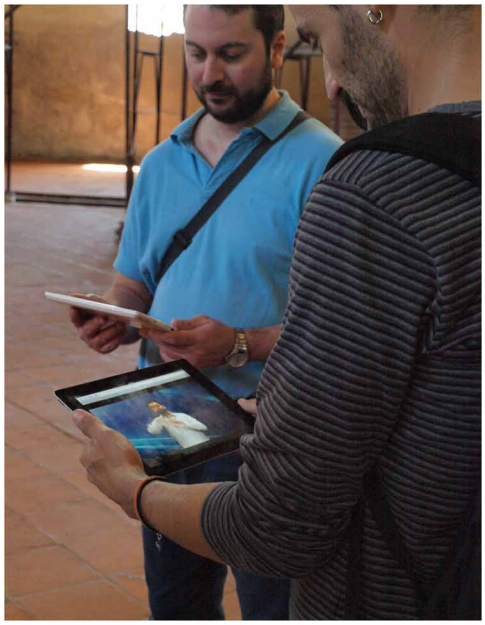
A website was developed to provide audio and visual information about the monument. Since interaction with the user and support of modern multimedia systems is needed, a Web 2.0-compliant solu-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tion should be chosen. Additionally, in order for non-professional personnel to be quickly trained on it, ease-of-use and maintenance of the system is required. Taking into account the above requirements, the popular PHP-based Content Management System (CMS) Joomla! was the selected solution.

Users retrieve text information about the monument in Greek, English and Russian. Info is also available in audio format in the three languages mentioned above as well as in Sign Language, Greek and International, allowing Deaf visitors access to information, as can be seen in Figure 1. The software used is compatible with screen readers and information on the monument is also provided in Braille on an individual basis. A tablet pc is available in situ for those who don't have a Wi-Fi compatible mobile phone or own tablet PC.

Figure 1. Deaf visitors retrieving information in sign language



To meet the requirements of the project, Phoca Gallery component was installed for the management of the monument's pictorial material. This component combines various visualization effects, including slideshow, with many interactive features, such as guest comments and geotagging. Images can be grouped into categories or displayed separately inside an article, thus providing various possible ways of presentation to choose from.

Various other functionalities can be considered and implemented during the website's design procedure or even later, according to the needs of the contractor and possible guests' suggestions. One final important point, concerning the maintenance and safety of the application, is the installation of Akeeba Backup, a component that can automatically back-up the application's files and store them locally on the server, on an everyday basis.

The finished application was evaluated in cooperation with the local association of deaf people before it was available to the public.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Installation of Three-Dimensional Tactile Models of Monuments

Three-dimensional models in general can be used by persons with visual impairments for orientation and perception of the environment. In the case of the PROSPELASIS project, these were used in order to assist visitors with the perception of the monuments' volume, shape and materials.

Two tactile models of the Rotunda and Heptapyrgion monuments were created and installed at the monuments' yards. These give visitors the chance to get familiar with the monument, understand its dimensions and characteristics.

Through cooperation with the local Association of the Blind, the following requirements for the realized models were identified:

- An accompanying audio guide for visitors on the use of the tactile model was a definite requirement, since most of persons with vision impairments, particularly in Thessaloniki, do not have experience in the use of tactile models.
- The model should not, in any circumstances, pose any danger to the user. Thus, it should not have sharp edges and certain compromises should be made, if required, in the accuracy of the monument's representation.
- Depending on the model's placement (indoors or outdoors) a variety of materials can be used. The use of different materials, with different textures, can also be beneficial for the model's usefulness.
- The model's size should not be too large in order to allow the user to easily perceive it.
- Additional information could be written on the model in Braille. Text in Braille can be part of the model's manufacturing process or added at a later stage, if so desired.
- Maintenance is important, particularly for models that will be placed outdoors.
- Smaller scale models should be made during the model manufacturing process in order for the constructor to consult potential users with vision impairments and make any adjustments necessary.

In order to prepare the tactile model, a 3D computer model of the monuments had to be produced using laser scanning equipment, through the following process, aiming at recording the three-dimensional information:

- Scanning of the monument using a Laser Scanner
- Depiction of the monument through the use of a point cloud
- Restructuring of the three dimensional geography
- Creation of the three-dimensional model
- Creation of scale replicas, as in this case, or virtual tours in future applications

The laser scanners used are active depiction instruments that have the ability to collect a large number of three dimensional data, creating point clouds with x, y, z, i coordinates for each particular point.

For example, in the case of Rotunda, in order to achieve the required number of points, 25 scans in total were required, which were carried out from the monument's roof, the monument's yard as well as neighbouring blocks of flats. In total, 51 million points were collected. This was followed by reconstruction and registration followed in order to achieve the visualization of the final model (Tokmakidis, 2011).

The completed 3D model became the basis for the manufacturing process that followed. First of all, a small scale model was produced in a 3D printer (figure 2). This was used for the project implementation

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Tactile model for blind visitors at Rotunda



team to get some feedback from blind and partially sighted potential users. After some small corrections were made, the project team decided on the scale on which the monuments would be represented. This led to the cast printing and the completion of the moulding process.

An audible description of the tactile model was created and is available through the Wi-Fi system installed at the monuments. Through this, a brief description of the monument as well as a detailed description of the monument's representation through the tactile model is provided. As has already been mentioned, this was a definite requirement of the users, since most of the persons with vision impairments in Thessaloniki do not have experience in the use of tactile models.

Interventions on a Route Connecting Three Monuments

The "visual noise" in Greek cities is particularly high, the urban landscape is flooded by arbitrary and vulgar interventions (constructions, graffiti, posters, advertisements etc.). In such an environment, the two partners of the PROSPELASIS project chose a route connecting three important monuments of the city, Hagia Sofia, Acheiropoietos and Rotunda, in order to realize a colour-coded signage. The concept utilizes ideas from the "Freedom Trail" in Boston (Freedom Trail Foundation, 2015) as well as from the European project MAPLE (Naniopoulos & Nalmpantis, 2004).

Main objectives of the signage realized were:

- To facilitate orientation and movement of people with sensory and cognitive impairments
- To depict that accessibility improving facilitations can be beneficial for the general public

The artist Constantin Xenakis participated as a member of the PROSPELASIS team during the signage planning. Constantin Xenakis in his art work has been particularly occupied with the "code of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the route" and also has made the plans for an artistic/poetic signing of a new settlement in France, the Moissy- Cramayel which though, has never been realised.

It should also be noted that, during the signage implementation, certain actions took place for the improvement of the physical accessibility of the selected route with the cooperation of the technical services of the Municipality of Thessaloniki. In particular, new ramps were created along the route, bridging height differences that hindered the movement of wheelchair users, signifying the Municipality's will to improve the route's accessibility level.

The planning and design of interventions, along the route, followed various stages. What has been realised is described in the following.

1. **Horizontal Signing:** Along the route connecting the three Monuments, certain pavement tiles were coloured with the colour assigned to each monument, while arrows indicated the movement direction to the monument. For each monument a colour code had been chosen
   a. Yellow for Hagia Sofia
   b. Blue for Acheropoietos
   c. Red for Rotunda

In certain selected areas where direction changes take place, as well as in front of each monument, different tiles were used with the adjacent monument's name written, accompanied with a direction arrow and the colour code selected in the background. The signing at the entrance of the Rotunda monument is depicted in Figure 3.

Figure 3. Horizontal signing at Rotunda



Particular effort was paid, on the one hand to have visual contact among the coloured tiles installed along the route, on the other hand not to intrude visually the urban landscape.

2. **Vertical Signing:** In front of each Monument a sign was installed, which included the following:

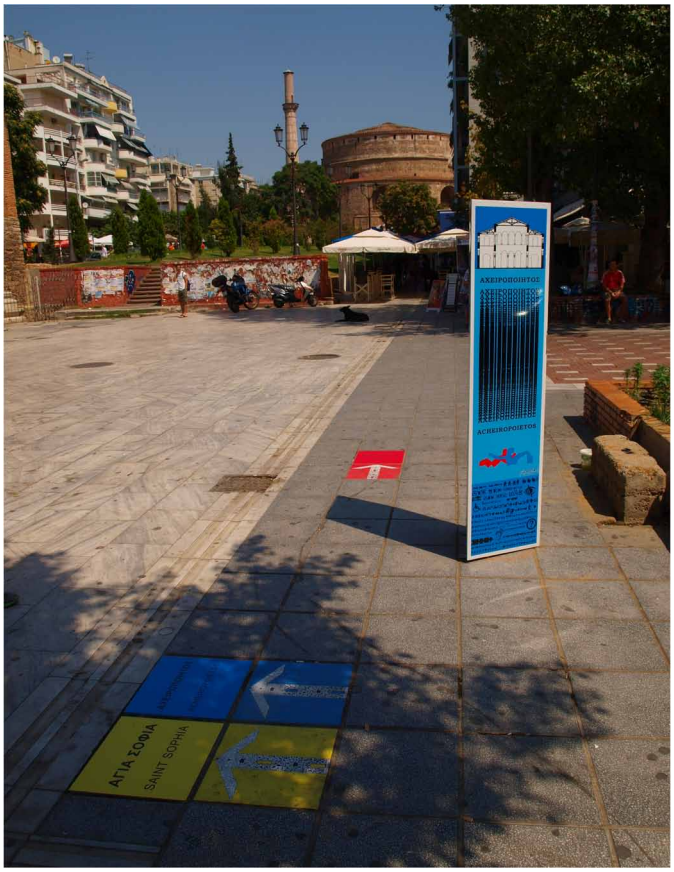
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a. Brief history of the Monument
b. Monument's layout
c. Diagram of the route connecting the three monuments
d. Information about the interventions for the improvement of physical and sensory accessibility which took place in the monument
e. Information concerning the context of the project, the sponsors etc.

The above mentioned information was written in three languages: Greek, English and Russian. The last language was chosen since all three monuments are very well known and attract many tourists from countries with Christian orthodox population, particularly from Russia.

On the upper side of the sign, a horizontal strip with the monument's colour code was located. The placement and type of the information signs were approved by the Greek Central Archaeological Council, following a relevant recommendation of the 9th Ephorate of Byzantine Antiquities. As seen in Figure 4, in the area of Kamara, where direction change towards Rotunda takes place, a vertical column of triangular profile was installed, where on each side an artistic reference on each one of the three monuments was made, further assisting pedestrians.

Figure 4. Vertical signing at the Kamara area



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Along the north east pavement of Egnatia Road, where the signage was applied, two bus stops of the local public transport company OASTh are located. Following permission by the Municipality of Thessaloniki, two posters-diagrams were installed on them which offered the following information:

- A diagram of the route connecting the three monuments which appear with their colour code
- Data concerning the realised interventions improving physical and sensory accessibility in each one of the three monuments
- Data concerning the project's identity

It should be noted that the accessible buses of OASTh, whose exterior has been designed by the Greek well-known fashion designer Yannis Tseklenis, bear also the colours yellow, blue, red, something that is in line with the PROSPELASIS interventions, does not create additional "visual noise" and makes a positive reference to the city's public transport system. Thus, the choice of colours and symbols by the PROSPELASIS team serves the grater scope of the unification of the visual communication code of the transport and mobility system of Thessaloniki.

3. **Facilitation of a Short Stop/Rest, Along the Route:** In order to facilitate short stop/rest along the route, special resting bars were designed around street trees and posts. The resting bars are semi-circular and have two levels, thus facilitating their use by people of varying heights. Their design is based on an idea of the disability expert David Finnegan, which had been first realised in Merseyside, UK.

On the resting bars an artistic intervention was created, with graphic elements on it similar to the ones of the same artist, Constantin Xenakis, on the mini buses of OASTh serving as a Demand Responsive Service for disabled people.

Interventions Aiming at the Improvement of Accessibility for Visitors With Physical Impairments

The following accessibility improvement interventions were carried out at each of the six selected Byzantine Monuments:

Acheiropoietos

The monument had two entrances to its yard, both of them used by the general public. Staircases bridged the height difference between the yard's entrance and the monument's entrance, thus making access to wheelchair users impossible (Naniopoulos et al., 2010b).

At the north side of the monument a non-modulated yard was located, where the 9th Ephorate's archaeologists had archaeological excavations in progress. A lift was installed there, its location ensuring that it causes minimum aesthetic intervention to the monument. The lift is fixed on a base made out of concrete as well as on an existing retaining wall.

However, the installation of the lift alone could not solve the problem of achieving access into the main monument. Thus, it was decided to widen appropriately a gate at the northwest side of the monument. In order to bridge the existing height difference between the outside of the new door and its surroundings,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a metal platform was created. The height difference in the inside of the door was bridged through the creation of a platform with a metal staircase and a small platform lift.

Saint Demetrios (Hagios Dimitrios)

As the entrance to the monument and horizontal circulation in it did not pose significant problems, the interventions concerning physical accessibility focused on the improvement of access to the monument's public toilets, which are placed in the monument's yard. A new toilet was created, its dimensions and equipment ensuring that it can be used by visitors with restricted mobility. The colour contrasting surfaces used facilitate its use by visitors with restricted vision (PROSPELASIS team, 2012).

Saint Nicholas Orphanos (Hagios Nikolaos Orfanos)

Due to the monument's very small scale and particular characteristics, it was decided that the significant interventions required to improve physical access to it would be at odds with its particular character. Thus, only a portable ramp was purchased and is available upon request (PROSPELASIS team, 2012).

Rotunda

Rotunda had significant problems as far as physical accessibility was concerned. The large height difference between the present main entrance of the monument and its interior made access impossible for wheelchair users (Naniopoulos et al., 2010b).

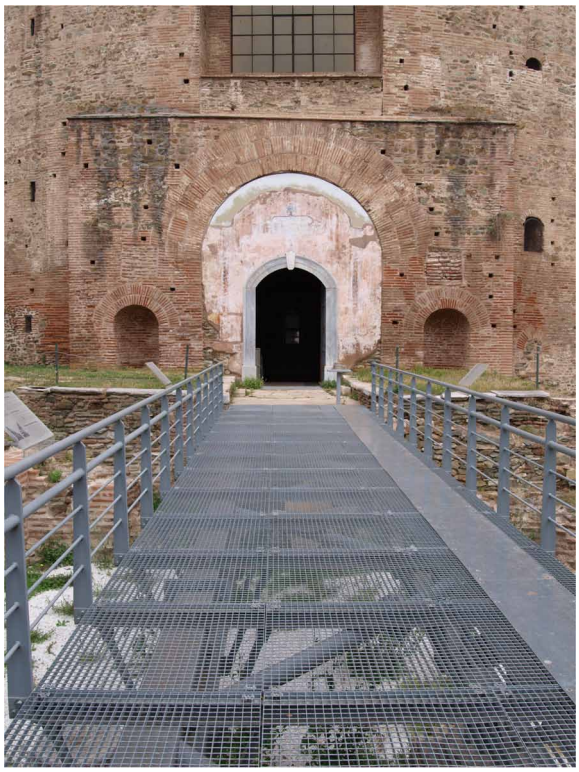
As a solution which would not only improve access to the monument for visitors with restricted mobility but also highlight further its importance, the approach of the monument from the main "Imperial" gate, opened on the south side of the monument and not in use, was selected. In order to enable visitors to reach this gate, a bridge over the excavation of the south outbuildings of the Monument, was created. The bridge has a total length of 15.5 m and is constructed from metal truss section. As seen in Figure 5, the bridge's surface is constructed from perforated metal, while metal plates on the surface act as tactile signs for pedestrians with sight problems. In general, the interventions are designed so as to have the minimum possible visual impact. The artist Cris Giannakos has contributed to the design of the bridge.

In order to bridge the height difference between the entrance and the monument's floor a new staircase as well as a lift were installed inside the monument. The new staircase was created out of metal, and forms a small platform at its top. This construction, together with the "bridge", creates a single tread for wheelchair users. It should be noted also that alternative designs were presented in order to have a final approval of the Central Archaeological Council of the Hellenic Ministry of Culture.

It should be noted that the interventions for the improvement of physical and sensory accessibility that were completed at the "Rotunda" monument of Thessaloniki in the frame of the "PROSPELASIS" project received an honorary award in the UIA (Union Internationale des Architectes) competition "Friendly Spaces Accessible to All".

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. The bridge constructed at the Rotunda monument



Hagia Sofia

There are no particular problems concerning the monument's physical accessibility. Thus, the only intervention deemed necessary for the improvement of physical accessibility was the creation of a small ramp that would bridge a small height difference of 11cm at the monument's entrance threshold.

The monument is also part of the "Cultural route" connecting it with Acheropoietos and Rotunda.

Heptapyrgion Fortress

The monument has two entrances to its yard, only one of them being used by the general public. The staircase in front of the monument's main entrance makes access to it by wheelchair users impossible (Naniopoulos et al., 2010b).

The main entrance leads to a corridor inside the monument, where offices are located and to a second entrance with a staircase in front of it. Thus, even if the visitor negotiates the main entrance, further access to the monument is prohibited for wheelchair users and is difficult for users with restricted mobility. A secondary entrance, which was closed, appeared to be a better solution for a visitor with restricted mobility to access the monument. This led directly to the monument's main area. It should be noted, however, that this entrance had a height difference with its surroundings. In order to bridge the height difference between the entrance and the surroundings' ground the construction of a ramp was deemed

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

necessary. The ramp was constructed from sheet metal grid with a length of 8.00m and 5% slope, to allow the unhindered movement of wheelchair users (PROSPELASIS team, 2012).

It should be noted that the participation of users during the implementation of interventions was achieved through continuous cooperation with local associations of persons with disability and restricted mobility and was deemed essential in order to pinpoint and correct any mistakes before the interventions were opened to the public (Naniopoulos et al., 2011).

ISSUES, CONTROVERSIES, PROBLEMS

The realization of the described interventions revealed procedures which were not known to the research team from the beginning of this project, mainly concerning the approval of the proposed interventions from the Central Archaeological Council of Greece (CAC).

The Central Archaeological Council is the highest advisory body on all matters pertaining to the protection of ancient monuments, archaeological sites and sites of exceptional historical or legendary importance up to 1830.

The Central Archaeological Council:

- Recommends to the Ministry of Culture on principles governing the protection of the cultural heritage and the annual programs of expropriations or direct purchases, excavations, restorations, conservation as well as other works on monuments.
- Gives advisory opinion, among others, on the protection of monuments entered on the World Heritage List, as well as other monuments and archaeological or historical sites of outstanding importance, interventions of major importance to monuments and sites, the designation and establishment of archaeological and historical sites and protection zones in accordance with the provisions of the law.

The CAC is composed of seventeen (17) members, while rapporteurs to the CAC are the respective heads of Directorates of the Ministry's Central Services depending on the issue to be discussed.

The CAC approves or rejects the proposals made or provides suggestions for further elaboration, by majority voting. Following the CAC decision, next the relevant Ministry of Culture and Tourism (MCT) Directorates undertake to elaborate it. The MCT Directorates communicate with the Ephorate and, depending on the case, they inform on:

- The approval of proposal as it is
- The rejection of the proposal
- The approval of the proposal with certain changes

In the third case, a new proposal may be asked to be presented to the CAC or the Directorates will undertake the follow up of their appropriate elaboration.

Due to the importance of the monuments where the interventions took place (UNESCO monuments), all accessibility improving constructions had to be approved by the CAC In the case of the PROSPELASIS team's proposed interventions, the head of the Directorate of Restoration Works presented the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

PROSPELASIS team proposed interventions, together with the opinion and recommendation of the MCT Directorates.

Furthermore, as far as the application of the structural interventions is concerned, the following problems were identified:

- The detailed nature of the checklists for the evaluation of the existing accessibility level allowed its application from non-engineer staff members and the self-evaluation of monuments and archaeological sites. However, it resulted in a large number of data, the recording of which can prove to be time consuming. This also became obvious during the checklists' application in situ, since the research team members who were specialized on accessibility could more easily identify the checklists' more important elements, thus reducing the time required for each evaluation.
- The cooperation with staff members of the evaluated monuments pinpointed accessibility requirements that the research team itself had not identified.
- The solutions proposed at pre-study level were not evaluated nor approved by the aforementioned relative public bodies (CAC and MCT Directorates). Thus, some of the proposed solutions may not have received approval, if the project team had proceeded with their realization at final study level.

Some problems were also encountered in the design and installation of the WiFi information system. These included restrictions in the placement of the system's antennas due to aesthetic or infrastructural reasons which affected the system's effectiveness. Another problem encountered, which was not envisaged by the research team during the system's installation, was the fact that power cuts were common in some of the monuments. Since the system was not designed to restart automatically, an intervention by one of the monuments' employees was required, something that was not always realized on time. Cooperation with the local association of persons with vision impairments pinpointed some problems in the WiFi application's compatibility with screen readers. Finally, copyright issues prohibited the project team from exploiting all the information material available.

SOLUTIONS AND RECOMMENDATIONS

Recognising the difficulties the lack of knowledge of the aforementioned processes can pose to future accessibility improvement interventions carried out at monumental spaces or archaeological sites, the project implementation team created, as part of the project deliverables, a "Handbook of basic principles for the realization of accessibility improvements in monumental spaces". The handbook aspires to provide interested stakeholders a clear "step by step" approach for the implementation of accessibility improvement interventions as well as the experience the project team gained during the interventions' implementation.

In particular, the handbook's contents include the following:

- Description of disabled visitors' needs at monumental environments
- Description of basic restrictions and demands in the realization of interventions
- Identification of the authorities involved in the approval of interventions at monumental sites
- Description of the approach followed at the PROSPELASIS project

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Methodology for assessing the existing accessibility level
- Description of the realized interventions.

The project handbook is available at:

http://www.prospelasis.com/sites/default/files/pdf/handbook_edit_final.pdf

As far as the issues encountered in the application of the methodology itself, on a more practical level, the following solutions were identified:

- The creation of a "short" version of the checklist could prove beneficial, particularly in cases when the responsible auditor does not have previous relevant experience.
- The cooperation with staff members who are familiar with each monument's peculiarities should be made before the suggestion for accessibility improvement interventions even in pre-study level.
- The installation of information systems should take into account particular problems encountered in each monument, including infrastructural issues.

FUTURE RESEARCH DIRECTIONS

Europe is a key cultural tourism destination, with a large number of major monuments and archaeological sites. It is estimated that cultural tourism accounts for around 40% of all European tourism. The great variety of European cultural heritage – both material and immaterial – represents an important competitive advantage. (EC, 2014)

In order to maintain Europe's tourism leadership, a need to modernise and innovate the European tourism offer is recognised. Diversifying tourism products and capitalising on common and rich heritage (natural, cultural, historical, industrial etc.) is the first priority listed in the European Commission's Action Plan for tourism issued in 2010. It is also a stated intention of the Commission to capitalise on those initiatives and look for synergies with similar or complementary initiatives undertaken by other International and European Organisations, such as the UNESCO world heritage sites.

The interventions carried out in the "PROSPELASIS" project combine these characteristics, as the implemented large scale accessibility improvement interventions in major monuments of Thessaloniki which are included in the UNESCO World Heritage list. It should be noted that UNESCO is focusing in particular on the connection between cultural heritage and development through the Mexico City Declaration on Cultural Policies (UNESCO, 1982) and the Report of the World Commission on Culture and Development "Our Creative Diversity" (UNESCO, 1996).

Thus, the methodology and process developed constitute a precedent for further actions in other monuments of similar importance, not only in Greece but at European and international level, since it does not rely on a particular country's legislation, characteristics and authorities' structure.

However, the PROSPELASIS experience also showed that there might still be research potential and an open market for the development and application of an accessibility standard for monumental and archaeological sites. Even though accessibility guidelines have been developed in various countries, with some of them focusing on accessible heritage sites, there is no common accessibility standard applied at European level focusing on the whole mobility chain (infrastructure, perceptibility, information, service

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

provision). The adoption of a common "accessibility label", following the example of the various "eco-labels" developed and applied, could prove a potential critical advantage for the European tourist market.

CONCLUSION

Promotion of accessibility, usability and perceptibility of archaeological sites and monuments for people with disabilities is desirable for social, financial and political reasons.

Improving accessibility of cultural spaces provides people with disabilities with the opportunity to live the unique experience of visiting a monument or archaeological site.

The fact that a large number of archaeological sites and monuments exist in Greece is particularly important, since they are a unique feature and a powerful attraction for tourists. In Thessaloniki in particular, there are numerous monuments that could become friendlier to all visitors and not just to people with disabilities, if their accessibility and perceptibility were improved with the necessary interventions.

Actions concerning the accessibility, usability and perceptibility of a city's monuments and archaeological sites cannot be fragmentary. On the contrary, they must comply with a "systematic approach", according to which all necessary measures and actions are considered in a way that promotes the principles of Inclusive Design, accessibility and perceptibility throughout the entire "chain" related to a person's transport and reception in a site of interest.

The created methodology provides a "step by step" guide for the successful implementation of accessibility improvement interventions in monuments and archaeological sites.

The realization of these interventions, as well as the training seminars realized during the "PROSPELASIS" project, have provided invaluable experience for all involved actors (including authorities of antiquities, tourist guides, organizations of people with disabilities etc.). Moreover, the interventions have initiated a cooperation between involved stakeholders, with common actions concerning access to Thessaloniki's cultural heritage that have already taken place.

The evaluation of the Wi-Fi applications by users with hearing impairments showed that they were quite satisfied with the functionalities provided, particularly with the inclusion of the descriptions in sign language.

Concerning the audio guide of the tactile model for people with visual impairments, it proved to be useful and necessary, particularly if it is accompanied by additional information provided by an experienced tour guide.

The project participants aspire that this experience can lead to further actions that will improve monuments' and archaeological sites' accessibility at national as well as at international level.

REFERENCES

AMBAVis Project: Access to Museums for Blind and Visually Impaired People through 3D-Technology (2015). *The use of tactile models in museums Status quo and best practice.* Retrieved April 26, 2017, from http://www.ambavis.eu/wp-content/uploads/2016/01/150805-AMBAVis-BestPractice_Final-disclaimer.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Americans with Disabilities Act Accessibility Guidelines (ADAAG). (1992). *Checklist for Buildings and Facilities*. Retrieved October 20, 2008, from http://www.access-board.gov/adaag/checklist/a16.html

Brizard, T., Derde, W., & Silberman, N. (2007). *Basic Guidelines for Cultural Heritage Professionals in the Use of Information Technologies. How can ICT support cultural heritage?. The Interactive Institute AB*.

Buhalis, D., Eichhorn, V., Michopoulou, E., & Miller, G. (2006). *Accessibility Market and Stakeholder Analysis.* Retrieved April 21, 2017, from http://www.accessibletourism.org/resources/ossate_market_analysis_public_final.pdf

Council, E. U. (2003). *Council Resolution of 6 May 2003 on accessibility of cultural infrastructure and cultural activities for people with disabilities (2003/C 134/05)*. Official Journal of the European Union.

Department for Transport. (2002). *Inclusive mobility*. London: DfT.

English Heritage. (2004). *Easy access to historic buildings*. Swindon, UK: EH.

English Heritage. (2005). *Easy access to historic landscapes*. Swindon, UK: EH.

European Commission (EC). (2014). Transnational Cultural Tourism Products and Tourism and Accessibility for all – Call for Proposals. EC.

Fertier, A. (2003). EUCREA International: Policy, objectives and programme of action. In *Access to culture and sports for people with disabilities conference proceedings*. Hellenic Ministry of Culture.

Hellenic Ministry of Culture. (2017). *Respecting the rights of the disable people: Access by lift to the top of the Acropolis.* Retrieved April 26, 2017, from http://www.yppo.gr/files/g_423.pdf

Ioannidis, Ch., & Vozikis, K. Th. (2007). *Application of a GIS for the accessibility of archaeological sites by visitors with disability and visitors with reduced mobility*. *XXI International CIPA Symposium*, Athens, Greece.

Kaminski, J., Benson, A. M., & Arnold, D. (2013). *Contemporary Issues in Cultural Heritage Tourism*. Routledge.

Naniopoulos, A., Antonopoulos, C., Karadedos, G., Polychroniou, I., Tsalis, P., Genitsaris, E., . . . Palantzas, G. (2011a). Handbook of basic principles for the realization of accessibility improvements in Monumental spaces. PROSPELASIS project Deliverable. Thessaloniki: AUTh.

Naniopoulos, A., Giannakos, C., Xenakis, C., Papanikolaou, E., Kalliagra, S., Kourbeti, C., Tselegidis, I., & Digbasbani, A., (2010a). *Proposal of functional alternative solutions in pre-study level for selected Monuments/spaces*. PROSPELASIS project Deliverable. Thessaloniki: AUTh.

Naniopoulos, A., Giannakos, C., Xenakis, C., Papanikolaou, E., Kalliagra, S., Sakantamis, K., … Karagiorgos, F. (2011b). *Proposal of functional solutions in final study level for selected Monuments/spaces*. PROSPELASIS project Deliverable. Thessaloniki: AUTh.

Naniopoulos, A., & Marki, E. (2003). Accessibility and Comprehensibility of Monuments and Archaeological Sites for people with Restricted Mobility. A Preliminary Investigation for the Application of a Methodology on Sites of the 9th Ephorate of Byzantine Antiquities. In *Access to culture and sports for people with disabilities conference proceedings*. Hellenic Ministry of Culture.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Naniopoulos, A., & Nalmpantis D. (2004). *An overview of: Problems, suggestions and good practices concerning the situation in Greece.* Maple project deliverable. Thessaloniki: AUTh.

Naniopoulos, A., Papanikolaou, E., Kalliagra, S., Tsalis, P., Palantzas, G., Nalmpantis, D., Genitsaris, E., Kyriakopoulos, N., & Tokmakidis, P. (2010b). *Evaluation and mapping of the existing situation in selected Monuments/spaces.* PROSPELASIS project Deliverable. Thessaloniki: AUTh.

National Disability Authority of Ireland (NDA). (2011). *Code of practice on accessible heritage sites*. Dublin: NDA.

PROSPELASIS Team. (2012). *D7: Interventions realized in selected Monuments*. PROSPELASIS project Deliverable. Thessaloniki: AUTh.

Royal National Institute for the Blind. (1995). *Building sight*. London: JMU.

Stumbo, N. J., Wang, Y., & Pegg, S. (2011). Issues of Access: What Matters to People with Disabilities as They Seek Leisure Experiences. *World Leisure Journal*, *53*(2), 91–103. doi:10.1080/04419057.2011.580549

The Freedom Trail Foundation. (2015). *Explore the trail*. Retrieved August 2, 2016, from http://www.thefreedomtrail.org/freedom-trail/

Tokmakidis, K. (2011). *The process of creating haptic models*. Presentation in the frame of the 4th PROSPELASIS Seminar "Maintenance and Management of accessibility improvement interventions", Thessaloniki, Greece.

Tsalis, P., & Naniopoulos, A. (2008). *Needs of people with disabilities in tourist activities. MEDRA Project deliverable*. Toroslar Municipality.

UN Committee on the Rights of Persons with Disabilities. (2013). *General comment on Article 9: Accessibility.* Retrieved April 24, 2017, from www.ohchr.org/HRBodies/CRPD/GC/DGCArticle9.doc

UNESCO. (1982). *Mexico City declaration on cultural policies.* World Conference on Cultural Policies, Mexico City, Mexico.

UNESCO. (1996). *Our Creative Diversity, report of the World Commission on Culture and Development*. Paris: UNESCO.

United Nations. (1993). *United Nations General Assembly Rules on the Equalization of Opportunities for Persons with Disabilities Resolution 48/96.* Author.

Vlahakis, V., Ioannidis, N., Karigiannis, J., Tsotros, M., Gounaris, M., Stricker, D., ... Almaida, L. (2002). Archeoguide: An augmented reality guide for archaeological sites. *IEEE Computer Graphics and Applications*, *22*(5), 52–59. doi:10.1109/MCG.2002.1028726

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

KEY TERMS AND DEFINITIONS

Accessibility: As used here, includes: usability and possibility of independent physical access and movement; and perceptibility, referring to the way one perceives, understands the environment.

Byzantine Monuments: Also referred to as the Eastern Roman Empire, was the continuation of the Roman Empire in the East during Late Antiquity and the Middle Ages c. 330 – 1453b.

Central Archaeological Council: The highest advisory body in Greece on all matters pertaining to the protection of ancient monuments, archaeological sites and sites of exceptional historical or legendary importance up to 1830.

EEA Grants: Represent the contribution of Iceland, Liechtenstein and Norway to reducing economic and social disparities and to strengthening bilateral relations with 16 EU countries in Central and Southern Europe and the Baltics.

ICT: Information and Communication Technologies.

Tactile Models: In this chapter the term is used to describe 3D models of Byzantine monuments created to assist persons with vision impairments.

UNESCO World Heritage List: List of sites of outstanding universal value that meet at least one out of ten selection criteria, as described in The Operational Guidelines for the Implementation of the World Heritage Convention.

This research was previously published in the Handbook of Research on Technological Developments for Cultural Heritage and eTourism Applications; pages 191-214, copyright year 2018 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 74
Knowledge Transfer Openness Matrix Facilitating Accessibility in UK Management Education Teaching

Jonathan D. Owens
University of Salford, UK

Usman Talat
University of Salford, UK

ABSTRACT

This is an empirical investigation considering how the Knowledge Transfer Openness Matrix (KTOM) could facilitate accessibility and Knowledge Transfer (KT) for the UK Higher Education (HE) Management Education Teaching when utilising learning technologies. Its focus is where learning technologies applications currently assist the KT process and support accessibility for the HE teacher and learner. It considers the philosophy of openness, focusing on its usefulness to support accessibility within UK HE Management Education Teaching. It discusses how the openness philosophy may assist the KT process for the HE teacher and learners using learning technologies. In particular, the potential to support accessibility within HE Management Education Teaching environments is appraised. There appear several implications for both teachers and learners. These are characterized in the proposed KTOM. The matrix organises KT events based on the principles of the openness philosophy. The role of learning technologies in events is illustrated with regard to teaching and learning accessibility.

INTRODUCTION

If we try and forget the last eight hundred years or so of university tradition of transferring knowledge between teacher and learner, and imagine starting anew with the problem of how best to enable a large percentage of the population to understand and access discussions on difficult and complex ideas. Do

DOI: 10.4018/978-1-7998-7297-9.ch074

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

you think putting two or three hundred people into a large room for a couple of hours would immediately spring to mind as the obvious solution? (adapted from Laurillard, 2005)

Technological advances over the past century have greatly enhanced our reach beyond our immediate human senses. We are on a technological curve the progression of which signals the increasing availability of systems that store and aid manipulation of data for human learning and Knowledge Transfer (KT) in organisations. With the emergence of the internet the landscape of Higher Education (HE) has changed. Teachers and Learners in UK HE benefit from aided KT because it enhances their ability to experiment with ideas and share them in productive ways (Goh, 2002). Accessibility to HE has been greatly facilitated through the advance of the internet, learning technologies and e-learning environments (Xiong and Winckler, 2008). Accessibility of university websites, virtual learning environment (VLE's) etc. has a critical role in the activities of currently enrolled and prospective HE students (Cook-Sather, 2014).

In HE learning environments, the interactions between users and technology can represent critical points of breakdown and potentially end achievement. However, sometimes these interactions can provide poor accessibility because of human error and limited availability of information (Nonanka and Takeuchi, 1995; Goh, 2002; Paiva *et al*, 2016). Breakdown at this point can mean that both learners and teachers stand unable to benefit and can suffer low levels of KT (Bates, 2001; Jerrard *et al*, 2013).

In this chapter we discuss the KT and the Openness philosophy, which has the potential to facilitate a current generation of teachers and learners in UK HE by sharing the utility and accessibility of knowledge through a Knowledge Transfer Openness Matrix (KTOM). In the HE sector this approach can represent Higher Education Institutions (HEI's) as environments that mediate generatively the transfer of knowledge and accessibility. This involves systems that are open and can enable accessibility of effective KT for both teacher and learner. A particular focus is developed around the issue of accessibility of knowledge in HE. Therefore, this research considers how the development of a KTOM could potentially assist the reduction of KT barriers to accessibility within the organisation.

Understanding Knowledge Transfer

Over the years various researchers (Stewart, 1977; Ratcliffe, 1997; Jackson; 2002; Mougin *et al*, 2015) have the common view that Knowledge Management is often used to describe the management of knowledge within an organisation and this includes KT within the organisation.

Bates (2001) and latterly Mougin *et al* (2015) claim that the value of KT relates directly to the effectiveness with which the transferred knowledge enables educators within the establishment to deal with the current situations and effectively envision and create their future. People; in the case of this research, the teacher and learner; and the connection between these are considered the most critical factor in KT (Denning, 2011). People create knowledge, share knowledge, learn, and use knowledge to complete tasks (Ratcliffe, 1997). Accessibility to knowledge through a structured KT process can increases the ability of individuals to deal with new situations, events, information, and context (Kunmari and Ilomkai, 2016). Research suggests (Nonanka and Takeuchi, 1995;Goh, 2002; Hanna, 2016) there are potentially many barriers to effective KT that could emerge because the process relies heavily on human interactions and relationships that are not designed into the organisation's culture.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Understanding E-Learning

In simple terms, E-Learning is the use of telecommunication technology to deliver information for education and training (Lin, 2001). Perhaps predominantly due to continuing progress of information and communication technology development, e-Learning is rapidly emerging as the paradigm of modern higher education. The key advantages of e-Learning can include the advantageous interactions between learners and instructors, or learners and learners, free from limitations of time and space through the asynchronous and synchronous learning network model (Paiva *et al*, 2016; Turban et al, 2000). More so that ever E-learning's characteristics can fulfil the requirements for learning in a modern society and have created great demand for e-Learning from both businesses and institutes of higher education (Hasanzadeh *et al*, 2012).

Understanding the Openness Philosophy

The openness philosophy is an attempt to orient research efforts towards the principle that effective knowledge transfer between learning systems is crucial, particularly in the context of fast and lasting penetration of e-learning technology. However, there remains lack of clarity about openness in education (Peter and Deimann, 2013). There is increasing awareness that openness is essential and best practice in education, which should fertile terrain for sharing knowledge as a common good (D'Antoni and Savage, 2009: 138). Three areas of openness have been proposed as social characteristics, technical and the nature of the resources (Hylen, 2006). In the education sector open education has been aided with the development and widespread use of digital technologies (Weller, 2011: 21). Through the openness principle it is argued that greater sharing of knowledge in the scientific community can enhance and refresh perspectives in individual disciplinary spheres. We propose the KTOM taxonomy as an evaluation of the types of systems found in higher education. This is predicated on an exploration of scenarios that signal indeterminacy, transparency and accessibility in e-learning environments.

E-Learning as a Knowledge Transfer Enabler

E-Learning can be perceived as a key enabler to KT within HE sector (Owens & Floyd, 2007; Deejring & Chaijaroen, 2012).The successful introduction and implementation of e-Learning into existing and new units, modules, programmes etc. at an HEI can be heavily influenced by its ability and accessibility effectiveness, in delivering knowledge based products and managing any number of strategic issues that may need to be addressed as part of the successful development of KT though e-Learning products (Conaway *et* al, 2005; Hanna, 2016; Owens and Price 2010).

Laurillard (2008) suggests the strategic issues of significance when considering e-Learning as a tool for KT through traditional and independent study within the HE sector are:

- Identifying the customer service imperative for each stakeholder or institute involved in an e-Learning initiative;
- Appreciating the advantages and disadvantages of incremental KT through e-Learning in HE;
- Understanding the value of national, integrated approaches to e-Learning and KT in HE;
- Understanding the need to develop user support systems, to underpin e-Learning and KT developments;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Working within technological and financial limitations associated with HEI's;
- Successful internationalisation of HE.

Accessibility to Teaching and Learning in HE

Research (Gladstone, 2000; Reeder *et al, 2004;* Weller, 2004; Kandiko & Mawer, 2012) suggests that academics (teachers) and learners have accepted the idea that e-learning environments (i.e. Virtual Learning Environments, Blackboard, Discussion Boards) can be effectively used for accessibility to teaching and learning. Research suggests a common theme in that both traditional and non-traditional students increasingly expect this presence and use HE (Roberts, 2004; Hannon & D'Netto, 2007; Paiva *et* al, 2016). In some HE teaching and learning environments the high penetration of these teaching and learning tools has become the norm, or at least one of the indicators of accessibility to a HEI (Lanham & Zhou, 2003; Dobozy, 2012). Alexander (2002) and Kandiko and Mawer (2012) claim new students expect the institutions to offer up-to-date web based teaching and learning tools. Further studies (Goodfellow, 2004; Goodfellow & Lea, 2007) suggest that some HEI's are using the tools as a competitive advantage for accessibility in order to attract more students in an increasingly competitive HE market. More and more, students expect lecturers (teachers) to use these tools to support their provision and accessibility to teaching and learning (Goodyear & Jones, 2003; Owens and Price, 2010). This is perhaps nothing new though, as mature and distance learning students in UK HEI's, who are often in full-time employment and from a working environment, adopt e-learning environments predominantly due to accessibility necessity for their teaching and learning agendas (Lanham & Zhou, 2003).

Understanding Learning Technologies

Learning technologies can effectively assist teaching when it is seen as one of a set of activities aimed at supporting students' learning (Akgun *et al*, 2003; Kunnari, 2016). This approach corresponds to the level three of Biggs' student-centred theory about teaching (Biggs &Tang, 2011). They discuss how student learning depends on the following:

- The learner's ability and capability;
- The learner's prior knowledge of the subject/field which they are about to be taught;
- The learner's accessibility to new knowledge on the academic subject/field, including:
    - The teacher's responsibility;
    - The learner's decision-making ability and capability;
    - Good KT process management skills of predominately the learner, but consideration should be given to the teachers KT ability and capability in this area also.

Therefore, good teacher and learner interaction, including the use of learning technologies, involves an awareness of contextual dependency of learning and teaching (Borstorff & Lowe, 2007; Falconer, 2006; Goodfellow, 2005; Gosper *et al*, 2008).

The evaluation of learning technologies includes examining the intentions, implementation process and the outcomes of technology use (Hannon & D'Netto, 2007). Sims and Jones (2002) the purpose of evaluating learning technologies is to provide the designer (teacher) or user (learner) with enough evidence on which to make confident judgements regarding the effectiveness of the innovation. They

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

also claim that the match between the intentions and outcomes determines the success; therefore it is important that the intentions add value to student learning.

Existing research suggests (Jackson, 1998; Gladstone, 2000; Falconer, 2006, Goodfellow, 2007; Gosper *et al*, 2008) learning technologies can be evaluated against intended outcomes such as ease of use, accessibility, efficiency, student preferences, technology attractiveness, and cost effectiveness. Subsequently, there is a reasonable assumption that accessibility to an effective KT process within the HE learning environment is relatively important requirement for both parties, thereby supporting the need to investigate KTOM as vehicle to support this feasibility.

Using Learning Technologies for Teaching and Learning

Both Borstorff and Lowe (2006) and Kandiko and Mawer (2012) suggest the introduction of e-learning environments represents an additional burden on lecturers' timetables, as it requires co-ordination and integration of the activities in the teaching programme. In order to be effective, these learning technologies should reflect the current constructivist-learning model that over the last few decades evolved from behaviourist and objectivist models (Fry *et al,* 1999; Borstorff and Lowe, 2007; Deejring and Chaijaroen, 2012). Above all, e-learning should foster interaction and dialogue between the learner(s) and the teacher (Goodfellow, 2005). Research (Institute of Teaching and Learning Seminar, 2003; Roberts, 2004; Goodfellow and Lea, 2007) suggests that learning though this environment can be enhanced in all sorts of ways, including hearing, seeing, as well as participating in activities such as a game, quiz, and podcasting.

Hannon and D'Netto (2007) argue that the potential of learning technologies to improve learning depends on the context of learning and assessment. The context is defined by the combination of its elements that include the students, lecturers, institution, teaching material, style and method. Research by Ashraf (2009), Goodfellow (2007) and Gosper *et al* (2008) claim the majority of studies in this area fail to provide solid evidence of increased effectiveness of the e-learning for teaching and learning. As discussed earlier (Student Expectations Study, 2007), when considering technology, there should perhaps be a manner of caution in adoption and utilisation. This is because HEI's cannot assume that presenting new technologies automatically makes their institutions "*youth friendly*", this new generation would like to see some concrete benefits of technology. Additionally, Gosper *et al* (2008) report that adaption of these technologies for teaching and learning contributes to a "*blurring*" of the boundaries between traditional (full-time) and non-traditional (part time, distance learning) students. This is primarily because its introduction is more than solely a teaching issue as it can affect the design of the unit and programme, as well as having professional and organisational development implications.

The literature has predominantly indicated that students are enthusiastic (Jackson, 1998; Roberts, 2004; Gamlanglert & Chaijaroen, 2011) about the e-learning environment, and they take the medium more seriously when their work is assessed (Fry *et al*, 1999; Borstorff & Lowe, 2004). However, both Hannon and D'Netto (2007) and Goodfellow (2007) state an e-learning environment fails to enable the achievement of significantly different learning outcomes. They also suggest that organisational, operational and logistical problems combined with technical difficulties mean that the learning technology cannot always be used to its full potential. Further research (Falconer, 2006; Owens & Price, 2010; Turban *et al*, 2000) suggests that in order for this to perform more effectively, learning technologies need to be fully embedded in a programme/unit/ module etc., and importantly both the teacher and learner should be provided with the adequate skills and support.

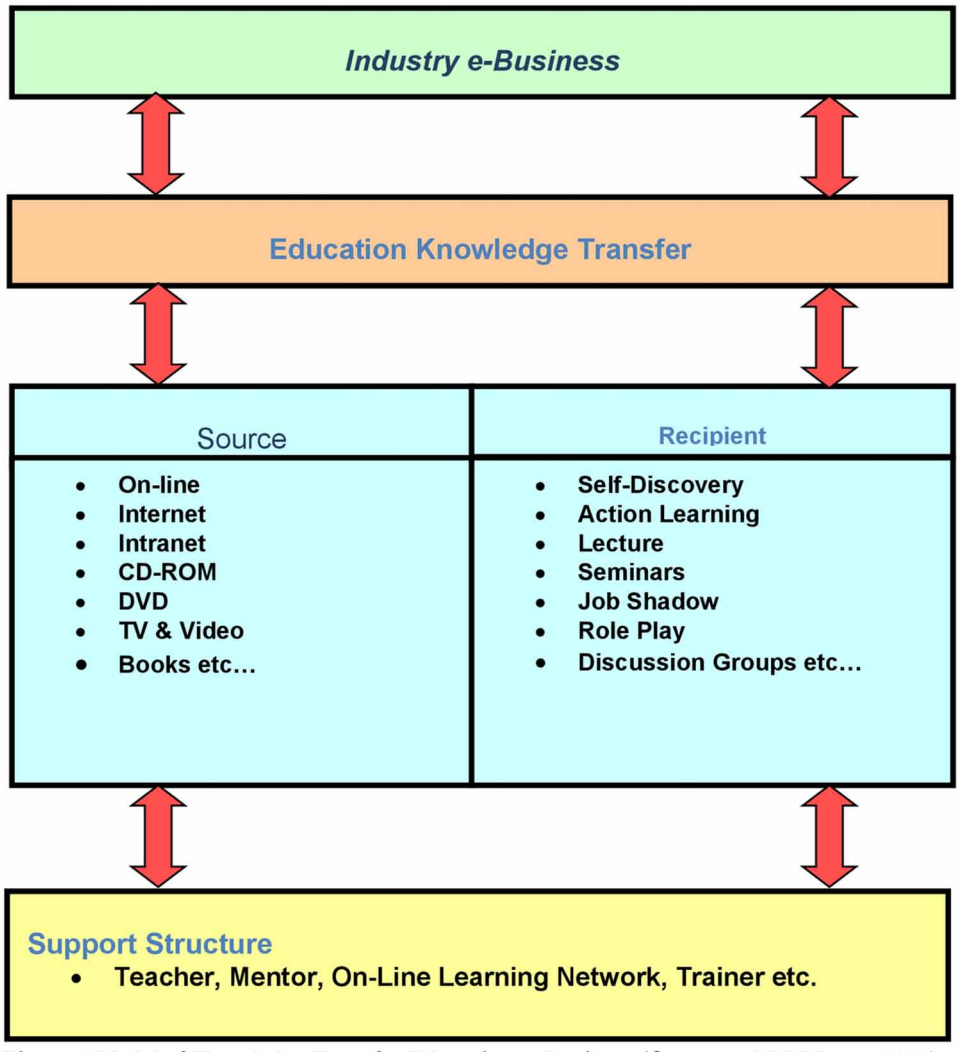
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Knowledge Transfer Using Learning Technologies in an E-Learning Environment

Research suggests (Hannon and D'Netto, 2007; Hanna, 2016; Owens, 2002, 2006; Macfayden, 2005) and is relatively consistent in that E-Learning is perceived as a key enabler for effective and efficient KT within the HE sector. E-learning can be used to facilitate KT in a number of ways, as set out in Figure 1. The successful introduction and implementation of e-Learning into existing and new units/ programmes/modules etc. at HEI's is heavily influenced by the institution's ability to deliver knowledge based products and services.

In addition, as discussed earlier in this chapter by Laurillard (2008), it is perhaps useful to consider the strategic issues of significance of e-Learning as a tool for KT through traditional and independent study. This is particularly pertinent, if the HEI needs to be effective at managing any number of strategic

Figure 1. Model of knowledge transfer education to business (Owens & McManus, 2004)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

issues that may arise as part of the development of KT though the utilisation and operationalisation of learning technologies within an e-Learning environment. As such, designing and developing KT processes within e-learning environments and with the utilising learning technologies can be both costly in time and money (Owens & McManus, 2004). Consequently, before making the investment, HEI's may prefer to establish if it is worthwhile (Goodfellow, 2005). It may therefore be beneficial to have a strategy in place for sustaining and embedding the institutes proposed KT and e-Learning developments.

Owens and McManus (2004) suggest there are two schools of thought when considering the integration of KT and e-Learning to support HE accessibility:

1. The exploration of learning technologies currently known and understood to produce sound learning and teaching KT through the model (see Figure 2). Where the current technologies available in the HEI do not allow this, then both internal and external developers should be encouraged to assess if new technologies are necessary, in order to provide a feasible solution for the teacher(s) and learner(s) involved in the KT process;
2. To examine the current learning technologies within the HEI and explore the possibilities for innovation that can lead to the development of new pedagogies and enhance the KT process in the model. This school of thought considers that the potential of the technology that currently exists has not yet been fully investigated and realised by the HEI. Thus, it focuses on the premise of embedding new teaching and where applicable learning practices utilising the existing learning technologies, before moving onto new learning technologies to assist the KT process.

Internet Utilisation in the UK

The 2009 Oxford Internet survey reports that the top four reasons people in the UK accessed the Internet to go on-line were:

1. Check emails;
2. Product information search;
3. Browse to Buy on-line;
4. Fact finding, through search engines such as Google, Wikipedia etc.

Therefore, with the rapid advance of on-line learning technologies (Kunnari and Ilomaki, 2016) it is perhaps interesting that there is no clear correlation to on-line learning at 19th place at just over twenty percent. Unfortunately; from an e-learning perspective; even use of the internet to download to watch videos and listen to the radio achieved an almost ten percent better score than distance learning. Another disappointing finding for learning purposes is that twenty percent read less due to the advent of the Internet. This suggests that perhaps internet is not a perfect substitute for knowledge, and that lecturers need to encourage both means to foster both more creativity and utilisation. Subsequently, as the Openness philosophy is a novel concept that has been underexplored in UK HE, later this chapter will start to consider if the development of a KTOM could help foster this creativity and utilisation.

A summary of the twenty main reasons people access the internet is illustrated in Table 1.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Top twenty reasons why we go online in the UK

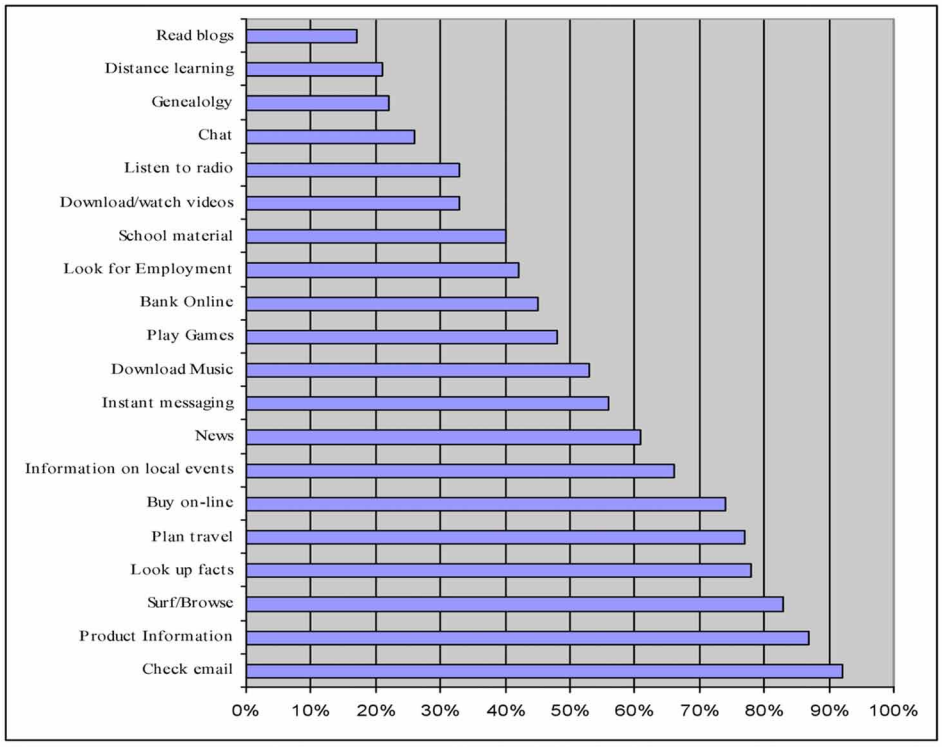


Table 1.Top twenty reasons why we go online in the UK. (Oxford Internet Survey, 2009)

(Oxford Internet Survey, 2009)

Teaching and Learning Through Internet Based Technology

Various authors (Kalkota and Whinston, 1996; Turban et al, 2000; Owens and Price, 2010) have identified that the Internet offers unique opportunities in both teaching and learning applications. A common theme that appears to have changed little (Ackoff, 1989; Dearing, 1997; Conaway *et al*, 2005; Hasanzadeh *et al*, 2012) is that students are very keen on using the Internet for entertainment, peer communication, and for secondary sources of data. Researchers (Lissenburgh, 1999; Dobozy, 2012) claim that, in some cases, students assume the information does not exist if it is not available on the Internet.

Although students are familiar with Internet technology, some researchers (Gladstone, 2000; Hannon and D'Netto, 2007) argue that students often lack the specific skills that would enable them to use it more effectively. It could be that students are not clear about the benefits from the outset (Ashraf, 2009). A Student Expectations and Perceptions survey carried out in 2012 reported that, whilst many current and prospective students are comfortable with the learning technologies both used and available, this new generation of students like to see the concrete benefits of technology usage and implementation; for example that work is recognised and contributes to final grade assessment (Kandiko & Mawer, 2012).

In summary, it becomes apparent that as internet usage continues to gain momentum with increased dependency amongst both teacher and learner. This perhaps supports the increasing need for accessibil-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ity to internet technology to facilitate KT in e-Learning Environments with the UK Higher Education Management Education Teaching.

Preliminary Investigation of Teaching and Learning Through Internet Based Technology at Two UK HEI Business Schools

Introductory research investigating teaching and learning through Internet Based Technology was undertaken at two UK HEI's Business Schools. A number of units that included IT-based learning were identified at both HEI's.

Three teaching modules that offered similar content and level were reviewed and each had a dedicated web site aimed at supporting students' learning. The site gives the lecturer some degree of flexibility in terms of inclusion of teaching material, and setting up the discussions despite being fairly standardised. The cohort for this study included both undergraduate and postgraduate students studying fulltime at both HEI's.

The data collection approach included an unstructured discussion (interview) with the lecturer for each cohort and a questionnaire for the students. The discussion with the lecturer aimed to identify the main issues related to use of the web site that emerged during the semester. The breakdown of respondents for each module and HEI is illustrated in Table 2.

Table 2. Respondents breakdown from both HEIs

UK HEI Business School One			UK HEI Business School Two		
Module	**Level**	**Number of Respondents**	**Module**	**Level**	**Number of Respondents**
Operations Management	7	17	Operations Management	7	12
Strategic Management	6	14	Strategic Management	6	17
Management of Operations	5	19	Management of Operations	5	13
	Total	**50**		**Total**	**42**
Combined Total	**92**				

Table 2 Respondents breakdown from both HEI's.

Interview Findings

It emerged that the teaching team for each module provided a web site that aimed to offer additional support for the students. Although standardised to suit institutional requirements, the web site offers a certain degree of flexibility. The lecturer was able to publish the lecture notes, the syllabus, the module outline, the assessment brief and any other text material. The related web links could be edited at the discretion of the lecturer who has the control over the content of the web site. Additionally, the lecturer

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

could set up a discussion area by proposing a topic and encouraging student participation. Typically, the lecturer posted a question related to the lecture on a weekly basis. The students could respond or comment on the topic and get the lecturer's feedback. The students could see the contributions of their fellow students but could not address the comment to one particular student. Similar to research by Chou (2003), the communication channel corresponded to the interactive of one-to-many model. Each participant was identified through a username and a password.

The discussion with the lecturer allowed for identification of main themes and items that were then included in the questionnaire. For example, ascertaining how often the student accessed the discussion area, if they found it helpful, and if they contributed. The feedback helped to build a picture of the level of interaction between the student and the lecturer using internet-based learning. Once the questionnaire had been drafted, it was reviewed by the lecturer, and the final version administered to students towards the end of the semester. This is similar to Goodfellow and Lea's (2007) thoughts on encouraging links between the two parties involved in the learning process.

Level 7 Operations Management Module Questionnaire Findings at Both HEI's

These students scored the lowest usage rate of the three groups involved in this research. Only twenty one percent and nineteen percent of respondents respectively logged on to the web site at least once a week. Approximately two thirds of the students at the two institutes visit the web site once per month or less, or not more than five times in a semester.

When the students log on they mostly look at the lecturer's questions but only one in four contributes to the discussion. Across both institutes approximately two thirds look at the contributions of other students and use the web links. Less than half use the web based lecture notes and less than a third use other material related to the assessment. This finding is not surprising as it supports the common view (Fry et al, 1999; Borstorff and Lowe, 2007), that the student will only take this medium of study more seriously if it is assessed. Hannon and D'Netto (2007) comment that the real potential of learning technologies to improve the student's learning experience depends upon the context of learning and assessment.

At both HEI's, the majority of students feel the web site helps their learning, makes it easier to keep up to date with the lectures, offers the opportunity to discuss questions with the lecturer, and ask for clarifications. The use of the website therefore promotes efficiency, effectiveness, ease of use and attractiveness as a mode of learning (Gladstone, 2000; Falconer, 2006; Kunnari & Ilomaki, 2016).

However, a large majority of students at both HEI's do not think the web site gives the lecturer a tool to monitor their learning, nor themselves the opportunity to show how much they study. This is supported by Goodfellow (2005), Ashraf (2009) and Randy Garrison (2011), who identified this to be a particular constraint as HEI's appear to predominantly use this as an attendance and retention tool. They suggest more development needs to be undertaken with this mode of learning in order to achieve its full potential for both lecturers and students. The implications for students who are technically competent are that the use of web-based interaction may deliver 'concrete' benefits which involve measuring their level of understanding and improvement.

Level 6 Strategic Management Module Questionnaire Findings at Both HEI's

Almost two thirds of the students at each institute visit the web site at least every other week. They predominantly use the lecture notes, look at the lecturer's questions, and at the contributions from other

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

students. However, only seventeen percent and fourteen percent respectively have ever contributed to the discussion on the web site.

Similar to earlier findings with the L7 findings, the students at both HEI's felt that the web site helps their learning; makes it easier to keep up to date with the lectures, offers the opportunity to discuss questions with the lecturer, and to ask for clarifications. Approximately one in four and one in three respectively agree that it should be part of the portfolio of activities. However, an interesting finding was that the majority of students studying this module at both HEI's agreed that web-based work should not be formally assessed for this module at this level of study. This did not follow earlier trends in this research, nor the literature (Hannon and D'Netto, 2007), where students would prefer to see it as part of their assessment. A possible explanation for this could be that, as this group comprised level six students, they were more aware of the significance of grade at this stage of their degree programme. They perhaps preferred the familiarity and 'concrete benefits' (Student Expectations Study, 2007) of the traditional assessment methods.

Level 5 Operations Management Module Questionnaire Findings at Both HEI's

It was both an interesting and common finding at both HEI's that almost half (forty nine percent and forty seven percent) of the students used the web site on a weekly basis. This was perhaps an expected finding at level six undergraduate, rather than level five undergraduate because of the maturity of the student towards learning and, the weighting of the degree programme at level six in UK higher education.

Similar to the previous two cohorts, these students mostly use the lecture notes; they look at the lecturer's questions and use the web links. Across both HEI's, approximately half the respondents think the web site helps their learning and that it makes it easier to keep up to date with the lectures. This is a finding supported by Goodyear and Jones (2003) and latterly Dobozy (2012), who identify that there is a clear expectation by students to use IT for teaching and learning. One in three and one in four respectively were of the opinion that it offered them the opportunity to have discussions with the lecturer, ask questions, to show how much they study, and that it should be part of the portfolio. However, only one in four at both HEI's thought it should be assessed.

The students at both HEI's were of the opinion they would use the web site more often if it counted towards the final mark, if there was additional learning material and if there was more material related to the assessment. Another common finding was that the lecturer should promote the web site more convincingly during the lectures and seminars. It should also be easier to use and it should be part of the portfolio of activities.

Key Finding From Preliminary Investigation of Teaching and Learning Through Internet Based Technology at Two UK HEI Business Schools

The key findings summarised in Table 3. The ticks indicate where more than half the cohort had used the particular function of the website, or had expressed a preference for how the website had been used.

The majority of respondents across both institutes would like to see more teaching material and more material related to their assessment presented on the module web site. A common theme similar to Hannon and D'Netto's (2007) findings is that they would use the web site more often if it counted towards their final mark. Assessment could consist of a small component of the unit's total marks. For example, there were positive aspects for including the web-based work in the portfolio of activities,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Summary of responses for each cohort

	UK HEI Business School One			UK HEI Business School Two		
Use of Module Web Site:	**CMS**	**BA3**	**BA2**	**CMS**	**BA3**	**BA 2**
To log on/visit regularly	X	✓	✓	X	✓	✓
To look at the lecturer's questions	✓	✓	✓	✓	✓	✓
To contribute to the discussion	X	X	✓	X	X	✓
To look at lecture notes	X	✓	✓	X	✓	✓
To look at web links	✓	✓	✓	✓	✓	✓
To interact with the lecturer	✓	X	✓	✓	X	✓
To interact with other students	✓	X	✓	✓	X	✓
To look at material related to assessment	✓	✓	✓	✓	✓	✓
How effective is the Web Site for						
Monitoring learning?	X	✓	✓	X	✓	✓
Demonstrating how much students study?	X			X		
Should the Web-based activities:						
Form part of a portfolio of work?	✓	X	✓	✓	X	✓
Form part of formal assessment?	X	X	X	X	X	X

Table 3 Summary of Responses for each Cohort.

and a small minority of students supported making it count toward their final mark. However, students said they would be more likely to undertake work that they would be rewarded for, which suggests that some kind of assessment of web-based activity could promote use of e-learning. Research (Kandiko and Mawer, 2012; Laurillard 2005; Owens and Floyd, 2007) all suggest that this is a common finding in that the students will not do anything unless they clearly benefit through a contribution to their grade.

The Openness Philosophy and its Application to UK HE Management Education

In HE management education environments across the UK, the concept of openness remains somewhat indistinct and not clearly defined (Baker, 2012). At present, there is limited application of this concept in the field. Overall, openness in science means that data should be shared with the wider scientific community (McComas, 2014). In the context of this ethos, accessibility to platforms and technologies becomes a prime focus for HE distributors. In this regard, we suggest that the openness of a pedagogical system can be understood by recognizing its degree of indeterminacy, transparency and accessibility.

Indeterminacy in UK HE Management Education Environments

Indeterminacy suggests that a system does not have sufficiently rigid boundaries and discrete variables such that its development is wholly determined in advance (Stein, 1991). This characterizes most systems that are used by humans, which are open systems consisting variables not wholly determined in advance. For example, if a student uses the software Microsoft Excel then he or she engages with a system that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

provides tools through an integrated environment. The behaviour of this system is partly determined through its states, features and rules, and in part through the user's behaviour. The system is open in the sense that its behaviour depends to some extent on the unpredictable behaviour of the user, but also serves idiosyncratic learning needs (Cziko, 1989). In such systems that are characterised by human use of information communication technology, a boundary of the tool in question might be sufficiently rigid, however human behaviour remains relatively less rigid and less predictable, whilst at the same time necessary for adaptation. Such learning systems build through trial and error loops that provide feedback based learning for human users with varying demands for knowledge exchange over e-learning platforms. Such a system cannot become accessible in its authentic form. Thus, indeterminacy means that MS Excel is not accessible in its rule governed forms alone, but rather, it is accessible as *n* number of iterations in relation to user subjectivity, interactions, errors, and learning outputs.

Openness in this sense offers a principle for guiding numerous tasks for learning and developing solutions. To the extent that indeterminacy is a condition for e-learning, improvements in accessibility through higher education systems might aim to manage the inherent indeterminacy of pedagogical processes and outcomes.

Transparency in UK HE Management Education Environments

Transparency of a system is the degree to which its components are visible in their workings. Increased transparency can help align perspectives of users (Benkler, 2006). A transparent system, might increase visibility of indeterminacy in systems, and provide users with options to manipulate components for pedagogical ends. In this instance, research (Peters and Roberts, 2012: 45) suggests the degree of transparency of a learning system such as MS excel is based on two points:

1. Its functions;
2. What the user brings to the social environment in terms of experience, knowledge, expertise, interest, task, goals, and time.

They discuss that openness of technology must be coupled with open-mindedness of users and collaborators. Philip (1987) notes that measuring human learner behaviour accurately is extremely difficult due to the indeterminate nature of education systems, which are inherently complex and open to varying change. To this proposition, transparency adds the likelihood of effective access to content, based largely on the increased ease of managing system components. However, transparency is a condition that is specific to the e-learner engaged in gaining access. A system that is open and visible in its workings remains as such by virtue of learner knowledge and expectations in relation to attributed system features/functions. However, it remains the case that openness as a practice through conduits like Massive open online courses (MOOCS) can be effectively seen as transparency of activity (Cormier and Siemens, 2010: 32).

Accessibility in UK HE Management Education Environments

In contemporary organisations the accessibility of a system is the ease with which users can obtain intended and satisfying outcomes with regard to learning. Enhancement in accessibility signals a relatively open system. In general, accessibility is enhanced with virtual environments that provide storage, processing, representation and transmission of data facilities. This has leveraged the accessibility of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ideas over computerised platforms, which can often talk to each other, without compromising content quality (Altbach *et al*, 2009). However, in relation to how humans learn with tools that enable access, openness is not a new idea. In the early part of the 20th century the philosopher Martin Heidegger proposed openness as a non-intentional or pre-intentional state of being in the world (Fuenmayor, 1991). The term non-intentional is the antithesis of the term intentionality; the latter is a central feature of human consciousness whereby we walk about in the world always holding beliefs, emotions, imaginations, and feelings that are directed towards things we play with and learn from. Intentionality structures provide access through experience, and represent the analytical experience of idiosyncratically reaching out and carving meanings in experiences, using tools systematically. In Heidegger's sense, openness is about taking a step back from intentionality. For example, openness of a learner in an HE environment is the deliberate letting go of pre-conceptions and starting with a tabula rasa type psychology. Through conversations teachers and learners attempt to improve access by co-constructing what is learnt. They might attempt to linguistically represent each other's narratives (Dahlberg *et al*, 2003) or store, process, and share content, which can be manipulated and become accessible through transparency and interconnectivity of technical frameworks. In this sense, openness applies more easily to electronic technology then to human users, whilst both co-operate to produce educational output in HE systems. When applied to technology openness primarily means ease of use because syntax, rules, goals and processing in technological systems is often easier to delete or modify (i.e. accessibility). Conversely, the application of openness in terms of accessibility of the cognate user-as-learner's behaviour appears riddled with indeterminacy (Cziko, 1989). Conclusively, the application of openness might address accessibility of systems whereby technology, users, and their cooperation can improve or decline in that system. We contend that accessibility sits in tandem and in co-operation with transparency and the in determinacy inherent in human learning spaces that characterize e-learning systems. In such learning spaces, the behaviour of technology and the user represents an integrated process - a continuous system - which can be evaluated for openness through its indeterminacy, transparency, and accessibility.

Openness in UK HE Management Education Environments

In regard to the above picture of openness, in an HE context, we propose that in so far as indeterminacy, transparency and accessibility are applied, this represents behaviour of systems between concentric levels at which they operate and cooperate in learning spaces. In HE learning environments a system can be (Baker, 2012) discernible at the component and sub-component levels. From a higher abstract viewpoint, a system is also discernible at the actor, group, organizational, and the society wide level. These concentrically coupled levels where systems behave can themselves display openness at the intra-level, that is, systems constituting a level (e.g. at the group level classroom learning or blackboard blogs) and at the inter-level, that is, across systems behaving within and between levels (e.g. individual access to content also shared with other learners over social mediums for communication). Applied to the UK HE in management education environment this provides a diagnostic matrix to illustrate the degree of openness of a system, expounded below.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THE KNOWLEDGE TRANSFER OPENNESS MATRIX (KTOM)

The Knowledge Transfer Openness Matrix (KTOM) illustrated in Figure 2 provides six openness scenarios for teachers and learners in UK HE management education environments. Each one of these can be characterised in different scenarios (i.e. perspectives) when facing the same system. Each scenario's evaluation is based on degrees of indeterminacy, transparency, and accessibility – indicating openness of the system.

Figure 2. The knowledge transfer openness matrix

Openness Scenarios for Teachers and Learners in UK HE management education environments	Indeterminacy	Transparency	Accessibility
Scenario 1: Chaos	●		
Scenario 2: Interpretable Chaos	●	●	
Scenario 3: Platonic Openness	●	●	●
Scenario 4: Randomness	●		●
Scenario 5: Closed Environment		●	●
Scenario 6: Rote system			●

Scenario 1: Chaos

The first scenario occurs in learning interactions whereby indeterminacy is increasingly present as the system components (user, technology and content) develops and thus indicates learning that is not predictable, but somehow functional (i.e. it meets minimum user needs to retain its use). Such a system is chaotic in the sense that it is not predictable and only reflects a probable developmental trajectory. This involves the use of most human learning tools. For example, the behaviour of the whole World Wide Web is indeterminate for a human user (Carr, 2012:205). Over the period of its use, such a system increases in complexity with two parallels. First, as more components and relationships are added, the indeterminacy of the system emerges over a time period conceivable as probability distributions. This involves system interactions that add layers of complexity conditioned by the subjective choices of users (Cziko, 1989). Second, the learning system behaves to increase or decrease in indeterminacy. This can impact accessibility of knowledge in so far as the knowledge is searchable throughout learner-teacher-technology structures of the system, in intended ways. Such structures and channels involve mapping of subjective data on other relatively homogenous mediums of communication. We find indeterminacy in complex knowledge acquisition in so far as learner-teacher relations fuse human tacit knowledge with more objective encoding platforms. This process can modify and qualify shared knowledge as indeterminate. The degree of this also depends on the environmental noise that interferes in preserving the intended meaning of types of knowledge shared, processed and stored in a learning environments system.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Scenario 2: Interpretable Chaos

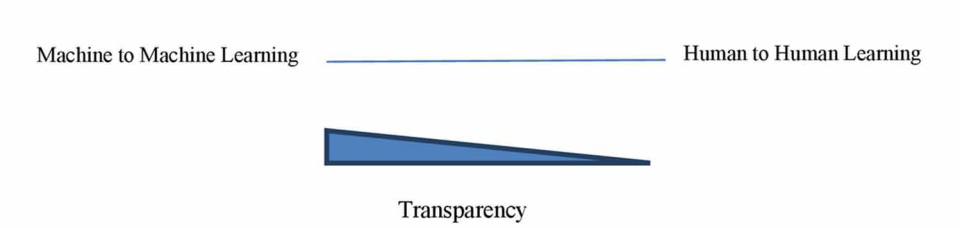
Learning Systems that exhibit indeterminacy and transparency are independent of user accessibility but remain observable in their ultimately non-deterministic and probable behaviour. That is, the user (i.e. student) can observe but cannot modify the system towards a determinate state. These exhibit interpretable chaos for the learner. For example, this might be the use of online software that displays information and can be visually seen such as an algorithm based blackboard learning environment. However, it is not amenable to modification and thus affords partial accessibility whereby the learner is on the receiving end.

The limit of an event that is in interpretable chaos is its non-feedback based behaviour.

Scenario 3: Platonic Openness

The third scenario involves complete openness, which we term *platonic openness* whereby indeterminacy, transparency and accessibility are all featured in the learning system. This is an idealistic state (Stein, 1991; McComas, 2014), albeit one that any system can aim towards. Because the human-technology system is indeterminate, it is an open system in continuous flux. The transparency of the system is indicated through workings of non-human components in the learning system (i.e. system features, relations, functions, and data) with heterogeneous human perspectives (i.e. intelligence, background experiences). Cziko (1989) and Sagan (1977) contend that students in this kind of human-technology learning system are components that are impossible to predict and measure because they are more complex then learning technologies. The difficulty of measurement means that transparency of human-technology pedagogical interactions represents a spectrum of events, such as those identified earlier in Figure 1. One end represents knowledge transfer that indicates machine to machine acquisition with complete openness. This contrasts with human to human learning that is less transparent in its workings due to immeasurable differences between people, as illustrated in Figure 3.

Figure 3. Transparency of human-technology pedagogical interactions



In this instance, accessibility is bounded by user capacity to learn (Peters and Roberts, 2012). Systems close to the Platonic openness scenario would be machine to machine learning systems, used extensively outside pedagogical environments and in the finance and energy markets (Fadullah *et al*, 2011). Applying this to machine-human interaction is a fertile prospect for further research and use that should strike a balance on our spectrum of learning interaction/events.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Scenario 4: Randomness

This is a system with indeterminacy and accessibility, which displays randomness because it is not observable by virtue of lack of patterns. However, it is tacitly received by the learner who has access to partly determine its behaviour through rules or functions of the system available through end-use interfaces. An example is a time series analysis conducted by a computer science student whereby the system/software rules and functions are accessible, the results of input equations are non-deterministic, and after some iteration's transparency is lost in terms of system behaviour (Fuenmayor, 1991; McComas, 2104). A more social example is a one to one conversation between a teacher and student. The conversation is not determinable despite availability of the topic of the conversation and rules of the language. The conversation can lack transparency by virtue of access to how differing perspectives deliver confusing conceptions throughout the conversation (Peters and Roberts, 2012).

Scenario 5: Closed Environment

We propose a transparent and accessible learning system that is not indeterminate. This is a closed system found in e-learning games with definite rules, syntax and a set of discernible patterns for the learner to engage with and utilise. We call such systems or sets of systems closed learning environments. Examples are found in Game Theory studied by learners in a host of fields including Economics, Finance, and Strategy that deals with non-cooperative games. Essentially, environments that provide zero-sum games (Mendelson, 2004:9) are examples found across e-learning platforms like Wolfram Mathematica and Gambit. The determinate nature of such platforms to some extent arises from the complete visibility of component workings (transparency) and access to a finite number of interactions by each learner (accessibility), whereby processes are discretely as well as jointly traceable. Whilst this kind of system is highly amenable to determinate outcomes, the indeterminacy of human error still remains a variable that represents imperfect transfer of knowledge and replication of learning strategy. In large part this is due to the bounded capacity of learners in HE environments aided by communication technologies (Morton, 2012: 147). The openness of a closed environment in so far as this is the ability to share knowledge at individual, group and organization wide levels is high because the platform in question demonstrates predictable, transparent, and accessible behaviour. Given formal axiomatized systems used in disciplines like economics and social sciences, the replication of content for learning is easier to study due to homogeneity of the content.

Scenario 6: Rote System

Finally, there is the scenario where a system is open to the extent that it is accessible, but neither is it indeterminate nor transparent. This type of user-technology e-learning system involves humans memorizing iterative content and replicating it. We recognize this as a single-loop learning system based on Argyris (1976). In this type of system learning takes place with content; however, the methods of learning (human mental models and technological functions) are not transparent for the user. Thus, what is determinate in relation to our indeterminate condition is at the content level rather than a methodological level. For example, a user constructing a pivot table is able to engage in rote learning by memorizing steps needed for using MS Excel functions. This is a matter of memorizing and replicating procedural steps that are determinate in their cause-effect relations (i.e. rote systems stand opposite to chaos systems of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

learning proposed earlier). The transparency of user subjectivity as well as backend workings of the MS Excel software (i.e. Visual Basic scripts) is absent. In these types of e-learning systems and platforms, learning is severely limited, not innovative and tedious for HE students due to monotonous interactions. We propose that openness in a rote learning system is limited to educational subject specific content, without recourse to methodological or psychological operations. Tan (2011) argues that in UK HE education -within management and other disciplines - international students from the East often engage in rote learning, which is ineffective, and remains poorly recognised by most education providers. Rote learning is not an open system to the extent that content can be replicated without an understanding of 'context' (the connected texts and conditions of learners), that are continuously changing, indeterminate, and not transparent.

DISCUSSION AND EARLY CONSIDERATIONS

Higher Education is on the threshold of being transformed through the application, integration and utilisation of e-learning technologies in UK HEI's. However, it has been on the threshold for some time now (Goodfellow and Lea, 2007; Paiva *et al*, 2016; Turban *et al*, 2000). Personalisation, flexibility of delivery and inclusion of a wider participation are cited (Laurillard, 2008) as being key ambitions for learning e-technologies in education. However, perhaps we should not fully enter the route of making HE "techno friendly" institutes, because as discussed the current generation want to see the concrete benefits of "click and mortar" (Ashraf, 2009) learning before they sign up. The contributions of Internet learning should therefore count towards the completion of only part of the module (Goodfellow, 2005). An e-learning system that exhibits the proposed features of openness should recognize the excessive attribution of techno friendly cultures that cannot condition sustainable and deep long terms knowledge acquisition.

As previously discussed Openness is a novel concept that has limited research and application available in UK Higher Education (HE) management education. This paper has offered an preliminary investigation that considers the philosophy of Openness in a UK HE management education teaching and learning environment. It has discussed the philosophy of openness as a KT tool that might aid UK HE management education teaching and learning technology applications. The early focus being to investigate if the feasibility of developing a Knowledge Transfer Openness Matrix (KTOM) could assist and support the learning process and utilisation.

The KTOM appears to assist with the identification of systems that might facilitate or inhibit knowledge transfer across UK HE management education teaching and learning environments. This could be because KT predominantly depends on co-operation and collaboration between users (Goh, 2002:25), which varies across the types of systems (i.e. scenarios) identified in the KTOM. There exists scope for conceptual ambiguity in learning tasks involving KTOM systems. A closed environment (scenario 5) presents determinate conditions such those involved in solving a mathematical equation through graphical iterations. The homogenous character of such system variables coupled with rules and intended meanings, increases predictability as well as complexity of the learning system (Bauersfeld, 1980; Pea, 1987: 91). The error in learning may occur on the human side of the interaction when a closed environment interacts with user demands (Monetti *et al*, 2005: 5-6). Interaction between a closed environment and a chaotic system (scenario 1) for instance fuses objective encoding platforms with subjective tacit knowledge, whereby multiple meanings are attributed at innate tacit levels of psychological processing,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

compared with the more explicit and shared meanings intended for the platform. Hence, in so far as face to face human learning must compliment the more basic learning needs of e-learning users, conceptual ambiguity is a hazard in e-learning environments by virtue of human error, intended or otherwise. Whilst growing numbers in research endorse the idea that e-learning environments can be effectively used to enhance accessibility (Gladstone, 2000; Reeder *et al,* 2004*;* Weller, 2004; Kandiko and Mawer, 2012) our proposed system type categories (i.e. scenarios of KTOM) provide conceptualizations of e-learning environments. Coupled with the high penetration of learning technology in HE and positive outcomes for accessibility (Lanham and Zhou, 2003; Dobozy, 2012), the KTOM recognises that certain technologies through integration with human behaviour vary in terms of access to intended knowledge transfer and acquisition. KTOM characterizes systems that will recurrently arise through the progressive adoption of e-learning environments based on both accessibility and desire for greater access in education (Lanham and Zhou, 2003).

This is very early stage investigation offering an alternative approach that considers the real issue as whether a KTOM could help new generation of students see the concrete benefits of technology usage and implementation. The current and future challenge is to recognise the complexities and nuances of the modern context, and seek to create a UK HE teaching and learning environment that recognises the need to ensure academic relationships are as equal as possible. No academic system can exist by itself in the 21st century of HE.

REFERENCES

Ackoff, R. L. (1989). From Data to wisdom. *Journal of Applied Systems Analysis*, *16*(2).

Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2009). *Trends in Global Higher Education: Tracking and Academic Revolution*. United Nations Educational, Scientific and Cultural Organization.

Argyris, C. (1976). Single-Loop and Double-Loop Models in Research on Decision Making. *American Quarterly*, *21*(3), 363–375.

Ashraf, B. (2009). Teaching the Google-eyed YouTube generation. *Education and Training Journal*, *51*(5/6), 343–352. doi:10.1108/00400910910987165

Baker, F. (2012). Unshackling Future Minds: How including openness in teacher education can avoid insurrection and usher in a new era of collaboration. In P Resta (Ed.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2012*, (pp. 1488-1493).

Bauersfeld, H. (1980). Hidden dimensions in the so-called reality of a mathematics classroom. *Educational Studies in Mathematics*, *11*(1), 23–41. doi:10.1007/BF00369158

Benkler, Y. (2006). *The Wealth of Networks: How Social Production Transforms*. Yale University Press.

Biggs, J., & Tang, C. (2011). *Teaching for Quality Learning at University*. McGraw-Hill Press.

Borstorff, P. C., & Lowe, K. S. (2007). Student Perceptions and opinions toward E-Learning in the College Environment. *Academy of Educational Leadership Journal*, *11*(2), 13–29.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chou, S. W. (2003). Computer systems to facilitating organisational learning: IT and Organisational Context. *Expert Systems with Applications*, *24*(3), 273–280. doi:10.1016/S0957-4174(02)00155-0

Conaway, R. N., Easton, S. S., & Schmidt, W. V. (2005). Strategies for enhancing student interaction and immediacy in online courses. *Business Communication Quarterly*, *68*(1), 23–35. doi:10.1177/1080569904273300

Cook-Sather, A. (2014). Student-faculty partnership in explorations of pedagogical practice: A threshold concept in academic development. *The International Journal for Academic Development*, *19*(3), 186–198. doi:10.1080/1360144X.2013.805694

Cormier, D., & Siemens, G. (2010). Through the Open Door: Open Courses as Research, Learning, and Engagement. *EDUCAUSE Review*, *45*(4), 30–39.

D'Antoni, S., & Savage, C. (2009). Open educational resources: conversations in cyberspace. Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO).

Dahlberg, K., Ekebergh, M., & Ironside, P. M. (2003). Converging conversations from phenomenological pedagogies: Toward a science of health professions education. In N. Diekelmann & P. Ironside (Eds.), *Teaching practitioners of care: New pedagogies for the health professions* (Vol. 2, pp. 22–58). Madison, WI: University of Wisconsin Press.

Dearing, R. (1997). *Higher Education in the Learning Society. Report to the national Committee of Inquiry into Higher Education*. Norwich, UK: HMSO.

Deejring, K., & Chaijaroen. (2012). The constructivist learning environments model enhancing cognitive flexibility for higher education: Validation phase. *Social and Behavioural Sciences*, *46*, 3764–3770.

Denning, S. (2011). *The Springboard: How Storytelling Ignites Action in Knowledge-Era Organisations*. New York: Routledge.

Dobozy, E. (2012). Learning in Higher Education Symposia: A new professional development model for university educators. *Issues in Educational Research*, *22*(3), 228–245.

Falconer, L. (2006). Organisational learning, tacit information and e-learning: A review. *The Learning Organization*, *13*(2), 140–151. doi:10.1108/09696470610645476

Fry, H., Ketteridge, S., & Marshall, S. (1999). *Understanding student learning. In A handbook for teaching and learning in higher education*. London: Kogan Page.

Fuenmayor, R. (1991). Truth and openness: An epistemology for interpretive systemology. *Systems Practice*, *4*(5), 473–490. doi:10.1007/BF01104462

Gamlanglert, T., & Chaijaroen, S. (2011). Design and Development of Knowledge Construction Model Enhancing Scientific Thinking. *European Journal of Soil Science*, *25*(3), 395–404.

Gladstone, B. (2000). *From Know-How to Knowledge*. London, UK: The Industrial Society.

Goh, S. C. (2002). Managing effective Knowledge Transfer: An integrative framework and some practice implications. *Journal of Knowledge Management*, *6*(1), 23–30. doi:10.1108/13673270210417664

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Goodfellow, R., & Lea, M. (2007). *Challenging e-Learning in the University – a Literacy Approach*. McGraw Hill/Open University Press, Studies in Research in Higher Education series.

Hanna, T. (2016). Collaborative online professional development for teachers in Higher Education. *Professional Development in Education*, *42*(2), 258–275. doi:10.1080/19415257.2014.961094

Hannon, J., & DNetto, B. (2007). Cultural diversity online: Student engagement with learning technologies. *International Journal of Educational Management*, *21*(5), 418–432. doi:10.1108/09513540710760192

Hasanzadeh, A., Kanaani, F., & Elahi, S. (2012). A model for measuring e-learning systems success in universities. *Expert Systems with Applications*, *39*(12), 10959–10966. doi:10.1016/j.eswa.2012.03.028

Hylén, J. (2006). Open educational resources: Opportunities and challenges. *Proceedings of Open Education*, 49–63.

Jackson, T. (2002). *International HRM - A Cross Cultural Approach*. London, UK: Sage Publications. doi:10.4135/9781446280089

Jerrard, B., Smith, M., & Johnstone, I. (2013). Applied Research and Knowledge Transfer: Retaining Design Knowledge Assets in Higher Education. *The Design Journal*, *16*(3), 339–355. doi:10.2752/175630613X13660502571822

Kalkota, R., & Whinston, A. B. (1996). *Frontiers of Electronic Commerce*. Addison Wesley.

Kandiko, C. B., & Mawer, M. (2012). *Student Expectations and Perceptions of Higher Education: A Study of UK Higher Education.* Report for UK Quality Assurance Agency. Retrieved from https://www.kcl.ac.uk/study/learningteaching/kli/People/Research/DL/QAAReport.pdf

Kunnari, I., & Ilomaki, L. (2016). Reframing teachers work for educational innovation. *Innovations in Education and Teaching International*, *53*(2), 167–178. doi:10.1080/14703297.2014.978351

Laurillard, D. (2005). *Rethinking University Teaching: A Conversational Framework for the effective use of learning technologies*. London, UK: Routledge Falmer.

Laurillard, D. (2008). *Digital Technologies and their role in achieving our ambitions for education*. Institute of Education, University of London.

Lin, K. M. (2001). E-learning continuance intention: Moderating effects of user e-learning experience. *Computers & Education*, *56*(2), 516–526.

Lissenburgh, S. (1999). Knowledge Links. *New Economy*, *6*(1), 13–27.

McComas, W. F. (2014). Scientific Openness. In The Language of Science Education. Sense Publishers. doi:10.1007/978-94-6209-497-0_85

Mendelson, E. (2004). *Introducing game theory and its Applications*. London, UK: Chapman and Hall, CRC.

Monetti, V. M., Guarracino, M. R., Giannino, F., Randazzo, L., & Toraldo, G. (2005). *A Web-based learning tool for applied mathematics disciplines*. Academic Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mougin, J., Boujut, J. F., Pourroy, F., & Poussier, G. (2015). Modelling knowledge transfer: A knowledge dynamics perspective. *Concurrent Engineering Research and Applications*, *23*(4), 308–319.

Nonanka, I., & Takeuchi, H. (1995). *The Knowledge Creating Company: How Japanese Companies Create the dynamics of Innovation*. New York: Oxford University Press.

Owens, J. D. (2002). A framework for E-business Learning. *Manufacturing Engineer Journal, IEE Press*, *81*(4), 196–200. doi:10.1049/me:20020412

Owens, J. D., & Floyd, D. (2007). E-Learning as a tool for Knowledge Transfer through traditional and independent study at two UK Higher Educational Institutes: A Case Study. *E-Learning Journal*, *4*(2), 172–180. doi:10.2304/elea.2007.4.2.172

Owens, J. D., & McManus, J. (2004). E-Business: Knowledge transfer from higher educational institutions to industry. *International Conference on Intellectual Capital, Knowledge Management and Organisational Learning*. University of Toronto.

Owens, J. D., & Price, E. (2010). Is E-learning replacing the traditional lecture? *Education and Training Journal*, *52*(3), 128–139. doi:10.1108/00400911011027725

Oxford Internet Survey. (2009). *Oxford Internet Survey 2009*. Oxford Internet Institute (OII). Retrieved from www.oii.ox.ac.uk

Paiva, J., Morais, C., Costa, L., & Pinheiro, A. (2016). The shift from e-learning to learning: Invisible technology and the dropping of the e. *British Journal of Educational Technology*, *47*(2), 226–238. doi:10.1111/bjet.12242

Pea, R. D. (1987). Cognitive technologies for mathematics education. *Cognitive Science and Mathematics Education*, 89-122.

Peter, S., & Deimann, M. (2013). On the role of openness in education: A historical reconstruction. *Open Praxis*, *5*(1), 7–14. doi:10.5944/openpraxis.5.1.23

Peters, M. A., & Roberts, P. (2012). *The Virtues of Openness: Education, science and scholarship in the digital age*. Boulder, CO: Paradigm.

Phillips, D. C. (1987). *Philosophy, Science and Social Inquiry*. Elmsford, NY: Pergamon.

Randy Garrison, D. (2011). *21st Century: A framework for research and practice*. Routledge.

Ratcliffe, P. (1997). A theoretical framework for the study of Knowledge Transfer in Organisations. *First International Organisation Conference*. Warwick University.

Stein, H. (1991). On Relativity theory and the Openness of the Future. *Philosophy of Science*, *58*(2), 147–167. doi:10.1086/289609

Stewart, T. A. (1977). *Intellectual Capital - The New Wealth of Organisations*. London, UK: Nicholas Brealey Publishing.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Tan, P. L. (2011). Toward a Culturally Sensitive and Deeper Understanding of Rote Learning and Memorisation of Adult Learners. *Journal of Studies in International Education*, *15*(2), 124–145. doi:10.1177/1028315309357940

Turban, E., Lee, J., King, D., & Chung, H. M. (2000). *Electronic Commerce: A managerial Perspective*. London, UK: Prentice-Hall.

Xiong, J., & Winckler, M. (2008). An Investigation of tool support for accessibility assessment throughout the development process of Web sites. *Journal of Web Engineering*, *7*(4), 281–298.

This research was previously published in The Future of Accessibility in International Higher Education; pages 230-252, copyright year 2017 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 75
Corporates in the Digital Age

Hammad Azzam
Independent Researcher, USA

ABSTRACT

A proposition for digital transformation of global groups into efficient enterprises is introduced. At the heart of the proposition is a transformational practice aimed at creating a customer-focused, data-driven global culture in any customer-serving company. The digital age has added a level of complexity to the way we acquire and serve customers. Doing a good job in the traditional channels is not enough anymore. Online is increasingly becoming the channel of choice with the two main customer-interaction paradigms: sell and service. And building a great customer experience is probably the most essential factor of success for both functions.

INTRODUCTION

The digital revolution is far more significant than the invention of writing or even of printing. - Douglas Engelbart

The world is flat. Global enterprises are undergoing disruptive paradigm shifts where thinking outside the box and working with cutting edge technologies will create extraordinary synergies. These synergies will help conglomerates push the envelope and will allow thought leaders to leverage human capital and technological assets to break down new barriers and make a step change in the performance of organizations.

If the above sounds like empty business-techno jargon to you, it's because it is. We will do our best in this chapter to avoid all such generic clichés and focus on pragmatic approaches to solve a monumental problem: "How is digital transformation changing with time?".

It's public knowledge that the single most important driver in any corporate transformation journey is digital transformation. If you don't already know that, then welcome back from your 3 years hibernation. Jump on your nearest WIFI so you can get up to speed with the crazy things that have been happening around the world while you were slumbering (just a teaser, Trump is president, France won the World

DOI: 10.4018/978-1-7998-7297-9.ch075

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Cup, and Britain existed the EU). Seriously though, there is no denying that digital is on every agenda. Few stats for you to know:

- *$1.3 trillion will be spent on digital transformation technologies in 2018 (IDC, 2017)*
- *By 2019, 5% of revenue will come through interaction with a customer's digital assistant (IDC, 2016)*
- *By 2021, one third of CEOs and COOs of Fortune 2000 companies will have spent at least 5 years of their career in a technology leadership role (IDC, 2016)*
- *27% of senior executives consider digital transformation a matter of survival (Coleman, 2017)*
- *The biggest disruptive technologies, as specified by global respondents, are the cloud (58%), mobility and collaboration (54%) and data (52%) (DCO Conclave, 2018)*
- *By the end of 2018, two-thirds of the CEOs of Global 2000 companies will have digital transformation at the center of their corporate strategy (IDC, 2017)*

Self-service is the path forward. Companies are slowly transforming to serve customers by helping them serve themselves, and as companies put their new strategy statements together, digital is being mentioned in every other sentence as the main growth agent.

Growth itself is the most important goal of any corporation. To grow a business you have to constantly acquire new customers and retain them as long as possible. If your attrition rate (opposite of retention) is bigger than your acquiring rate, your business is doomed.

To acquire customers, you have to have a reasonably priced product appealing to a segment of the population.

To retain customers, you have to service your customers well once they are acquired.

Sounds simple and straightforward. It also sounds too obvious to even mention. It's like saying "to swim, you have to be in the vicinity of water" or "to have a successful business you will need to make money."

In reality however, the digital age have added a level of complexity to the way we acquire and serve customers. Doing a good job in the traditional channels is not enough anymore. Online is increasingly becoming the channel of choice with the two main interaction paradigms: sell and service.

It also became very clear even at the early stages of the digital, that the first wave of digital transformation was not very effective. Just exporting existing applications from call centers or retail locations to online does not create a successful digital solution. To truly create a great customer experience we need to enable a casual user like the customer (as opposed to a trained profession like call center reps) to successfully use the digital assets. That was the main driver of the second digital transformation wave which was all about customer experience. In the next four sections, we will explore the four important factors that are crucial to enabling a customer-driver digital transformation in an enterprise.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

AVOID THE HYPE AND STAY GROUNDED

First and foremost is tackling the most obvious question: Why are companies struggling with customer experience practices and why dream results like the ones we see in Amazon or Google are so out of reach for so many companies? Executive teams are so obsessed with these companies they have created acronyms for them -- FANG (Facebook, Amazon, Netflix, Google) or FAAMG, etc. To be fair, it's an interesting question and deserves some space in this chapter. The revenue of just four companies, Apple, Amazon, Google and Facebook, is around $600 Billion. That's equivalent to the GDP of the following countries put together:

Gabon, North Korea, Brunei, Mozambique, Iceland, Cambodia, Equatorial Guinea, Papua New Guinea, Georgia, Botswana, Senegal, Zimbabwe, Congo, Republic of the, Jamaica, Namibia, Albania, Chad, Burkina Faso, Mauritius, Mongolia, Mali, Nicaragua, Laos, Macedonia, South Sudan, Armenia, Madagascar, Malta, New Caledonia, Benin, Tajikistan, Haiti, The Bahamas, Niger, Moldova, Rwanda, Kyrgyzstan, Kosovo, Monaco, Guinea, Liechtenstein, Malawi, French Polynesia, Bermuda, Suriname, Mauritania, Timor-Leste, Sierra Leone, Montenegro, Togo, Fiji, Swaziland, Barbados, Eritrea, Cayman Islands, Andorra, Curaçao, Guyana, Maldives, Burundi, Aruba, Greenland, Liberia, Lesotho, Bhutan, Cape Verde, San Marino, Central African Republic, Belize, Djibouti, Seychelles, Saint Lucia, Somalia, Zanzibar, Antigua and Barbuda, Guinea-Bissau, Solomon Islands, Sint Maarten, British Virgin Islands, Grenada, Saint Kitts and Nevis, The Gambia, Samoa, Vanuatu, Turks and Caicos Islands, Saint Vincent and the Grenadines, Comoros, Dominica, Tonga, São Tomé and Príncipe, Federated States of Micronesia, Cook Islands, Anguilla, Palau, Marshall Islands, Nauru, Kiribati, Montserrat and Tuvalu put together!

They must be doing something right!

Looking closely at FANG, you will notice that they never relied on overhyped initiatives. Their most profitable programs are well within-the-box ventures. The differentiator is execution. All hyped efforts are done for pure research and PR.

This is what we will explore in this chapter. The lines between futuristic concepts and practical implementations is not that thin, yet frequently organizations jump that line and dive heads on into science fiction like endeavors that are good for nothing more than a Hollywood effect. We will focus on what makes business sense and what needs to be done to move the digital train forward. We believe in three main paradigms that are prerequisites for digital transformation:

- Impeccable Technology Implementation: Including customer experience, usability and stack stability
- Customer-obsessiveness
- Artificial Intelligence

This chapter will address the first two.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

FOCUS ON IMPLEMENTATION

So, why do so many fail to replicate the fantastic user experiences that these elites have mastered? Why can't every company have these capabilities? Why can't everyone have that edge? Well, for starters, if everyone has it, it won't be an edge. If all companies can do these experiences effectively, customer experience will stop being a differentiator. Remember, to mathematically have superbly performing top 1%, you need to have tons of mediocre ones. There is still a lot of room for hard working, persistent, deep-pocketed enterprises to quantum-advance their customer experience, so why are we not seeing that happening often enough? Let me put on the table my theory, most of which are really opinions from experience.

First and foremost, there is a clear misunderstanding of what constitutes customer experience. Executive are convinced of the argument that engineers cannot build anything remotely usable and they need the UI/UX teams to really take the lead and make that significant jump into usability. UI eccentrics would love to tell you it's the sexy, beautiful front end screens that matter. UX teams would swear that it's all about the experience overall (flows, interactions, etc.) not just the look and feel. Engineers would focus on the correctness, stability and scalability of the application. The reality is all three disciplines are important, but engineering takes center stage. We are not discounting the importance of usability and customer experience, but rather than bringing another standalone discipline to the game, you need to equip your engineering organizations with the right usability-focused design/engineering resources. Separation of the two disciplines is the wrong thing to do. The core of the organization needs to be great engineering teams and usability needs to be instilled in the organizations DNA, not sit outside manufacturing exquisite UI and smooth flowing flows.

Every customer facing application consists of two parts:

1. Things You See. That includes the screens you browse, the paths you traverse, the errors you come across, etc. Most of that is built by engineers and UI teams and is governed by UX teams, as it should be.
2. Things You Don't See. That includes everything that goes on under the hood to make the application run well.

Corporate executives think that good experience is about the first, "Things You See". In reality, that is barely the tip of the iceberg. The majority of poorly performing websites and applications suffer from issues related to "Things You Don't See". Sounds very theoretical and abstract, so let's roll up the sleeves and zoom in.

"Things You See" is about designing the screens, the flows and the usability of the interface. It's about creating the web pages or the mobile screens that make sense from a customer perspective. Every screen should have easily understandable language, logically progressing flows and proper exception handling.

"Things You Don't See" is about everything else. It's about the web server, the authentication/authorization engines, the security framework, the logging framework, the session tracking application, the cloud services, the internal APIs, the external APIs, the load balancer, the application servers, the ports, the firewalls, the middleware, the databases, the messaging queues, the workflow manager, the Hadoop framework, the Kafka servers, the core platforms, the mainframes, the hardware, the EMC drives, IDMZ/EDMZ, the fault tolerance platforms, the data center, etc. The points of failures are almost infinite in this complex, technology behemoth.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

My contention is that most poorly performing websites and applications get their low marks on the "Things You Don't See" while most executive teams focus on "Things You See". ***It's all about building a correctly functioning, consistent, stable stack.*** There is no argument that aesthetics matter and eye candy enhance digital applications, but that is only a tiny piece of the good experience puzzle. A website UI needs to be good looking, but not necessarily mold-breaking. We are building a business application, not the next generation Hollywood visual effect box office blockbuster. Look at the most successful innovations out there and you will clearly see that beautiful UI is not a differentiator. Google Search is almost UI-less. Amazon is nothing to write home about. In fact, their website UI is borderline mediocre and it feels like something that an 18 year old savvy high school student can put together. Facebook front end is barely ok. Apple might be an exception. They pay extraordinary attention to aesthetics and it seems to be part of the brand. Based on these few data points, correlation between UI and success does not exist. Good UI is good enough. What is more important is to build a flawlessly performing stack.

Let's take closer look at Amazon. Why do we love that company? Is it because of the sexy website? Is it because of the graphics? Is it because of user experience? Is it because of the prices? The answer is "No" to all these questions. There is nothing beautiful about their website and no mind blowing structure in its flows that stands out. And if you want better prices, just go to your nearest Walmart.

We love amazon because of the following very important and very boring features:

1. The website works every time. Every click on every page has a very predictable outcome. I have never ever seen a technical error, a "page cannot be displayed" response, or slow performance/ timeout on their site. If I want to know if there is a problem with my WIFI connection, I check Amazon or Google websites. That's how stable their stack is.
2. Their fulfillment process works every time. They give me an estimated day of delivery and almost every time the item arrives on schedule. They have never failed to deliver one single item to my doorstep. And they have rarely failed on quality. I almost always get what I expect.
3. Their customer support is a true customer support. You will almost never hang up unhappy with them.

The anecdotes about the amazing exchanges that people had with Amazon Customer Support are almost endless. Each of us has either experienced it firsthand or heard it from close acquaintances. Sometimes it's about a package that arrived late (to make up for that Amazon refunded the customer, while the customer kept the product.) Another maybe about the product that never arrived, so Amazon sent another one. When both arrived and, being the honest man that you are, you called to inform them, you were told to keep both items as a little gift from Amazon. Granted these practices might be expensive, but they have made great impact on customer base through the best marketing tool of all: word of mouth. Amazon is willing to lose great margins for the sake of keeping the customer happy.

KEEP YOUR EYES ON THE CUSTOMER

Even if you make it idiot-proof someone will make a better idiot to break it

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Getting a fully functional, stable, usable stack is not enough. A good digital team needs to also make sure that the application in place is servicing the customer well. The best way to make sure that the customer is happy is to obsessively watch every step he takes, every move he makes, and every word he says.

All tactical and strategic decisions at all levels need to be driven by the customer. In other words, the company needs to be customer-centric, which usually comes in one of two forms:

1. *Customer-centric by name*, where the company touts its focus on the customer in presentations, in meetings, in mission statements, in high level strategic discussions, around the water fountain, in executive off-sites and every other PR venue possible.
2. *Real customer-centric companies*, where every employee is engaged every day, first and foremost with the customer, whether it's directly through the traditional channels, or indirectly through extraction of reports and insights about the customer behavior last week, yesterday, and even an hour ago.

And if you had problem getting my borderline sarcastic message, let me be more explicit. 1 is bad. 2 is good. However, 1 is easy. 2 is very hard. Most companies are somewhere in the middle of these two models with tendency to be closer to 1. Given how anxious all executives teams about building a great customer experience, it's surprising how little energy is spend on that. As a CEO, to get a good sense of how customer centric your company is, ask yourself the following questions:

- **Operations:** How often do I, and everyone in my organization, look at customer feedback. In any good size enterprise, customers leave hundreds, if not thousands, of comments every day on websites, on mobile apps, in branches and in every other channel. If there exists a properly formatted, easy to read data that your management team is looking at every day (won't take more than 10 minutes) to get a feel on what's happening on the ground, then customer-centricity is on your radar screen. If not, then you are leaving the most important part of the company's strategy out of your immediate agenda.
- **Strategy:** Are all your strategic decisions driven by what your customers are telling you, directly or indirectly? Are you driving how you invest in the company through your understanding of what your customers want and need? If yes, then you are customer centric.

Customer centricity is so important that it cannot be left to a specialized department to manage. It has to be sown into the fabric of the company's operations, at every level and in every organization. Fifteen years ago, this was very hard to do. Now, it's do-able, not easily, but do-able!

The journey to really make sense of the humanely-incomprehensible digital footprints that the customers leave behind is very difficult but the prize is well worth it. Some customers leave plenty of feedback behind, but many don't. It's extremely important to digest the feedback, but what's more important is to know the state of mind of those that don't communicate at all. These silent customers that click away on apps and websites are sending, in hidden code, thousands of messages every day telling enterprises what they can do to serve them better. Every requirement, every enhancement and every feature in every project should be derived from what feels like an infinity of unstructured clutter. The fact that the digital wave sweeping enterprises come with disproportionate increase in customer traffic makes the problem even harder. Not only customers are becoming digital, they are coming to our doorsteps 10 times more often than they used to. This tsunami of footprint makes it harder and harder for the enterprises to keep

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

their arms around the customer. As less customers visit the traditional channels and more customers connect digitally, our ability to understand what customers need and want is diminishing and the pursuit to become customer focused is becoming harder. In call centers, stores, or other traditional channels, customers will communicate their intent explicitly and we learn what's on their minds firsthand. Online customers, on the other hand, are rarely verbose and we will increasingly need to do forensic work to really understand what's on their mind. The trick to successfully manage a digital stack is figuring out how to extract simplified insights from the piles of logs. These insights will be part of a continuous feedback loop that will real-time course correct the performance of the channel.

Static Insights

The types of data to be monitored will vary and new reports need to be created continuously to keep the organization informed and up to date. There are however a certain set of static reports that are essential to the performance of the company and need to be in place first and foremost. These reports will focus on four aspects of customer behavior that are critical to successfully serve the customer.

The first batch is transaction reports. These are mostly business reports detailing transactions performance on a daily basis. They reflect the business performance of the organization and need to be circulated daily to the whole organization to keep everyone on the same page.

The second batch is error reports. These reports should have detailed views of all exceptions with indicators to show which ones are spiking on the last day. There are two types of errors to track, acceptable and unacceptable. Acceptable errors are correct and valid responses to failing scenarios. For example, when a customer enters the wrong password on a website, the proper response need to be handled and an error needs to be logged into the system. The unacceptable errors are technical issues or mishandled exceptions that are completely unexpected. Usually the acceptable errors are much more than the unacceptable ones and organizations strive to eliminate the second type. However a spike in any type of error (acceptable or not) needs to be addressed immediately. A "wrong password" error spike is most likely related to a systemic issue, rather than a sudden increase in the erroneous passwords entered by the customer.

The third set is performance reports. That should include response times of backend systems and screen performance and snappiness. Properly optimized applications have a number of benefits for the company and the customer including better customer conversion, reduced hosting costs, and improved Google Search ranking.

Last but not least, customer feedback reports. These reports will show, in a structured way, the feedback customers leave behind.

Every self-respecting executive wants to constantly know what's going with the customer. The problem is that retrieving and digesting that information is just too hard. Important, properly distilled data is very hard to come by and getting that information in easy to sip doses is mission impossible. That is at the core of the concepts we propose. No matter how complex the problem, creating the easy to understand reports is a must. The skill of converting the heaps of data into a form share-able with the world is a must-have skillset for every manager.

Executive management teams need to be the first in line. The reason they don't dive daily into customer data is not because they prefer to spend their time in high level management meetings, off-sites, presentations, etc. The real reason is the lack of worthy reports.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

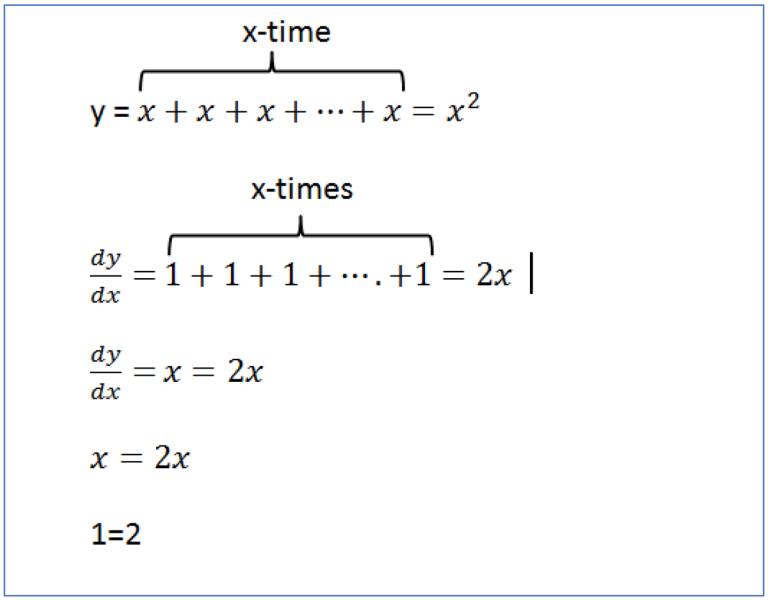
When the full structure is in place, the benefits to the corporation will be immense. With executives watching the company's performance daily, the impact on the team will be great. The organization will be self-correcting. Before issues are spotted by the CEO, or the CIO, the vice president is aware and working the problem. Before the vice president picks up the phone to call the director about the issue, the coder is already fixing the code. He/she knows that everyone up the chain is seeing the problems he sees and his/her phone is about to start ringing. Before the CMO get the chance to ask about the lack of progress on sales after the campaign that launched yesterday, the business analyst is doing the investigation and working on course correction with the rest of the marketing team. This transparency in viewing the data can put everyone on the same page and align the organization behind what's important, the customer and the results.

Dynamic Insights

Obvious is the most dangerous word in Mathematics - E.T. Bell

Sometimes, hidden in the deep folds of obvious statements are false assumptions that lead to disastrous results. Instinctive reactions are helpful and true most of the time, but occasionally they are barely correct, and in some rare cases they are completely off. Take for the example the little trick we show in Figure 1. If you track the logic, you'll find it impenetrable, almost. I mean how could it be all true? It's a shot at the basic fundamentals of mathematics.

Figure 1. How to entertain a mathematician!



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

If you are the kind of person that always wants to solve the puzzle without help, then stop reading now and go bang your head against the table trying to CSI the problem. For those not in the mood, let me explain the very little and obscure hole in the logic above. The problem is in the second line. When we derived by x, we did not account for the change in the length of the right side. dy/dx is change of y divided by a change of x. As x changes, each entry in the sum changes by dx, but also the length of the series itself changes proportionally, impacting all the individual x increments.

This section of the chapter is about how to see the obscure, and how to systematically construct insights from data without falling into the trap of the obvious. Data is everywhere now. Chief Data Officers are popping up like daisies in the corporate world and they keep making their way upwards, justifiably so. The data compound is large and complex. As new data points get created, the permutations needed to extract truths grow exponentially. And the demand is growing proportionally. Hardly a day goes by without breakthrough articles being published that accentuate the importance of running data driven organizations in every company and at all levels. This borderline-unhealthy obsession with data has sent many corporations chasing dreams that are nonconcrete and, in some cases, imaginary. Worse, many groups and organizations are blindingly pursuing the abstract concept without really understanding what bottom line to pursue. The outcome, more often than not, is an organizational structure and a mission statement that do not tie, in any form, to the principal goals of the company.

To be clear, we are not discounting the significance of data. In fact we unreservedly believe that data will have more impact on the digital transformation journey than any other concept. Collecting, distilling and acting on the data is the only way to create the intelligent machinery that can help the organization run effectively and efficiently.

To less abstractly explain the benefits of running a data-driven organization, we will demonstrate the concepts of this section using a scaled down model which is devised purely for illustrative purposes. Our model, Tinymart, is a successful supermarket chain with 10 stores sprinkled on the US map. They sell 10 products called mini1 through mini10 and they are open weekdays from 8 AM to 10 PM and on weekend from noon to 6 PM. Christina Ellen Orlando is the CEO and she feels that running companies came second nature to her since early years of adulthood. Christina relies on her data officer, Douglass Oak, to get accurate details of the performance of the company.

The most basic report will have the number of items sold every day, by store and the revenue associated with every sale. That is a straightforward, easily generate-able view that makes sense. However, it's pretty much useless. It will look like a spreadsheet with product names and number of items sold by store (see Figure 2). It's actually not really completely useless, but it requires serious effort to understand what the numbers mean. Let's for example take the data point Mini1 sales in Store 2. Looking at the number by itself is meaningless. Looking at it in comparison with the rest of the stores is more insightful. The first question that comes to mind: why is Store 2 the lowest selling store for Mini1? Now data is starting to stand out. An obvious answer is maybe because Store2 is a smaller store, or maybe it's the worst location of the bunch. That theory does not hold ground. If that is the case then why are other products performing better in Store2? Store2 Mini1 sales are low because of something else. That last statement is a fantastic find. It's a vector, with magnitude and direction, pointing towards the best places to investigate, fix and improve performance.

Take this one step further. You don't want to scan the table looking for the low numbers. You want the low performing numbers to stand out. So instead of showing the raw data, Figure 4 shows the relative performance of every product in every store. This is accomplished by simply dividing each cell by the average sale for a product per store. For example, on average, Mini1 sold 6.8 units per store. That is the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

baseline for Mini1. Any store selling more than 6.8 Mini1 units is doing better than the average. Any store selling less than 6.8 Mini1 units is doing worse than average. Store 2 sold one Mini1 unit, which is 15% of the average, clearly underperforming compared to the rest of the stores. Now color code the cells and the bad performers will stand out (in red in Figure 4). The end result is a simple way to effortlessly glance at a report and spot actionable issues.

Figure 2. Corporate product sales by store and product

	Store1	Store2	Store3	Store4	Store5	Store6	Store7	Store8	Store9	Store10
Mini1	9	1	5	6	8	7	10	10	5	7
Mini2	6	9	6	5	10	7	9	9	8	9
Mini3	5	6	9	10	7	8	10	7	10	8
Mini4	6	10	9	5	5	7	5	6	6	10
Mini5	7	10	10	9	9	6	5	5	8	8
Mini6	9	7	7	5	7	7	6	7	10	9
Mini7	8	5	8	7	5	6	9	10	10	9
Mini8	7	10	10	7	5	5	7	8	8	6
Mini9	5	9	10	10	6	10	7	10	5	7
Mini10	9	7	9	10	5	10	8	8	6	5

Figure 3. Corporate product sales by store, with average

	Store1	Store2	Store3	Store4	Store5	Store6	Store7	Store8	Store9	Store10	Average
Mini1	9	1	5	6	8	7	10	10	5	7	6.8
Mini2	6	9	6	5	10	7	9	9	8	9	7.8
Mini3	5	6	9	10	7	8	10	7	10	8	8
Mini4	6	10	9	5	5	7	5	6	6	10	6.9
Mini5	7	10	10	9	9	6	5	5	8	8	7.7
Mini6	9	7	7	5	7	7	6	7	10	9	7.4
Mini7	8	5	8	7	5	6	9	10	10	9	7.7
Mini8	7	10	10	7	5	5	7	8	8	6	7.3
Mini9	5	9	10	10	6	10	7	10	5	7	7.9
Mini10	9	7	9	10	5	10	8	8	6	5	7.7

Figure 4: Corporate product sale by store, with significant drops highlighted

	Store1	Store2	Store3	Store4	Store5	Store6	Store7	Store8	Store9	Store10
Mini1	132%	15%	74%	88%	118%	103%	147%	147%	74%	103%
Mini2	77%	115%	77%	64%	128%	90%	115%	115%	103%	115%
Mini3	63%	75%	113%	125%	88%	100%	125%	88%	125%	100%
Mini4	87%	145%	130%	72%	72%	101%	72%	87%	87%	145%
Mini5	91%	130%	130%	117%	117%	78%	65%	65%	104%	104%
Mini6	122%	95%	95%	68%	95%	95%	81%	95%	135%	122%
Mini7	104%	65%	104%	91%	65%	78%	117%	130%	130%	117%
Mini8	96%	137%	137%	96%	68%	68%	96%	110%	110%	82%
Mini9	63%	114%	127%	127%	76%	127%	89%	127%	63%	89%
Mini10	117%	91%	117%	130%	65%	130%	104%	104%	78%	65%

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Corporate product sale with store drops highlighted

	Store1	Store2	Store3	Store4	Store5	Store6	Store7	Store8	Store9	Store10
Mini1	9	1	5	6	8	7	10	10	5	7
Mini2	6	9	6	5	10	7	9	9	8	9
Mini3	5	6	9	10	7	8	10	7	10	8
Mini4	6	10	9	5	5	7	5	6	6	10
Mini5	7	10	10	9	9	6	5	5	8	8
Mini6	9	7	7	5	7	7	6	7	10	9
Mini7	8	5	8	7	5	6	9	10	10	9
Mini8	7	10	10	7	5	5	7	8	8	6
Mini9	5	9	10	10	6	10	7	10	5	7
Mini10	9	7	9	10	5	10	8	8	6	5
Average	7.1	7.4	8.3	7.4	6.7	7.3	7.6	8	7.6	7.8

	Store1	Store2	Store3	Store4	Store5	Store6	Store7	Store8	Store9	Store10
Mini1	127%	14%	60%	81%	119%	96%	132%	125%	66%	90%
Mini2	85%	122%	72%	68%	149%	96%	118%	113%	105%	115%
Mini3	70%	81%	108%	135%	104%	110%	132%	88%	132%	103%
Mini4	85%	135%	108%	68%	75%	96%	66%	75%	79%	128%
Mini5	99%	135%	120%	122%	134%	82%	66%	63%	105%	103%
Mini6	127%	95%	84%	68%	104%	96%	79%	88%	132%	115%
Mini7	113%	68%	96%	95%	75%	82%	118%	125%	132%	115%
Mini8	99%	135%	120%	95%	75%	68%	92%	100%	105%	77%
Mini9	70%	122%	120%	135%	90%	137%	92%	125%	66%	90%
Mini10	127%	95%	108%	135%	75%	137%	105%	100%	79%	64%

If what is more relevant is to compare how the products perform compared to each other in the same store, then Figure 5 is more fitting. Essentially, it shows the performance of each product baselined by the average the average number of units sold in the same store. After that, color coding will help you see which product is doing less than the rest in a specific store. An example for clarification, the third column shows the sales, by product, of Store 2. Sales of each product in that store are:

Mini1: 1
Mini2: 9
Mini3: 6
Mini4: 10
Mini5: 10
Mini6: 7
Mini7: 5
Mini8: 10
Mini9: 9
Mini10:7

The average number of units sold per product in Store 2 is 7.4. Dividing each entry for Store 2 by the average you get:

Mini1: 14%
Mini2: 122%
Mini3: 81%
Mini4: 135%
Mini5: 135%

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mini6: 95%
Mini7: 68%
Mini8: 135%
Mini9: 122%
Mini10:95%

Finally, color coding shows the underperforming products, Mini 1 in this case.

Suppose the demographics that each store serves vary widely. Let's take Figure 6 for example. The population that Store 9 service is much larger than that of the rest and the stores. Also Store 2 population is much smaller than the rest. Any comparative views are useless. What will be useful in this case is to normalize the table by the population. Basically divide every entry by the total number of customers serviced by that store. The result is a view that differentiates the performance of a store regardless of the population served.

Figure 6. Corporate product sale normalized by population

	Store1	Store2	Store3	Store4	Store5	Store6	Store7	Store8	Store9	Store10
Mini1	5715	2536	7937	6688	5622	5346	5667	7075	18042	9787
Mini2	6837	3208	8997	5182	9757	9081	6376	8908	12156	8789
Mini3	9973	3346	5864	8716	9960	5003	6303	7147	13765	6423
Mini4	7570	3030	8858	7304	6721	5635	7653	9729	17061	6550
Mini5	8657	3510	6818	6356	7592	9782	7565	7213	10645	6886
Mini6	8431	2067	6879	8813	9375	8206	7658	9632	12540	5527
Mini7	7060	3370	9347	5319	9194	8764	6265	6605	19973	8214
Mini8	8653	2265	8803	6084	9655	6393	9977	8832	17194	6228
Mini9	8217	3355	6271	5413	7378	5672	7694	5640	9396	6598
Mini10	6594	3357	8473	6301	8704	5774	8884	8213	9591	7240
Population	111544	62000	107059	102531	110690	115951	109059	106608	210000	103153

	Store1	Store2	Store3	Store4	Store5	Store6	Store7	Store8	Store9	Store10
Mini1	5	4	7	7	5	5	5	7	9	9
Mini2	6	5	8	5	9	8	6	8	6	9
Mini3	9	5	5	9	9	4	6	7	7	6
Mini4	7	5	8	7	6	5	7	9	8	6
Mini5	8	6	6	6	7	8	7	7	5	7
Mini6	8	3	6	9	8	7	7	9	6	5
Mini7	6	5	9	5	8	8	6	6	10	8
Mini8	8	4	8	6	9	6	9	8	8	6
Mini9	7	5	6	5	7	5	7	5	4	6
Mini10	6	5	8	6	8	5	8	8	5	7
Average	7.1	7.4	8.3	7.4	6.7	7.3	7.6	8	7.6	7.8

	Store1	Store2	Store3	Store4	Store5	Store6	Store7	Store8	Store9	Store10
Mini1	127%	14%	60%	81%	119%	96%	132%	125%	66%	90%
Mini2	85%	122%	72%	68%	149%	96%	118%	113%	105%	115%
Mini3	70%	81%	108%	135%	104%	110%	132%	88%	132%	103%
Mini4	85%	135%	108%	68%	75%	96%	66%	75%	79%	128%
Mini5	99%	135%	120%	122%	134%	82%	66%	63%	105%	103%
Mini6	127%	95%	84%	68%	104%	96%	79%	88%	132%	115%
Mini7	113%	68%	96%	95%	75%	82%	118%	125%	132%	115%
Mini8	99%	135%	120%	95%	75%	68%	92%	100%	105%	77%
Mini9	70%	122%	120%	135%	90%	137%	92%	125%	66%	90%
Mini10	127%	95%	108%	135%	75%	137%	105%	100%	79%	64%

So, putting data in a spreadsheet and circulating it by email is a useless act. On the other hand, designing and building properly structured, insights-extracting, efficient reports can help you run a company efficiently.

The art of the reporting is also an important enabler. Data has to be shared daily, in emails (not on websites or portals) and has to be straightforward and easy to understand effortlessly. Figure 7 is an example that shows how a 30 second glance at a table will allow anyone to know exactly what is working

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

well and what's not (1 means yesterday's performance was like the average of the past 10 weeks. 1.2 means 20% better than the average. 0.5 means 50% less than the average). Nothing in the report requires explanation. It's blasphemy to use engineering terms. You cannot have a row titled "Transaction 4325", or "ord_fbr_rsd". Instead titles should be in plain terms that a person not familiar with the program can understand, like "New Fiber Residential Orders." Note the use of the word yesterday, instead of a specific date. You basically want to minimize effort when it comes to reading the data. It all has to be self-explanatory and straightforward and all data need to be actionable with no need for deciphering and analysis. This is in line with the theme of the whole chapter. Usability is not about creating beautiful art. Usability is about exerting energy in creating easy-to-understand themes across the company.

Figure 7. Corporate product sale by date with sale drops highlighted

		Yesterday	Yesterday-7	Yesterday-14	Yesterday-21	Yesterday-28	Yesterday-35	Yesterday-42	Yesterday-49	Yesterday-56	Yesterday-63
Vini1	0.523	4343	2812	7559	7660	7437	8539	9214	7598	17161	6790
Vini2	1.038	8407	3714	9330	6402	9759	9835	9103	6836	9406	6629
Vini3	0.785	6557	3876	8324	9520	7886	8078	9838	7193	15153	9437
Vini4	1.135	9421	2560	7237	8767	7578	9735	5637	7362	11321	9962
Vini5	1.136	8934	2217	7300	7140	9855	6712	8609	8876	12442	8307
Vini6	1.067	8254	2663	7791	7167	6877	7640	6670	7856	13605	7576
Vini7	0.859	6257	3496	5113	5854	6543	7024	9475	5075	12706	7906
Vini8	1.142	8780	2748	7918	6644	9429	7710	9954	5181	17062	8509
Vini9	0.839	6915	2565	9330	6084	6073	9904	6805	5123	17790	9608
Vini10	0.991	8103	3479	5022	5328	6639	9998	8588	5145	19846	9831

LOOK FORWARD: AI

No data-driving digital transformation discussion is complete without a section on Artificial intelligence. No doubt we will need tens if not hundreds of data scientists running forensic jobs across all channels in order to produce new batches of intelligent reports, especially with the impending Internet of Things (IoT) at the gates. IoT is picking up steam and its market is vast and fast growing (we are quickly approaching $1trillion annual revenue.) Close to 30 million devices are plugged into the hive every month. That's like adding the population of the United States to the Internet every year. Cisco estimates that by 2020 there will be more than 3 devices per person on IoT.

With so many devices connected, the amount of data generated by IoT is enormous and borderline unmanageable which will only make data science orders of magnitude more complex. However, there is no escaping this. Enterprises will have to understand their digital customers better and those companies that will mine that data effectively will be the ones that prosper (whether the data comes directly from the customer or from IoT devices serving the customer). To do this right we need to infuse artificial intelligence in most technology initiatives and we need to change the way we view this mountains of data from being a problem to being an opportunity. Machine Learning based systems that can autonomously sift through the heaps of data deposited by the customer will thrive and help propel AI forward. Machine learning is most effective when the parameters needed are not clear. In essence, when you unleash a competent set of algorithms using machine learning on such unstructured data like, you can potentially get answers to questions you haven't even started to ask.

AI is going to be a major enabler in the future and we will need to create intelligent frameworks in every aspect of the enterprise to unlock its potential, but that is a discussion for another chapter.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

The digital transformation journey has an offspring called Customer Experience. As digital is becoming the norm and migration to digital is coming to completion, most transformed corporations are shifting the focus to perfecting the customer experience. The most successful organizations are the ones less focused on building overhyped futuristic programs and more focused on the mundane task of managing all customer interactions efficiently. Unfortunately, the volume of interactions have grown exponentially since the shift to digital. Those who mastered mining the footprints left behind by these interactions efficiently will excel in the digital age.

REFERENCES

Coleman, K. (2017). *Digital Transformation Strategy: A Matter of Survival*. Retrieved from http://www.projectmanagement.com

CDO Conclave. (2018, March). *10 amazing statistics about digital transformation*. CDO Conclave.

IDC. (2016). *IDC FutureScape: Worldwide Digital Transformation 2017 Predictions*. IDC.

IDC. (2017). *IDC Forecasts Worldwide Spending on Digital Transformation Technologies to Reach $1.3 Trillion in 2018*. IDC.

This research was previously published in Technology Optimization and Change Management for Successful Digital Supply Chains; pages 39-52, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 76
Challenges Facing Health Service Delivery in Developing Countries and Solution Approaches:
The Case of Benin, a West-African Developing Country

Thierry O. C. Edoh
https://orcid.org/0000-0002-7390-3396
Technical University of Munich, Germany

Pravin Amrut Pawar
Philips Research, India

Laura Y. Loko
National University of Sciences, Technology, Engineering and Mathematics, Benin

ABSTRACT

This chapter describes a case study of the poor access to healthcare in the developing the countries with more focus on the rural areas and presents an adapted remote care delivery system approach for improving and increasing the access to healthcare services by overcoming certain cultural, social, financial, and linguistic barriers. The remote care delivery system integrates traditional practitioners because most people are more confident with the traditional medicine. The chapter presents the results of a practical on-site test of the proposed system. The test has shown the potentiality of the proposed system to improve the quality and effectiveness of healthcare and increase the accessibility of health-care systems. The chapter also discusses the obstacles for applying standard telemedicine systems and e-health solutions in the developing world.

DOI: 10.4018/978-1-7998-7297-9.ch076

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

In the recent years, the burden of diseases is rapidly increasing in the developing countries. Most people living in developing countries and particularly in rural area are facing poor access to health care delivery services. The care units in rural regions lack expert medical specialists or most health professionals working there are undertrained (Thierry Oscar Edoh, 2010a). Further, existing medical infrastructures (facilities) are in a poor state. Care units are particularly scarce in rural areas and/or urban slums. Many urban areas are also facing care infrastructures issues similar to rural areas. Beyond the poor health care facilities and lack of care experts at pharmacy care units, which are underlying the poor access to health care services, the socioeconomic and cultural factors are decisive in how regularly a patient can visit a doctor (attend a health center in person). The few patients coming from remote areas who visit a healthcare facility are often hospitalized instead of being ambulatory or remotely treated and thus occupy unnecessarily hospital beds and cause unnecessary costs.

In the case of chronic infectious diseases such as HIV/AIDS and non-communicable diseases (i.e. diabetes, cardiovascular diseases, cancer.), a medical prevention, for patients living in underserved areas (region with healthcare facilities in poor state or without health unit), means regularly consulting doctors/nurses to perform certain medical examinations (i.e. blood test) and eventually re-adjusting their current medication. These medical routines at a healthcare facility are linked to relatively enormous and recurring costs for the patients or their relatives. According to the World Bank, most people in developing countries are living on less than one dollar a day. Therefore, beyond the poor state of most health care facilities, the economic situation, and poverty in the developing countries are part of the leading causes of poor health care services accessibility. Patient living on less than one dollar a day would prefer to buy food stuff instead of visiting a doctor, even in the case of chronic diseases [Results of our survey].

Most investigations carried out by the WHO have reportedly indicated that the poverty, lack of political will, poor national economy and not least the poor organization are the main challenges facing the health systems in Sub-Saharan Africa (SSA) countries. A study (Adeya & Cavanaugh, 2007) carried out by United States Agency for International Development (USAID) in Benin stated that the main problem of the poor healthcare services accessibility is due to severe lack of medical care facilities, particularly in urban slums and rural regions and additionally the lack of specialists due to brain drain. Similar conclusions have been made in studies conducted in other developing countries. A review conducted in (Harrison, Cohen, & Walton, 2015) indicates that unsafe and poor quality care such as infection, medication error or misuse and lack of patient safety skills are challenges being faced in the Southeast Asian developing countries. Another study on maternal health care (Srivastava, Bilal, Preety, & Sanghita, 2015) had concluded that, in the developing countries, safe deliveries remain a major challenge and barriers to utilization of institutional deliveries also pose a major challenge for healthcare programs.

A peculiarity of the health system in the Sub-Saharan-African countries is the wide absence of Information and Communication Technology (ICT) systems, particularly in rural areas. The weak ICT system landscape in the healthcare systems and its poor usage are discussed in Thierry Oscar Edoh, (2010a) and T.O. Edoh and Teege (2010). In nearly all cases, patient data processing is carried out manually using paper documents. Other ICT systems applications, such as data mining or communication platforms are also mostly absenting in the African health sector. Medical statistics are scarcely conducted. A group of researchers has examined the Kenyan health system and noticed a "Digital Divide" in African countries. Even for South Africa, an earlier Study (Mars, Seebregts, & Rockefeller Foundation, 2008) pointed out major obstacles for a successful introduction of ICT in the health sector. In (Scott & Mars, 2015), the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

authors discussed Health care services issues and analyze the needs of the developing world accordingly. Certain of these issues are poverty, communicable diseases, maternal and child health, violence and conflict and workforce shortages.

Launching Information and Communication Technology systems into the health care in the developing countries presents certain challenges with regards to the technology level and the existing infrastructure. The Health Information System Program (HISP) project(Scott & Mars, 2015) thus worked for more than 10 years to develop and launch the District Health Information Software (DHIS) system described in (J. J. Braa & Hedberg, 2002) and summarized in (Keeton, 2012).

In developed countries such as Ireland, there exists a Homecare system project named CASALA, which is designed and implemented for elderly people. This has shown how Homecare and Telemonitoring can increase access to the health care delivery system for old and disabled people. Telehealthcare system is launched in Ireland to improve the access to the health care for isolated people. Certain reports (Sluizer, S., Cashman, 1984; Khani, 2015) estimate that outpatients have to wait up to 2 hours before being examined by a medical doctor. The 2011 International IT and Connected Healthcare Solution Summit, taken place on 11th & 12th May 2011 in Dublin, has shown how Telehealthcare help to increase the health care services in Ireland.

Telehealthcare/Telemedicine is showing to improve health care services in developed countries like Ireland (e.g. eHealth ERA project), USA (Alaska, e. g. AFHCAN Project), Greenland (e.g. TEMS system) particularly in isolated regions (Niclasen & Mulvad, 2010; Haveman & Flim, 2007). Adapted Telemedicine/Telehealthcare Technologies and solutions could also be implemented to improve the poor access to health care services in the developing world.

This study aims at investigating the causes of poor health care services accessibility in the different health care systems in the developing world. It further pursues the objective to improve the health care services and increase access to healthcare services. An important objective of the present study is to investigate why, in the developing countries and particularly in Benin, only a few people use the health delivery services. It is reported in (Klein, 2005) that:

(…) Although in the meantime 83% of the population has access to the national health care delivery, only 36% of the population uses this.

The main point is how to tackle the challenges such as the poor health care accessibility as well as the quality of the health care services. Two major questions therefore arise:

1. Why only a few people (36% of the population) use national health care services?
2. What are the causes of the relatively poor health care accessibility in the developing world?
3. Could the access to health care services be improved as well as increased by launching information and communication technology (ICT) systems into the health care systems in the developing world?

In Thierry Oscar Edoh (2010a) the causes underlying the poor access to health care services are investigated and analyzed. It is figured out that launching Telehealthcare into the health care systems in the developing countries could be a solution to tackle the challenges mentioned above, so that expert medical specialists could remotely assist undertrained caregivers working in urban slums and/or rural health care centers in providing preventive, curative, promotional or rehabilitative health care services.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

A survey on mobile health (mHealth) adoption in developing countries reported that the use of certain mHealth technologies shows improvements in health care processes and health performance indicators (KPIs) (Chib, Velthoven, Car, & Helena, 2015).

This case-study on the health care systems in the developing world with a focus on the health care system in Benin, a West African country will be described in the following sections. The study results, solution approaches, and recommendations that are implemented for Benin could be also generalized and implemented for all SSA countries as well as other developing countries with respect to cultural and traditional means as well as social, economic, and technology level. The health care systems are similar in all SSA countries. The cultural and traditional means also do.

STUDY METHODS AND DATA

We conducted a case study from May 2007 until to November 2011 in Benin. Furthermore, we evaluated the accessibility of healthcare services in Benin from 2014 to. In 2016, the poor access to healthcare remains one of the main issues in the health system in Benin. In 2010, an eHealth system to improve access to pharmaceutical care in developing countries and particularly in Benin was implemented and tested in situ. By means of an ICT system called **"**ePharmacyNet**"**. ePharmacyNet is an E-commerce based eHealth-solution designed to increase access to the pharmaceutical care in the developing world. An on-site evaluation of the ePharmacyNet has shown how a simple adapted E-commerce system can improve the care provision delivery in developing countries. According to Maurice Mars et al. in (Scott & Mars, 2015), an E-commerce (the business side) is one of four (04) main elements of e-health. The other three (03) main elements are E-learning (the training – awareness, teaching, instruction, and education – side), Health informatics (the data gathering, storage, analysis, and distribution side), and Telehealth (the interactive – real-time or store-and-forward – side).

Samples Selection

To get more insight into the diverse issues and problems the health systems are being faced in the developing world, a quantitative and qualitative evaluation of the health care in different African countries is conducted. Thus, various prospective randomized studies in several African health care systems were performed. Health professionals, health bodies and patients from five (05) sub-Saharan African (SSA) countries(Thierry Oscar Edoh, 2010b; Thierry Oscar Edoh & Teege, 2011) were interviewed. The following countries are selected regarding the cultural, linguistic similarity as well as social and economic diversity (Income level, technology level):

1. Benin
2. Togo
3. Ghana
4. Ivory Coast and
5. Cameroon

Additionally, an exhaustive and comprehensive literature research was conducted about health care systems and health care services accessibilities in the developing countries (Srivastava et al., 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Among the literature we used following ones are best described the challenges facing the health care system in South Africa, in Tanzania, Nigeria, Kenya, Morocco, and Algeria (Williamson, Heywood, Williamson, Stoops, & Heywood, 2015; Mayosi et al., 2014; Thierry Oscar Edoh, 2010b; Adeya & Cavanaugh, 2007; Rotich, Hannan, Smith, Odero, Nguyen, Mamlin, Mamlin, Einterz, & Tierney, 2003; J. Braa & Hedberg, 2000; WHO Africa 2011; Development, Development, Hospital, & Hospital, 2015; WHO, 2015 -http://www.who.int/features/2014/morocco-maternal-health/en/-).

A snowball approach was used to select the relevant literature. The references in each paper are considered as the contact that links to another significant literature.

Study Data

Surveys are also conducted using questionnaires (online and paper format) and 1:1 interview. The surveys are focused on collecting data relating to:

1. Healthcare Accessibility,
2. Quality of health care services and health costs),
3. Use of traditional health care services,
4. Usage of Information and Communication Technologies and systems within the health care systems, and
5. Patient Education and Diseases Awareness.

The collected data were evaluated in the light of sociocultural influences, traditional manners, financial and familiar situation, as well as the education level the interviewees own.

The health care system in Benin was selected study's case to represent the whole SSA since a previous study had shown the similarity between all health care systems in SSA. Participants (*see* Table 1) to the study were public as well as private hospitals, clinics, district hospitals, rural health units, pharmacies.

We investigated the below questions relating to patient education. A comprehensive study has been performed, examining problems and solutions in fields of patient education, access to and quality of existing health information materials, access to the internet.

Q1: Is the Internet a source for health information materials?

Nowadays a lot of people are using the internet to get quickly informed about diseases and treatment. The survey has clearly pointed out this aspect.

Q2: *What is the quality of the health information materials from the internet?*

We investigate this question. Unfortunately, we cannot make any statement on the quality of the health information material from the internet. We just have a tendency, a lot of materials are consistent, the containing information is somehow biased. Certain materials are of good quality. In our forthcoming work, we will deeply analyze together with health care professionals an important sample of these materials to get more insight into their quality.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Q3: *How to assure the quality of the health information materials from the internet?*

Once we get more insight into the quality of the materials, we would design solution approaches to assure more quality in order to prevent health issues among the population using these materials.

Q4: *Do health systems use the internet to inform the population about diseases outbreak and how to prevent them?*

Our investigation shows that the health system in Benin has already used the internet to spread information on diseases. The recent case was during the Lassa outbreak in the north of the country.

Q5: *How to reach underserved population, that do not own infrastructure to access the internet, in case the internet becomes a secure platform for dissemination of medical information?*

An on-site test, we already conducted in the scope of previous work has shown that employing school teachers and other educated people in these regions can help to disseminate information on important subjects. These selected people could collect the information and disseminate it among the rural underserved population.

We pose a range of research hypotheses and verified them using the collected data and data analysis.

H1: *Nowadays people are getting health educated through the internet rather than by health care professionals*

This hypothesis is confirmed. Most interviewed people state to use the internet to get quickly informed, to seek for treatment methods and to compare the medication taking abroad in another health system. Most people seek health information from western countries because they are confident that these information materials are of good quality and, the medical treatment methods are better than the owner.

H2: *Highly educated people rather collect health information materials from the internet purposely for their own medical education than less educated people*

True. High educated purposely seek information on the internet. They have more ability and knowledge on how to use, to seek information on the internet. Most of them are using the internet for their daily work. Less educated with less social status only properly use the internet in their spare time. Also, they do not have the same ability as highly educated people.

H3: *Young people independently of their education level are less interesting in medical education*

We can figure out that girls are more interested in medical concerns than boys. WE have also noticed that the education is determinant here. Education girls are five (05) times more interested in medical means than less or not education.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

H4: *Young people are rather using the internet for joining social network than participating to online health communities*

This hypothesis is verified for young people, who use the internet more to attend social forums such as Facebook, WhatsApp, Skype, etc.

H5: *People living far from health care centers are more interested in online medical education*

These people behave similarly like other people. We cannot point out any difference. This hypothesis is rejected based on collected data.

H6: *Despite the collected information and materials from the internet and health communities, people more follow the doctor advises*

In the case of acute health conditions people tend to follow the collected information from the internet than the advice of a doctor, they further mostly avoid visiting doctors. Though in the case of chronic health conditions they behave differently, follow more doctors advises. They then go to traditional healers for two main reasons: (1) financial issues, (2) no satisfaction with the medical treatment at the hospital.

H7: *Most of the people whose use the internet to get educated on medical concerns cannot verify the quality of the materials they collect from the internet*

That's true. The study reveals this. The main reason is the lack of medical knowledge and capability to verify the content of the materials.

Table 1. Participants in the study

Category of health Care Units	Number of participating Units	Number of employees involved
University clinics (CNHU)	1	03
Departmental Hospitals (HD)	2	10
District and rural health care units	25	50
Individuals/Patients	495	00

Study Limitations

The main issues were the lack of information at the national level about the health care system. The collected data are mostly from academic studies carried out by non-African universities or international organization such as USAID. Less information is collected at the selected units. The Electronic Medical Records (EMR) system are most scarce or nonexistent. The few patient data found are stored on papers

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and are not complete. This leads us to conduct a survey at each selected health care system to collect complementary data in order to get a complete picture for a better analysis. The collected are therefore carefully evaluated and compared with the data from the literature.

STUDY RESULTS

Patient Education and Diseases Awareness (Health Literacy)

We adapted surveys from/of Agency For Healthcare Research and Quality (AHRQ) (AHRQ -, n.d.) to measure health literacy of the people and thus provide them with medical education materials through the system in order to improve their diseases awareness. The National Library of Health Medicine defines health literacy as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions. For the measurement of health literacy, we make use the Medical Term Recognition Test (METER) that consists of 32 medical words and 27 non-medical words. We define Score as number correctly identified medical words/ number incorrectly identified words. Scoring categories are:

1. Low literacy (0-15 words),
2. Marginal literacy (16-25 words),
3. Functional literacy (25-32 words)

The results of the patient education and diseases awareness survey show that subjects between 18 and 31 years old, independently of their education level, have similar score average between 25 and 30. We noticed similar score with Subjects older than 31 years.

Similarities in the Health Care Systems in Africa

Three (03) health regions are identified in the entire Africa (Figure 1), where all countries within a health region have similar health care system, health care deliveries issues, and economic level. The health care system and the quality of care deliveries in the countries in health region III are higher than those in the health region I. The access to health care and pharmaceutical care in the region III health systems are like the health care systems in the developed countries. Beyond these aspects, the rural areas in health region III are however facing similar issues like rural areas in health region I and II.

An annual report carried out by WHO confirms this result. The report says that the: (…). Usage of primary health services has increased but remains strongly marked by the disparity between urban and rural areas (…) [WHO 2014]

The health region II presents a special health care landscape. Different health care deliveries and services are identified within the same country (Thierry Oscar Edoh, 2010b).

A common aspect of the health care services in the developing countries is that the patient living in a rural region must go (by feet) a long distance (at least 30 km) before he reaches the next medical care facility able to give to him the specialized care he is looking for. For example, in Benin, it is difficult for patients living in the north and particularly in rural regions to visit (high) specialized health centres in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Cotonou or Porto-Novo (the two large cities in south of the countries), because of the high Transportation's expenditure and the cost of their staying in the large city during the treatment period.

Regarding the structure (Figure 2) of the health care system in Benin, each village, city, and commune in Benin may have at least one health care facility for the primary and secondary health care services. Unfortunately, not all Benin health regions possess a health care unit. The rural health regions are severely affected by the problem of the lack of health care unit. The health system, in Benin, is, furthermore, facing the poor access to pharmaceutical care. The density of pharmacies is extremely low in the entire country. In (Thierry Oscar Edoh & Teege, 2011), the poor access to the pharmaceutical care is investigated and analyzed. As result, an adapted E-commerce system, called ePharmacyNet, was designed and implemented to solve tackle this challenge.

In terms of health care delivery issues, the major challenges the health care system in Benin is facing are similar to those the Greenlandic health system has started fighting against in 2010 (Niclasen & Mulvad, 2010). However, Benin does not have the same telecommunication and city infrastructures like Greenland. Therefore, the main question to be addressed is whether the access to healthcare particularly in rural regions can be improved using Telehealthcare systems technologies inspired by the Telemedicine system implemented in Greenland and adapt them to the technical and economic realities in Benin. Telemedicine or eHealth is understood as the use of information and telecommunications system to provide remote health care to the population. Telemedicine is usually assumed to mean curative practices. Telemedicine is playing an increasing role in health development, in education and training, in quality improvement and in the improvement of efficiency of health care services (J. J. Braa & Hedberg, 2002).

Before launching e-health solution in the health care delivery system in Benin, each of the obstacles found regarding the present context would be analyzed in the step, and the system concept would accordingly be adapted. Since the obstacles are like those, which the authors found by launching ePharmacyNet the authors only discuss here the obstacles, which particularly concern the Launch of a remote care delivery system called eHospitalNet.

Challenges Facing the Health Care System

The literature research and surveys let us to identify the major challenges facing the health system, namely the limited economic resources, demographic structure (quickly growing population), big burden of diseases, rapid epidemiological changes, increased demand for specialized treatment, brain drain of health professionals, lack of health insurance and poor access to healthcare, particularly severe in rural areas and in the urban slums.

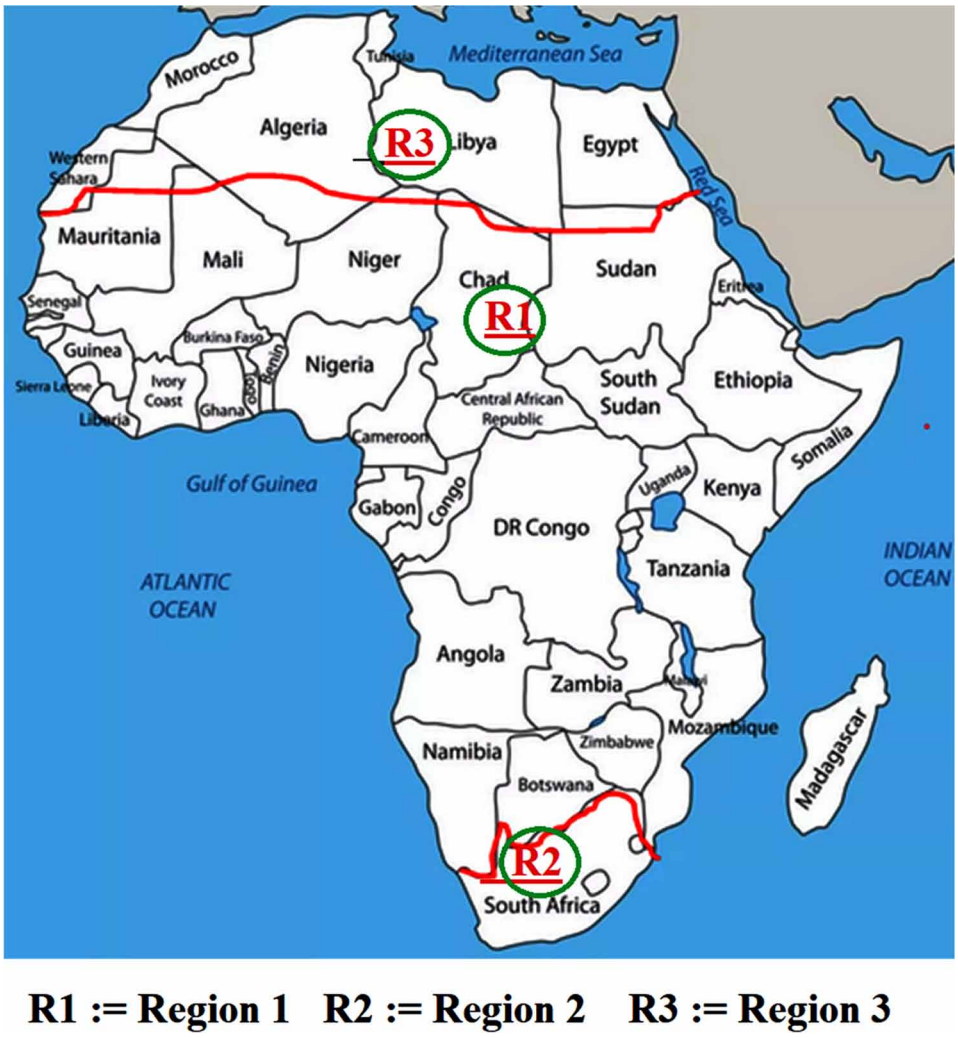
Structure and Infrastructure of Health Care Systems in the Developing Countries

The health care systems in most of the developing countries are similar. In a previous study, we pointed out that the health care systems in all sub-Saharan African (SSA) countries present similar structures, are facing the same infrastructural challenges (Thierry Oscar Edoh, 2010a). Asian developing countries' health care systems are however more developed than the SSA ones. Though, they face at diverse level similar infrastructural issues.

This section focuses on the structure and infrastructure in SSA countries. The health care system in the SSA countries falls under the purview of the Ministry of Health (MOH) and aims at providing ap-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Regions with similar health care systems and health care services accessibilities



propriate, qualitative health care services to the population even in the rural regions. Therefore, all SSA countries organize their health care systems in form of a pyramid consisting of three (03) services levels:

1. National Level is assigned with the tasks to define the national health policies.
2. Middle-Level coordinates (at least theoretically) all activities defined at national level.
3. The municipality, City, and District Level represent the decentralized unit. Medical facilities are subdivided into hospitals and a network of public or private medical services. They are intended to assure good accessibility to the healthcare delivery facilities.

The healthcare system based on two pillars, the public and the private health care sector, both parts of the system are under the responsibility of the Ministry of Health (MoH).

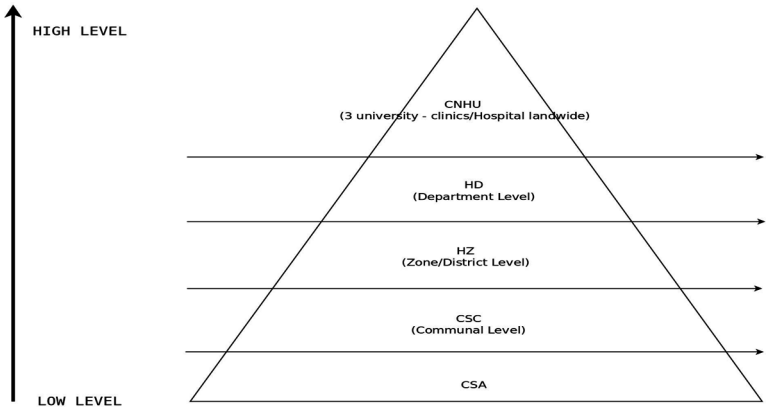
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In Benin, the medical infrastructure, also based on public and private health care sectors, presents a pyramid-shaped structure with five (05) levels (Maniatopoulos et al., 2009), which are, from the button to the top of the pyramid,

1. County Hospital/ Health Centre: CSA (Centre de Santé d'Arrondissement),
2. Communal Hospital/Health Center: CSC (Centre de Santé Communal),
3. District Hospital: HZ (Hopital de Zone),
4. Department Hospital: HD (Hopital Departemental), and
5. University Hospital: CNHU (Centre National Hospitalier et Universitaire).

Figure 2 illustrates the different levels of the healthcare infrastructure in Benin. The facilities of the lowest level (CSA) just provide the primary healthcare delivery, such as a small surgery (injury) or consultation for malaria infection. The next level, CSC, offers a little more health services. Therefore, the amount of the beds in a CSC is about 13 beds and more personal, and ambulance station (The third level, HZ, from below of the pyramid), can provide almost all conventional medical achievements and possesses a relatively good healthcare delivery system. The amount of the employees is higher than in a CSA and a CSC together and up to 200 beds are available in the category of hospital. The number of inpatient per year is clearly higher than in a CSA and a CSC combined. (30270 receptions per year comparing to 16996 receptions per year in the CNHU) (Adeya & Cavanaugh, 2007). Our research results reveal that these situations remain till date.

Figure 2. Structure of the healthcare system in Benin



Each Hospital of type HD has a capacity of around 300 beds. University Hospital (CNHU) disposes of up to 600 beds. The difference between both health care facilities categories HD and CNHU is about the amount of personnel and the beds, and the size of the health care delivery services: for example, radiology or cardiology department is more important and more equipped in a CNHU than in an HD. CNHU has more care specialists and is a university clinic. In comparison with HD, research projects are carried out in CNHU. There are more beds in large cities and particularly in the south of the country. A Report of the ministry of health (MoH) in 2004 had issued the disparity between different health centers

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

concerning a number of beds, care specialists and medical infrastructure. A survey conducted in 2014 in the scope of the present study, revealed that these disparity issues reported by the MoH in 2004 are not yet fixed. Table 2 summarizes the amount of existing medical facilities in the entire country as well as their density.

Table 2. Medical facilities in Benin and its distribution

Facility Categories	Facilities per Department	Total of Facilities in Benin
CSA	46	425
CSC	08	075
HZ	03	027
CHD	01	005
CNHU *(Available only in Cotonou, Porto-Novo, and Parakou At national level: [CNHU-HKM], [CNHPP l'HOMEL] [CNHNP Jaquât].)*	1	003
Facilities in medical private sector	> 400 *(In Cotonou only)*	2197 *(legal & illegal)*

Disparities in Access to Healthcare

Differences in access to healthcare across the different populations are the consequence of the structure described above and weak health care infrastructure and thus the main issues facing the healthcare system in the SSA countries. The medical facilities are often too far from the residential areas. Most rural regions lack municipal infrastructures such as streets, energy supply system, etc. The access to healthcare depends therefore on the place of residence of the patient. Thus, the rural populations have a poor access to healthcare in comparison to the urban population. In addition, the economic situation is an important factor impacting the degree of the access to the healthcare delivering services. Due to the large distance between the places of residence and the pharmacies, pharmaceutical care also remains a major challenging problem that the healthcare system is facing (Thierry Oscar Edoh & Teege, 2011).

As in most SSA countries, in Benin for example, 51% of the women are living relatively close to a hospital, more than 13% of the women live at least 30 kilometers far away from a hospital or a comparable facility, and the remainder has a poor access to medical care (Klein, 2005). About 15% of healthcare provision in Benin is provided by the private health sector. Most of the private health sector is in large cities. The quality of the services provided by the private sector is higher and more expensive than services provided by the public sector. The private health care provision is only accessible for a part of the population, namely the rich population, Government members and their families. There exists also a "cheaper private sector" in the healthcare system that is consisting of small facilities with a maximum of three employees with elementary medicine background. There are only nurses who just provide basic healthcare services like prescription in case of non-complex malaria and/or small injuries.

The healthcare provision in rural regions is almost non-existent. The causes are mainly the lack of medical infrastructure, missing of care specialists, health professionals, undertrained staff, insufficient funding of the health system (health insurance policies are scarce).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Many annual reports carried out by the World Health Organisation (WHO) have reportedly indicated that healthcare systems in the Sub-Saharan African countries are in a poor state; however, these reports have never discussed the true causes leading to the poor healthcare provisions and disparities in access to healthcare. The poverty is the most cited cause. However, the poverty is only the peak of the iceberg. The low density of pharmacies and health centers in the entire country, the lack of health insurances are the main causes of the disparities in the accessibility to health care.

Poor Pharmaceutical Care and Problems of Counterfeit Drugs

In the large cities as in rural regions, it is often difficult to purchase all medicine on a prescription in one pharmacy. Often the patient must search in several pharmacies for the medicine and sometimes the patient cannot purchase all prescribed products. All SSA countries are facing this challenge at diverse level.

The health care systems in SSA countries are also suffering from counterfeit drugs, which can be purchased at any market place. Despite the various registered adverse drug reactions, death cases, most people prefer to purchase the dangerous drugs (counterfeit drugs), because they are very low priced than the products at legal pharmacies, and are available anytime at the market while the pharmacies are often facing the drugs shortage. In South Africa, the villages and/or slums/ghetto are facing the drug stock-out more than the large cities.

Medical Data Processing, Communication Systems, and Usage of ICT in Public Health Care

A typical aspect of the health system situation in these countries is strongly limited use of information and communication technology (ICT). In nearly all cases patient data processing is carried out manually using paper documents. Other ICT systems applications, such as data mining or communication platforms are also mostly absent in the African health sector. Medical statistics are rarely conducted.

Data gathering and processing in the health care system of Benin remain largely paper-based. The paper based data management systems about the living situation of people particularly in rural areas and slums, the rate of illiteracy and the poor organization of the health care centers impact negatively the quality of the medical data, the data security and thus the medical care. The patient data are recorded in a booklet (*Figure 3*), which patients keep at home. Most of the patients, particularly in rural areas and urban slums, regularly lose their medical booklet. This influences negatively the data protection/integrity and data security.

Electronic medical records are scarcely used in the health care system in Benin. There exists no ICT based data processing system at the different health care units. This situation is more severe at all health care unit in the poor regions, rural regions, and slums. Patient medical data are recorded in a register. The information contained in such registers is incomplete and has no benefit for the care develiry. During the study, many registers were found in a bad state under the table of the nurses or in a storehouse. Each patient must buy at each medical visit a booklet to record his data into it. The recorded data are temperature, name, address, weight, and size. At the end of the medical visit, the nurse records the prescription into the booklet. At the next visit, the nurse collects the booklet but does not use the information contained in it. The patient and health care professionals contribute together to data loss in the system. More than 1000 booklets were evaluated. The evaluated booklets contain no health history or any data useful for a care delivery.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Beyond the poor patient data processing, information exchange and communication within the healthcare system is mostly paper based and takes long. The medical institutions have almost no IT infrastructure, particularly the medical facilities at the lowest level are poorly equipped.

Consequences of the situation described above are that 85% of reports and/or information within the system are wrong or contain incorrect data and are thus useless and can negatively affect the quality of the care delivery. In 1999, the USAID found out that 74% of the report contains errors. In 2014/2016, we found that the amount is higher than the one found in 1999. In conclusion, the error rate has risen at the rate of 11%. The main reason is the complexity of care delivery and the demographic factor.

(…) Data quality is still a problem because reports are not free from errors. An internal evaluation of SNIGS conducted in 1999 revealed that the proportion of errors in the reports transmitted was not significant. However, considerable errors and distortions existed in certain of the epidemiological data (for example, 74 percent of reports on new cases contained errors). (…) [USAID]

The ministry of Health (MOH) indicated in its report on May 2007 that National Information and Sanitary Management System (French: *Système National d'Information et de Gestion Sanitaires* -SNIGS) disposes of databases at the central, departmental and certain health zones level. Unfortunately, these digital databases cannot currently (in 2016/2017) be accessed through the Internet. There is a case definition for the data in it and standardized collection method. Following tasks are assigned to the actor within the system: (i) Epidemiological surveillance, quarterly meetings, (ii) Routine system (departmental team and sanitary zones) of annual meetings with the team SNIGS Central to validate the data and discuss the inconsistencies. The MOH has objectively declared that the annual meeting at the central level is insufficient and therefore has no effect on the expected improvement of the quality of the data at the departmental level (Ministere de la santé, 2007).

In 2017, we briefly investigate the use of SNIGS and find the usability tedious for people with less education level. The system contains a lot of information, but not complete, for example, we find no entry about pharmacovigilance, no entry about off-label-use, but more detailed information and statistics on malaria affection and relating death rates. Figure 4 shows a statistic on detected malaria in 2014 per region in Benin. Figure 5 illustrates the data flow in the SNIGS from low-level care unit to high-level care unit (Figure 2)

Personal Shortage

The workforce shortage a matter cause of the poor/limited access to health care delivery in certain regions of the country. So due to a brain drain from developing countries toward the developed countries, the low- and middle-income countries lack medical experts, general physician, nurse. The challenge is more severe in the rural areas than the urban areas, then the rural regions have poor medical infrastructures.

Poor Diseases Control

Infectious disease can quickly spread in a crowd such as in a supermarket, the market in Africa, festivities, dancing crowd, etc. It is therefore important to surveil crowds during their life-cycle collect and process the crowdsourced data to determine any risk of emerging infectious diseases. It is also important to collect data about infectious diseases through the health based on defined policies.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Booklet for patient's medical data record

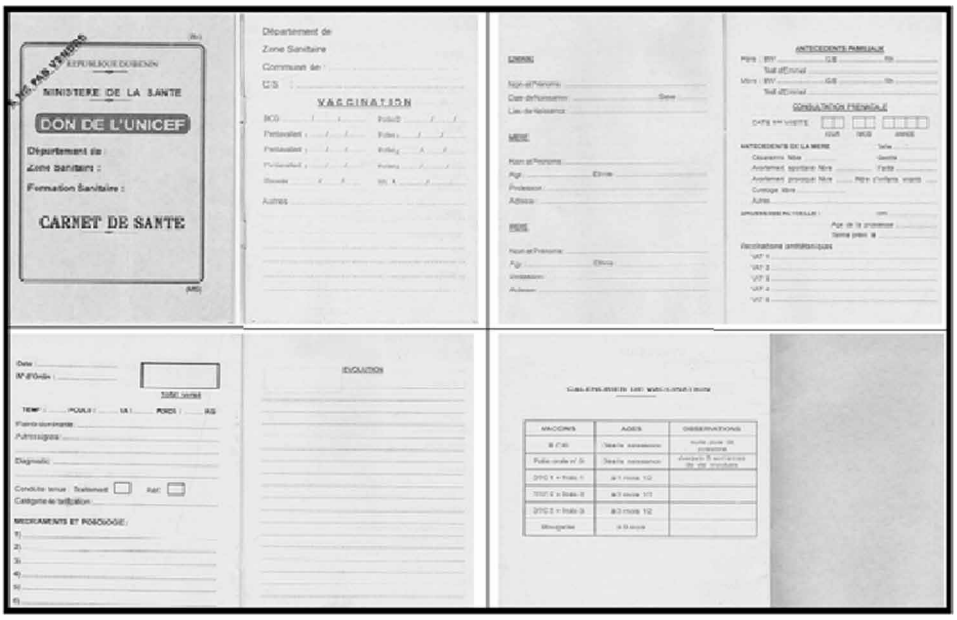
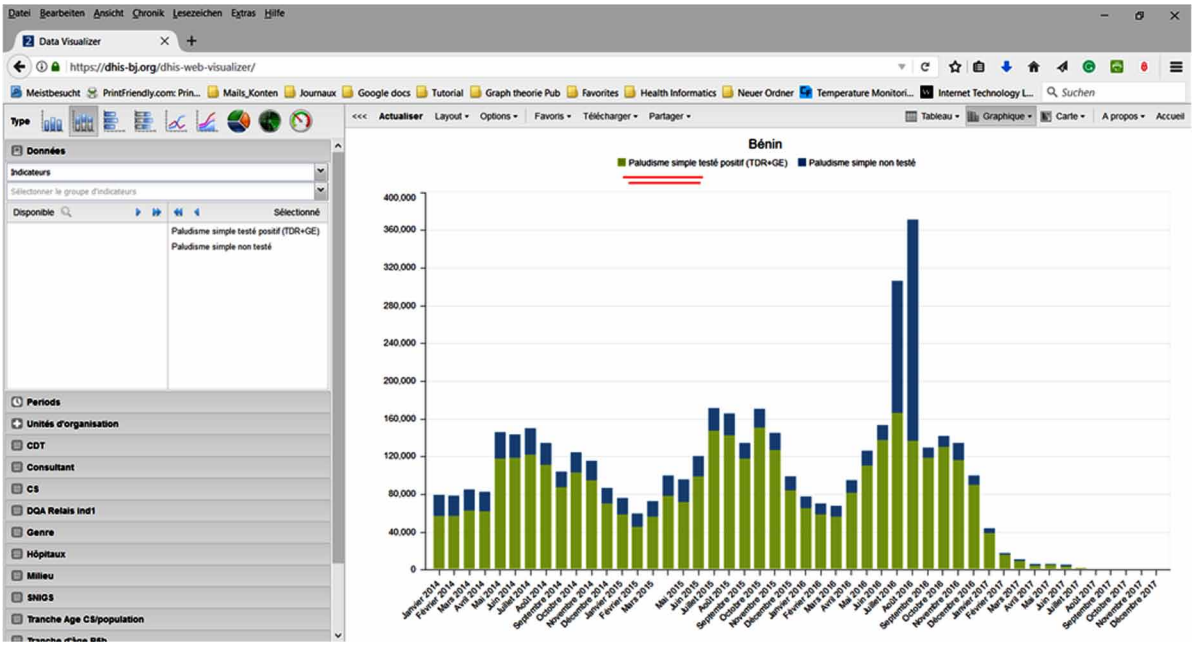
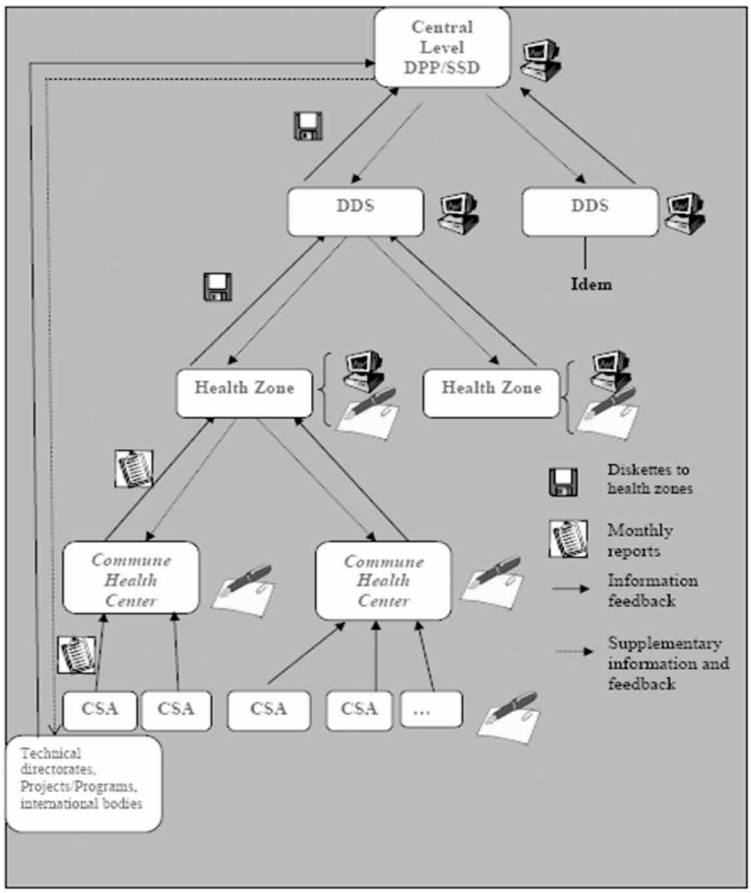


Figure 4. A view of malaria statistics on SNIGS GUI



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 5. Data and Information's flow within SNIGS



Notes: SSD (Statistics and Documentation Service) is part of the central-level DPP (Directorate of Planning and Forecasting). DDS is the regional administrative body (Health Department Directorate).
Source: DPP, Statistics and Documentation Unit.

The case of Ebola epidemic in Africa in recent years has shown the weak and poor diseases control in the developing countries. Our investigation reveals the non-existent of diseases control units in several developing countries, or weak health and technical infrastructures intended to surveil diseases outbreak. It arises thus the need of pervasive screening.

The study we carried out in the African developing countries also reveals a lack of policy and tools in the health systems to collect infections related data so that they can be analyzed. The recent Ebola outbreak in West-Africa leads the key actors in the different health systems to design and adopt diseases control and surveillance policies. However, these policies lack supporting materials such as ICT systems to collect, process, and share the information so that a quick decision would be taken.

Poor Funding and Health Insurances Systems

In 2001, in Abuja (Nigeria) the NEPAD recommended to the 53 African Countries to allocate at least 15% of total government expenditure to the health. They should steadily increase their budget allocation to meet the so-called Abuja 2001 target by 2015 (NEPAD, 2007). Unfortunately, Benin spends every

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

year 7,5% of the national budget for the health system. In 2014 Benin spends accordingly 129 million dollars for the health system. According to NEPAD Benin should allocate 258 million dollars to its health system. A health insurance system is therefore needed to help to meet the Abuja 2001 target of 15% of the national budget.

It's recommended to launch a health insurance where each inhabitant would pay 1000 Frs CFA (about $ 1,5) a month. The population of Benin is estimated to 10 million people. Such health insurance would bring each month about 15 million dollars. Launching the proposed health insurance could thus bring around 180 million dollars per year into the health care system budget, i.e. 10,5% of the national budget. The system would then dispose around 310 million dollars per year, i.e. 18% of the national budget and can thus improve a lot the quality of care services.

Further Major Challenges

Energy Supply, Frauds and corruption (Hope, 1999) *and poor health insurance* are further major challenges facing the health system. The poor health insurance is one of the underlying factor of frauds and corruption within the system.

Monitoring of and integrating *Traditional medicine and herbal treatment* into the health system remains a challenge the health system is facing. On one hand, traditional medicine can become too dangerous, since most practitioners are illiterate and additionally perform mostly wrong medical diagnosis. On another hand, traditional medicine can well cure certain diseases (Hlungulu & Thinyane, 2009).

A REMOTE HEALTH CARE IN BENIN AS SOLUTION APPROACH

To tackle the challenges described above, we propose a remote health care delivery system based on a multidisciplinary team. This kind of remote care health care delivery solution has the potential to tackle the challenges facing the health care delivery system. The example of the health care system in Greenland launching Telemedicine solutions to tackle the facing challenges lead us to also use the telemedicine to solve certain issues. We adapt the standard telemedicine solutions to needs and technology level in the country. The novelty of this approach is to adapt and use pervasive healthcare to improve access to health care tailored for a healthcare environment with a low degree of technical infrastructure in a poor state or non-existent.

The main questions arising in the concept and design phases are;

- Could telemedicine solutions tackle all facing challenges for the health care system in Benin?
- What about a personal shortage? Is telemedicine a solution approach to overcome this issue also?
- Could telemedicine help to fight against fraud and corruption?

To answer the above questions, it is a matter to know what telemedicine and/or telehealth care are and their limitations.

Telemedicine is defined as health care provided at the remote using modern information and communication technologies, such as the internet, audio/video, computer, mobile devices (mHealth) and across geographic time, social and cultural challenges.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Telehealth car**e** is according to WHO defined as the integration of tele communications systems into the practice of protecting and promoting health, and telemedicine is the incorporation of these systems into curative medicine(Darkin & Cary, 2000).

According to the above definition, a standard telemedicine solution cannot tackle all facing challenges. For example, the definitions above do not issue about a personnel shortage in health care systems. Therefore, the telemedicine solutions and systems must be adapted and extended with additional features to meet the needs and tackle the facing challenges

The adapted and extended telemedicine system will focus on pervasive healthcare, health promotion, and prevention, patient education to increase diseases awareness among the population, improve the (continuous) training for health professionals, and improve the data collection and thus the quality of the data within the health care system, and solve the workforce shortage issues.

Involving/including traditional practitioners into the proposed remote health care delivery system may help to overcome the personnel shortage issues. They will be trained to perform better diagnostic, improve their treatment methods. High-specialized health professionals and private clinics may be encouraged to move to smaller health care regions.

The proposed remote care delivery system features a Virtual Hospital-Network (VHN) solution that uses Telehealthcare technology such pervasive computing to provide mobile pervasive/ubiquitous healthcare service to the population at any time and in any region of the country by removing locational/geographical, time and other restraints. It should enable remote assistance to the undertrained caregivers, collaborating work between care professionals, provision of remote health care to the patient at home, and educate the patient. In addition, it should include traditional practitioners into the system and train them to be able to perform diagnostic, since this is the weak point of traditional medicine. Further, the system should consist of Telehealthcare system based on a network of medical centers, whereas at least one of the centers belonging to the network should be closer to the patient's place of residence.

The global aims of the proposed system is to tackle the challenges facing the health system in

1. Increasing the accessibility of professional caregivers and specialized care
2. Increasing the quality and continuity of care to patients
3. Focusing on preventive medicine through early intervention involving traditional practitioners, village nursing, and NGOs
4. Improving the Adherence to Treatment
5. Reducing the overall cost of healthcare
6. Improving the caregiver's education and training
7. Providing services to remote areas in the case of natural calamities and disasters, and Remotely monitor chronic patients.

CONCEPT AND CHALLENGES FACING THE IMPLEMENTATION

The proposed remote health care system is combining the telemedicine, telehealth, eHealth, and mHealth technology with agile project organization and management paradigm. Compared to agile development, the proposed system disposes of a team as a pedestal for supporting the remote healthcare delivery systems using mobile phone technology, a care facilitator (call scrum master in agile development) who assist the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

team during a medical treatment. The facilitator can be a remote physician with a strong background in medicine and organization. The patient and his relatives could be considered as the product-owner (scrum).

Multidisciplinary Health Care Team

The proposed multidisciplinary remote healthcare team consists of health professionals (doctors and nurses), NGOs workers (who play the role of social or community services, psychologist), pharmacists, and local communities.

Local Nursing/Village Health Centre health

The local nursing or care units at village (rural) level are the central component in care delivery services within a multidisciplinary remote health care system. At this level, primary or specialized care could be provided to the patient as far as the needed medical infrastructures and tools are available. Specialized care would be provided remotely through care specialists at large hospitals or clinics located in large cities.

Health professionals working at this level would oversee the patient-education for increasing diseases awareness, improving the disease prevention. The caregivers would inform individuals living around these care units about medical and health concerns. It is required that each health professional, working at these units, is proficient in the local language and dialects to communicate easily with the local population. A medical local dialect guide must design and implement for patient and health professional to ease the data record since the record into the system is finally done using the national working language (French in case of Benin). For example, how to translate 37°C into and from the local dialect? These communication's guides (medical local dialect guide) need to be improved.

Health professionals at this level work closely together with NGOs, community trained caregiver at many levels, for example, helping the patient in paying a part of his medical fees, visiting him at his place of residence, training him on hygiene, prevention of infectious diseases, and first aid.

Community Trained Carer (Voluntary) at Rural Level, NGOs, and Social Workers

Community trained caregiver and NGOs are mostly close to the population and work on voluntary basis and could provide first aid care to patients and organize their transportation to care units in case of emergency. They are present at the places lacking care units or health professionals. They are assisted by health professionals at rural level in giving first aid to the patients. The health care professionals at the rural level are in turn assisted by the specialist at large hospitals. Thus, the accessibility to health care and quality of the care services can be improved and increased.

Community trained caregiver and/or NGOs use a Mobile Computer Supported Collaborative Work Systems (MCSWS) to share information, data, and, a message with the health professionals at next close care unit. They can use the mobile phone for access to the patient emergency data. These emergency-data provide information about the communicable (infectious) disease the patient is suffering from, medicine that can cause adverse effects for the patient, and for chronic patients, the how-to-do for the first aid to stabilize him.

One important component of this system is the mobile emergency pharmacy the volunteer is equipped with. He can provide the patient with (all) needed medicine, then they know approximately the medical needs of each patient they are medically assisting. Regularly, surveys are conducted to state on the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

medicine used in each care area. Thus, they can refill their mobile emergency-pharmacy with necessary pharmaceutical products.

The work materials and pharmaceutical products are partially funded by the NGOs, community association, and certain foreign donors. An adapted health insurance for funding the system must be implemented.

Trained Traditional Practitioners

Rural populations in developing countries are more confident of traditional medicine than modern medicine. While poor medical diagnosis is the big weakness of traditional medicine, there are diseases, which are actually best treated by traditional medicine. Since the rural population in those parts of the world are more confident of traditional medicine, therefore it's proposed to involve the traditional practitioners into the multidisciplinary health team and train them to perform a better medical diagnosis to provide the best care. Traditional practitioners will be coached and assisted by health professionals.

It's further proposed a multimodal database to record information about traditional medicine and treatments. This would help to improve the traditional medicine, share information between health professionals and traditional practitioners, and between traditional practitioners and traditional practitioners. Because of the high illiteracy rate among the traditional practitioners a VoiceXML-application (Speech Interface Languages) is proposed so that the practitioners can use it to record information into the multimodal database. The system provides also video interface to enable to record images and video materials into the database.

Pharmacist (Using ePharmacyNet)

Most health care in developing countries are facing poor access to pharmaceutical care and the concerned populations are suffering of "Pharmacy tourism" (Thierry Oscar Edoh & Teege, 2011). ePharmacyNet was designed and implemented to tackle the challenges caused by the "Pharmacy Tourism". Pharmacies at care units and pharmacies from private health sector are chosen to be part of the multidisciplinary team and use ePharmacyNet to provide medicine and other pharmaceutical products to remote patients. A question arises here, how to deliver cost efficiently, effectively, and safely and securely the pharmaceutical products, since the road-rail network in the whole country is in a poor state? A smart drugs transportation system is presently in the testing phase. The results will be presented in our upcoming paper.

Remote Care Specialists (Tele-Doctors)

As described above, care units at rural level face a care-specialist shortage. Remote care specialists are required to be involved in the multidisciplinary remote health care system to assist nurses working at rural care units in providing care services. Care specialists from the private health sector could also be requested to participate in the system and help to minimize any eventual workload within the system. The remote care specialists are provided with MCSW systems, which they use in collaborating on a medical case. Patient-data can be shared through the MCSWS. The MCSWS enables video and voice conferencing communication. Most of the applications in use in the MCSWS are running on the mobile phone (from GSM to G3). Few desktop computer or laptops are in use in the system.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The designed MCSWS provides a training feature for the undertrained nurses and doctors. All communications, in any case, are recorded and serve as training materials for the health professionals providing an assistance and treatment protocols. Because of the privacy sensitive nature of health data, patient's personal data is erased from all training materials.

Psychologists

Psychologists will accompany the community carer/caregiver, nurses, and traditional practitioners in daily work. They will coach and train the community carer/caregiver, nurses, traditional practitioners, patients and their relatives.

Remote Care Delivery System and Diseases Surveillance

Tackling the challenges facing the health care system regarding the poor health care services accessibility means to provide the health system with an adapted telemedicine solution that helps to overcome the challenges.

The following features, according to the defined requirements, should be provided:

1. **Diseases Surveillance and Monitoring Using IoT/crowdsensing Paradigm**: Surveillance and monitoring of health have been recognized efficient and cost effective
2. **Electronic Medical Record (EMR):** Improving the data collection, processing, and management as well as data exchange
3. **Remote Diagnostic and Care Delivery:** Bring the care service to patient
4. **Continuous Education Unit for Care Professionals**
5. **Patient Education**
6. **A Subsystem to Help Traditional Practitioners to Perform Adequate Diagnostic and Treatment:** Overcoming the personal shortage issues
7. **Pharmaceutical Care Delivery Subsystem**

The proposed system (Figure 6) consists of two subsystems:

1. ePharmacyNet and the
2. Virtual hospital network system (VHNS).

ePharmacyNet is an adapted mail-order-pharmacy (Thierry Oscar Edoh & Teege, 2011). *VHNS* is a virtual Hospital network system providing a Hospital Information system, Enterprise Resource Planning and computer supported collaborative work system for hospitals-employees, medical doctors, nurses, enabling patient data management (data record system), tele-surveillance and remote healthcare delivery systems. Electronic health cards for health care professionals and patient, called eHealthCard, are also provided for access control to the system, securing data, and combating frauds.

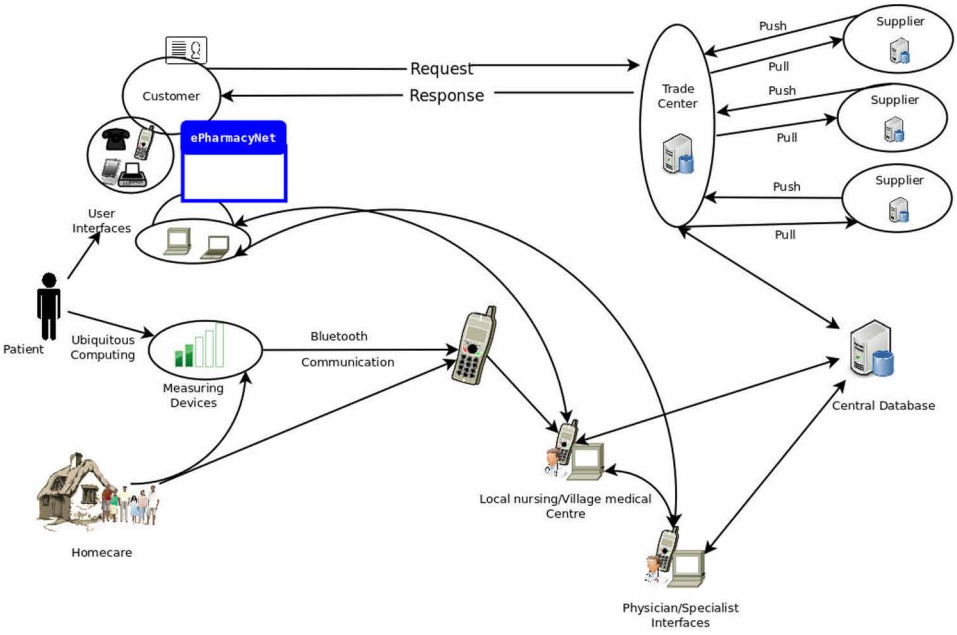
Chronic patients can be provided with a wireless sensor network (WSN) (i.e. Internet of Things –IoT-) that will be sensing and delivering medical data such as bio signal to *VHNS*. The WSN gateways are interfaced on the patient's mobile phone and allow each sensor in the WSN to send/receive data to/from

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

an application running on the patient mobile phone. An application transmits automatically all data from patient's mobile phone to the treating nurses/physicians.

Telehealth systems connect remote patient to doctors through ICT devices [Definition from WHO], the religiously and/or traditionally conservative population could reject the system because of the lack of a direct patient-to-doctor physical contact, therefore, the concept foresees a multidisciplinary health team that in situ works with the patient and remotely works with the treating physician. The team is an ad-hoc team that is built and committed to a precise medical treatment task.

Figure 6. Architecture overview of the proposed remote care delivery system



Barriers to Implement a Standard Telemedicine Solution

Implementing a Telehealth system as described in (Scott & Mars, 2015) implies that ICT smart devices, reliable telecommunication infrastructure, and energy are available. Furthermore, the users of the system need basic to solid ICT knowledge and awareness of IT-security in term of data protection. The present technology level and economic situation in Benin are unfavorable for implementing any standard Telehealth system. Therefore, this concept consists of two steps: first, adapt the designed system and chosen infrastructure to meet all identified obstacles and/or problems and satisfy the requirements. The second step will consist of considering the economic, financial, social, and cultural aspect of the solution.

The evaluation of the problem of the poor access to medical health care from the viewpoint of the information technology had revealed that the main issue is the lack of information and communication system and infrastructure in the Benin health system. Communication and data sharing between the different health-units remain paper based (e.g. the case of SNIGS in Health system of Benin (Figure 5*)* and the reports of MOH of Benin (Ministere de la santé, 2007) and (Mathias et al., 2013). A further

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

aspect is a large distance between the patient place of residence and next possible health care unit. The structure of the health system and the poor state of medical infrastructures particularly in rural regions are factors of the poor access to health care in Benin.

There exist obstacles for launching such a standard Telehealthcare into the health care system in Benin. Every single of these obstacles hinders the successful launch of a standard Telehealthcare system. A standard Telehealthcare system described in (Scott & Mars, 2015), is based on application, technologies using: (a) any ICT devices, (b) simple or complex multimedia to video conferencing to virtual reality. Further, it can be used for preventive, promotive and curative care; can be interactive (synchronous or asynchronous), and connects population/patients to health professionals and any person involved in care provision process.

Problem 1: (Tele) Communication

The infrastructure and the coverage of telecommunication systems (The Internet, telephone line, mobile phone system, etc.) are decisive for a well-functioning Telehealthcare system in the country. Telehealthcare requires a (large) bandwidth transmission system and a very high transmission quality for pictures (for example x-ray pictures, etc.) or video (video conference). This cannot be guaranteed today. Telephone connections must also be good. More than 90% of all regions in Benin are actually covered by mobile phone system (Thierry Oscar Edoh & Teege, 2011). However, internet connectivity is not well established in the population. Even Telephone connections have not entirely covered the country yet for the use of Mobile Data services.

Problem 2: IT Infrastructure for the System User and -Operator

A standard notebook costs more than 500 dollars against 300 dollars in the high-income countries. Fortunately, in Benin like many developing countries, the number of mobile phone subscribers reached 9.63 million in 2013. In 2015, Benin accounts about 10 million of mobile phone subscribers for 9 million populations. Our recent study conducted in 2014 showed that most people possess at least 2 to 3 mobile phones. Furthermore, GSM/2G, 3G mobile phones are more widespread than 4G capable mobile phones. Mobile phones are becoming ubiquitous. In 2017, the population in Benin is estimated to 11.516209 inhabitants. The penetrations of telecoms services, by March 2017, are summarized in below table.

87,2% mobile SIM penetration is an approximation since till to 2016, mobile phone numbers are not registered. In 2017, one can buy on the street SIM card and use it without registration. Our investigation leads us to estimate the penetration to more than 90%.

Table 3.

Penetration of Telecoms Services	Penetration
Fixed-line telephony	0.5%
Internet users	33.1%
Mobile SIM (population)	87.2%

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Problem 3: Paying the Medical Fees

There is no electronic payment infrastructure compared to what exists in high-income. Most patients do not even have a bank account. Only a few people in the country possess a bank account and there exists no obligation for the inhabitants to register with the authorities. Doctor's fees must be paid before the physician treats the patient.

How should the telemedicine services fees be paid in the case of a remote medical treatment? The issue can be solved by launching a mandatory health insurance for everyone, that will cover the most medical fees. Additionally, it is recommended to use the available mobile money solutions such as M-Pesa, MoneyGram, MTN Mobile money, etc.

Problem 4: Energy Reliability

There is no reliable electricity supply for operating ICT equipment. ICT components must have automatic recovery functions which allow a restart after an electricity outage without damage to the system.

There must be backup solutions to keep the system working when no electricity is available. This may be backup for electricity supply, such as a generator or solar power modules, or it may be a fall-back mode based on paper and mobile phones.

Problem 5: Medical Transportation in Case of Emergency

Unreliable transportation means and roads in the poor state are a factor underlying the poor access to health care too. Remote patients spend a lot of time to reach the next closer health center. Most of the time, they have to go more than 30 km and spend more than 3 hours to reach the next care unit. There is no transportation possibility available in remote areas due to the poor road-rail network. Ambulances for patient-transport are scarce in the whole country. Thus, in the case of emergency, remote patients are treated at home or delivered too late to the emergency-center. Most of the time emergency-patients are carried to the hospital using public or private transportation. The drive takes actually long. Most of the patients are dying at the place of accident or during the transport.

Problem 6: Poor Health Insurance and Underfunded Care System

There is no reliable health insurance system in the health system in Benin. A survey conducted on the topic and discussion with the key persons had figured out a government health insurance in the health care system. This health insurance is funded at 100% by the government for health care professionals and 20% for the other government employees. The remaining 80% are carried by themselves in the case of illness. Employees at the private sector or jobless have no health insurance. They have to pay 100% of the medical fees. The health care problematic also underlies the poor health care accessibility.

Problem 7: Fraud and Corruption

Fraud and corruption are also factored leading to poor access to health care in developing countries (Mackey & Liang, 2012), particularly in Benin. They further adversely impact the infrastructures, financing, and social determinants of health.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In Benin, each care unit at rural, district or national level possesses public pharmacy-infrastructures, which are intended to provide the patients with the basic medicine. Those pharmacies are often low on stock due to fraud occurring in the care units and/or because of poor planning. Caregivers sell the pharmaceutical products at black markets or use them for private concerns. Furthermore, patients are only provided with those products only if they bribe caregivers or have a relative working at the care units. This kind of corruption in any health sector, particularly in developing countries, can gravely and negatively impact the quality and the coverage of health care services. Price inflation or high medical fees could be the direct consequences and thus a barrier to access to health care delivery for resource-poor people.

ARCHITECTURAL OVERVIEW

A wireless sensor network to provide pervasive mobile healthcare and wireless health monitoring services for chronic patients is designed and implemented. This is the class of the measuring devices connected to patient's mobile phone for transferring critical measuring values to the next hospital and inform the concerned members of the multidisciplinary remote healthcare system. The communication between the measuring station and mobile phone is a Bluetooth based communication and/or near field communication technology. Today most mobile phones feature this technology to communicate with other devices nearby using device-to-device (D2D) communication paradigm. The architecture of the proposed Telehealthcare system is Service Oriented.

The system features services responsible for a defined unique task such diagnostic service, education service, payment service, etc. which use diverse communication protocols to exchange data and information. Devices using the same communication protocol such as Bluetooth, Near Field Communication follow the D2D communication paradigm. Machine-to-Machine (M2M) communication paradigm is then performed for autonomous communication between machines.

Brief Background

Device-to-Device (D2D) Communication enables devices to communicate directly without interaction of base stations or access point. It is intended to exchange data utilizing various technologies such as Ultra-wideband (UWB), Near Field Communications (NFC), ZigBee, Bluetooth, Wi-Fi-Direct or LTE Direct. The distance between the devices is relatively short and defined by the using protocol. The communication is technology(Haus, Waqas, Ding, Li, & Member, 2016).

Machine-to-Machine (M2M) Communication is an autonomous communication, based on a cellular network such as GSM, LTE, etc., where the communication past through core networks via base stations or access points and M2M Server (application server). Compared with D2D, the communication is not direct, does not matter if the devices are approximate to one other. The distance between the devices is unlimited. Furthermore, the M2M communication is application oriented and technology independent (interoperability) (Haus et al., 2016).

SYSTEM USER INTERFACES

User Interfaces (Devices)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In information technology, the user interface (UI) is everything designed into an information device with which a person may interact. This can include display screens, keyboards, a mouse and the appearance of a desktop. It is also the way through which a user interacts with an application or a website [Margaret Rouse]

Mobile devices such as mobile smartphones, PDA, tablets, notebooks/laptops are required as user interfaces to access implemented remote health care provision system. The applications can also run on a desktop computer. Further, for bio-signal acquisition through sensors and peripheral devices "Bio-signal Acquisition Module" will be provided. Digital Camera is additionally needed for the digital image or video capturing if requested.

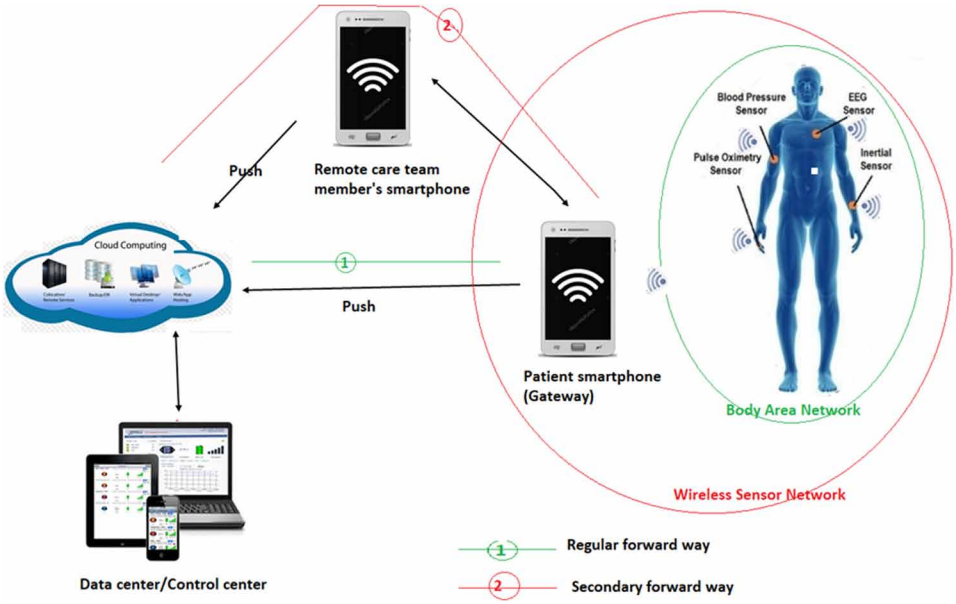
Mobile (Smart)Phones

Smartphones are used as a gateway within the wireless sensors network placed at the patient to pervasively collect his bio-signals.

The collected bio-signals would partially be processed and stored at the edge. If the patient smartphone is not connected to the internet to forward the data.

Remote system team's members could also use their smartphone to call the stored data on the patient smartphone and forward them to the system for further process. Figure 7 illustrates the data collection and forwarding to the remote care center.

Figure 7. Smartphone usage in data collecting, processing, and forwarding



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Tablets

The tablet as UI enables the user to access and interact with the application or platform (Figure 6).

Desktop Computer

Like a tablet, the desktop computer enables the user to access and interact with the application or platform (Figure 6).

Laptops

Like a tablet, laptops enable the user to access and interact with the application or platform (Figure 6).

Fax-Machines

Communication over fax-machine is foreseen to overcome the internet access issues. As above described the internet is not reliable and not all regions in the country are covered. This device could then be used to send requested documents to the remote care center.

Land Phones

The land phone, despite that it scarcely existent, could also be used for diagnostic purposes, medicine order, etc. in the case of internet access fail.

Graphical User Interfaces

A graphical user interface (GUI) is a purely textual user interface to a computer or computer program/application. A GUI enables interactions with an application where the client (in the case of server-client architecture) or the standalone application runs on a device (User interface).

Web-browser, desktop GUI, and console are candidate GUI enabling interaction with the proposed system.

The remote care delivery application is multimodal access platform, where the user can access and interact with the application through web-browser (Firefox, Microsoft edge/explorer, Google chrome, etc.), an implemented desktop GUI, and console.

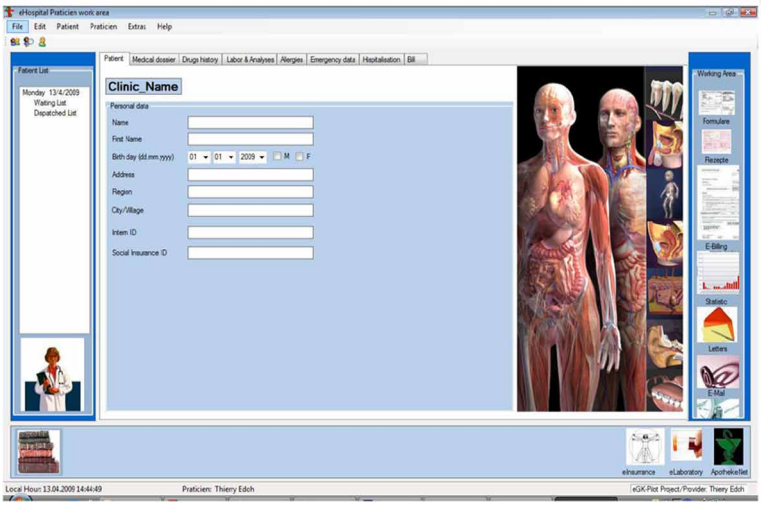
The application is a RESTful Web-Application accessible through web-browsers. The desktop variant of the is SOAP-web-service based where the client on the desktop a dot-Net client using WCF (Windows Communication Foundation) technology to communicate with the java based server.

In following certain main graphical user interfaces will be described. The further Forms could be provided by the authors on demand.

The application has more than 150 user interfaces provided by all sub-components. The application is still in implementing; thus, the amount of GUI will certainly increase presents the form to access to patient medical records. Through this form, a remote physician can see the collected data at a remote chronic patient. The collected data is pushed to the server in real-time or using the store and forward paradigm. Figure 9 presents an appointment management form. This enables to register a new patient,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 8. Electronic medical record form

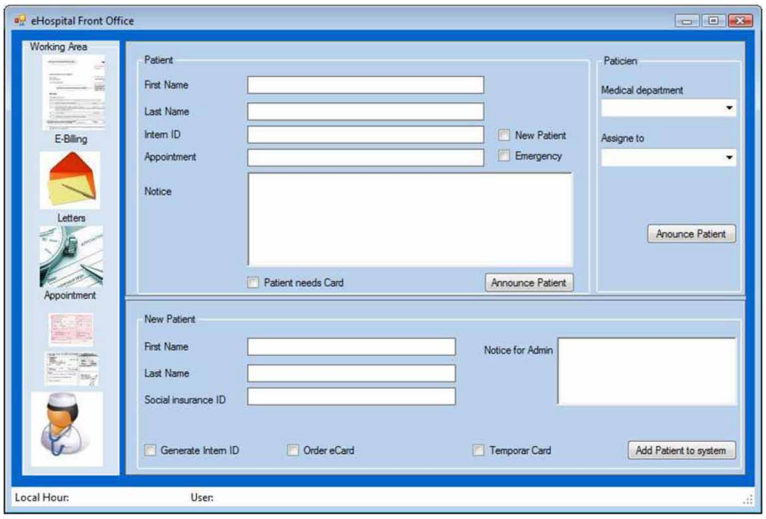


to manage emergency cases, and to automatically request the concerning patient medical record from the server. New patients are patients who are not yet registered into the national central patient database.

Emergency patients are automatically assigned to an appropriate physician and his medical records are forwarded to the physician. In the case of emergency, it is often difficult to collect the patient-ID to request his medical records. The system, therefore, provides a biometric identification feature, that enables the patient to identify himself using his fingerprint. The system collects the fingerprint and requests the corresponding ID which in turn is used to request the full medical records.

As presented in Figure 8, the treating physician can electronically prescribe medicine using this form. This form enables the physician to electronically order the prescribed products and the patient will be delivered at home.

Figure 9. Appointment management form



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To order the prescription, the system uses the another sub-component, call ePharmacyNet, whose forms are presented in Figure 9, Figure 10, Figure 11, and Figure 12

Figure 10. Medical prescription form

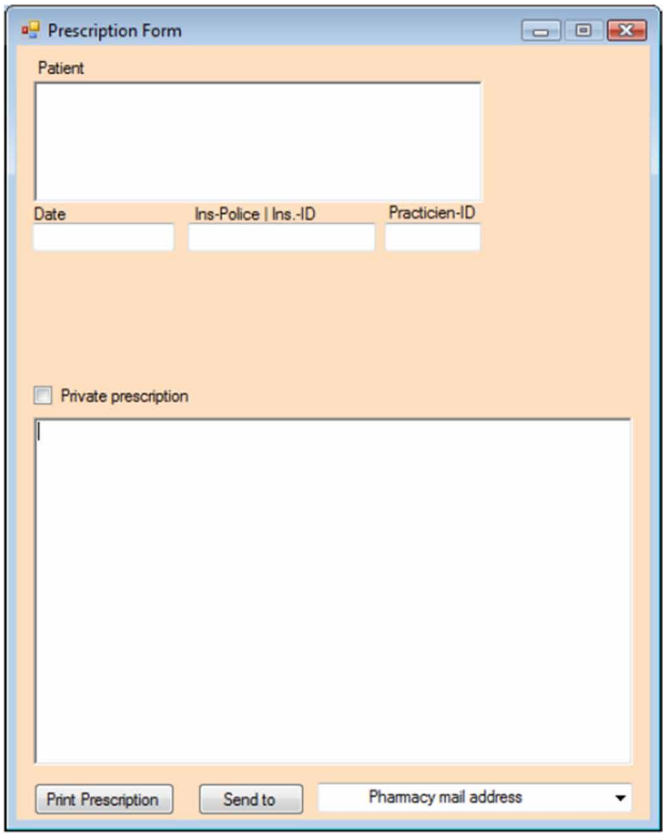
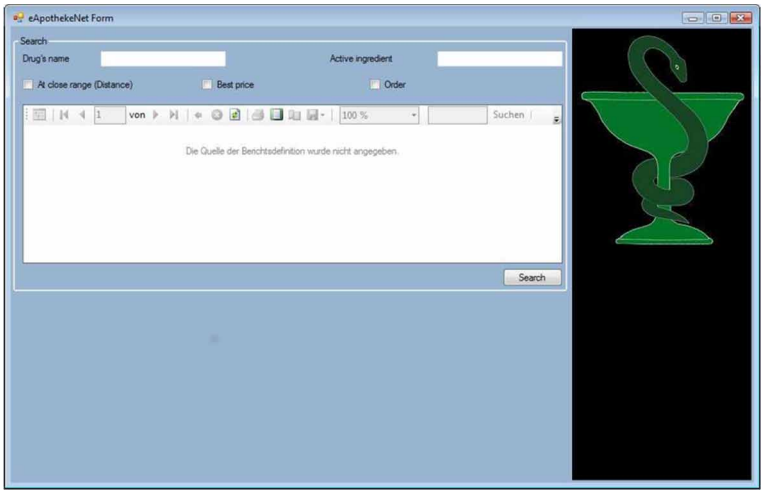
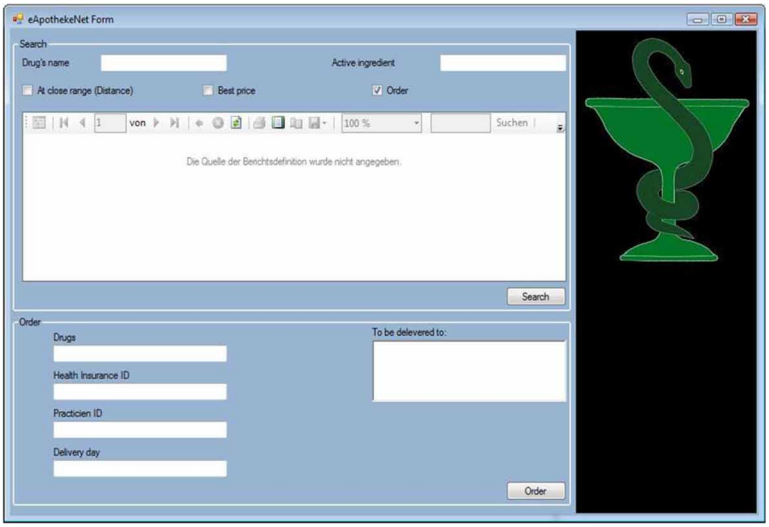


Figure 11. Drug search form



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 12. Drug order form



SYSTEM COMPONENTS

In this section, the system's components are presented. Figure 6 shows the high-level architecture of remote care delivery system. The payment, reminder (adherence to treatment) and MCSCW components are not shown on the overview architecture.

The system consists of below-described components, which in turn provides a set of functionalities. The components are:

ePharmacyNet

ePharmacyNet, a mail order pharmacy, that enables to prevent the patient to go through several pharmacies before he could, if any, purchase the prescription. This component is deeply described in (Thierry Oscar Edoh, 2010a; Thierry Oscar Edoh & Teege, 2011)

eDignostic and eConsultation

The two components enable to remotely be visited by a doctor and perform a diagnostic. A remote physician could also use this component to assist a traditional practitioner in performing a diagnostic at a patient.

The component further features a warehouse and data-mining based system to collect the diagnostics and consultation data such as disease data, framework, workflow, etc. These information processing and useful data are extracted for knowledge discovery using data mining technique which consists of querying, extracting, cleaning, and analyzing the data to represent the knowledge. Each system user (care team member) can access this knowledge and implement it for any similar case.

This component offers a special feature to overcome the language barriers in translating all information into local language so that the involved traditional practitioners can use the information too.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

eDataManagement

eDataManagement is a component for collecting, processing, persistent storing data. It provides a security mechanism to protect the data against any attack.

The component consists of body areas networks, wireless sensors networks that are in charge to collect medical data and send to the eDataManagement server at the cloud. It furthermore collects data from other sources such diagnostic data, medication data, etc.

eHospitalNet

eHospitalNet or Virtual Hospital Network (VHN) is a network of involved health centers. It is a virtual Hospital-network Solution inspired by the network-centric operation health care discussed in (Maniatopoulos et al., 2009). A network-centric operation as "unhindered networking operations within and among the physical, information, and cognitive domains that govern all activities conducted in healthcare space based on free, multidirectional flow and exchange of information without regard to the involved platforms or platform-systems, and utilizing all available means of ICTs to facilitate such operations" (Maniatopoulos et al., 2009). Health Care Systems in typical developing countries, particularly Sub-Saharan Africa, are facing a set of technical, organizational, informational, personal, social, and financial issues. A network-centric operation healthcare seems, therefore, to be the optimal concept to meet the challenges facing these health systems.

Logging Management

For the use of these services, a free call phone number has been arranged so that the patient in a case of emergency, particularly in rural regions can access to the system.

Each patient is required to carry an electronic medical card. In addition to the card, a personal identification number (PIN) is provided for the secure use of the medical card.

A patient can identify himself as follow: (1) The patient dials the number (the Telehealthcare system phone number), (2) the system asks him to identify himself: [name and first name, date of birth, card number, PIN], (3) the system connects him with the next hospital. Users can interact with the system using audio or text interface.

A picture-based password system, as shown in Figure 12, can be used by illiterates as well as by elderly people to access to the system. This kind of system is already used for mobile phone (e.g. SFR Password - www.sfr-password.com-). This solution approach consists of selecting pictures in certain order. Each selected picture corresponds to a digit from 0 to 9. An illiterate patient can then enter his PIN by selecting pictures in each order. Additionally, they can use the audio/voice to enter their PIN. For example, an ID like "1234" will be given as "Monkey, Panther, Lion, Buffalo". A voice-based password as described above can be considered for blind people too.

In a central database, the status of each health card owner will be stored. Based on this status, the system can verify which kind of PIN, standard or picture-based, the card owner can process and thus adapt the PIN processing to the user.

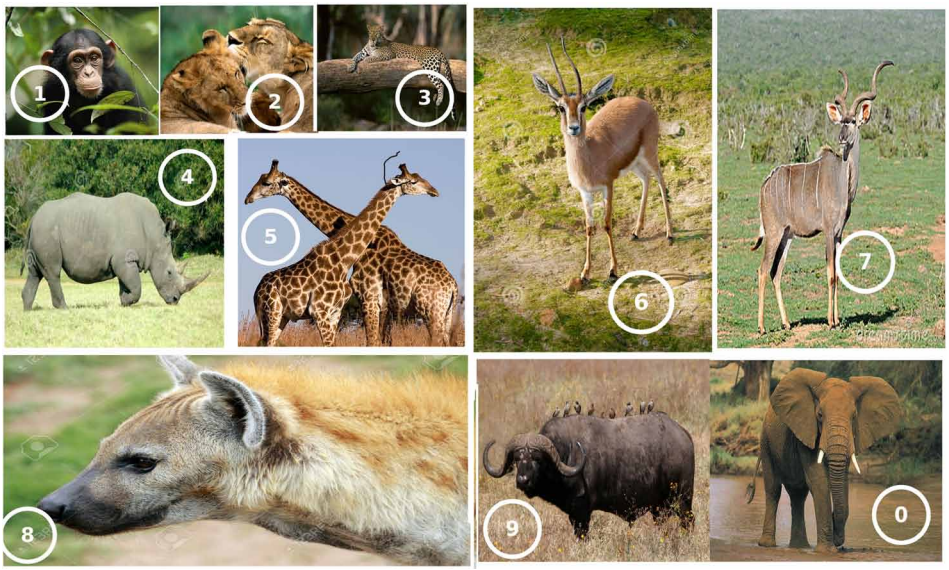
The phone number used for the call will be compared with the patient registered a phone number. If the comparison succeeds, the patient will be connected to the next closed hospital. The devices (mobile

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

phone) would be set for illiterate so that they can make call per speed dialing procedure. Biometric ID such fingerprint, iris can also be used to access the system.

An alternative solution for illiterate patients is to employ the multidisciplinary health team to assist the patients during or for processing the call. Unfortunately, this may lead to security or privacy problems. Therefore, this person must be rigorously trained and should be always available. A family member could also play this role.

Figure 13. Picture-based PIN system



Measuring Module Unit and Wireless Sensor Network

The measuring devices (Figure 13) are connected to patient's mobile phone via Bluetooth or near field communication interface and used for medical monitoring and surveillance. This component, is already implemented in (T. O. C. Edoh, Atchome, Alahassa, & Pawar, 2016), can also use the ZigBee communication protocol in order to reduce the energy consumption. As already demonstrated above, energy supply presents a challenge for the care system.

Patients suffering from chronic diseases and living at home would get the bio-signal remotely monitored using this unit. For those patients lying at a health care center, the monitoring system as implemented and described in (T. O. C. Edoh et al., 2016) would be used.

Central Database System

A central database for centralized medical data processing and promotes distributed data access for the patient's data is the system database. Distributed data access enables the storage approach which replicates gathered and recorded data at local databases at different care units that are involved in the multidisciplinary remote healthcare system. This approach also allows the queries to be processed any-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

where and at any time. The patient medical data is only replicated to the local database if the care unit requests at least once the data and configure the system to automatically replicate as soon as the patient dossier is updated in the central database.

Regarding the technical, connection issues that are facing, it is advantageous to keep patient's medical data updated at the local care unit, thus to guarantee to patient care provision at any time.

Mobile Computer Supported Cooperative Work Unit

Computer-supported cooperative work (CSCW) is a generic term covering and consisting of software tools, applications, and technology that supports a group of individuals working on projects at different sites. CSCW is based on the principle of group coordination and collaborative activities supported through computer systems.

A Mobile Computer-Supported Cooperative Work (MCSCW) as a CSCW supported through the mobile computer and/or a mobile phone (Schrott & Gluckler, 2004) is implemented to support the communication in the remote care network.

Table 3 shows the technologies used to implement the remote care system's MCSCW. Only the existing and reliable technologies in the country such as mobile telephony and the internet, services such as SMS, MMS, Email, devices such as mobile phones of the first generation (GSM) and higher, notebook, tablet, and laptop are elements of the MCSCW. Those technologies and devices are accessible for all, reliable and cost-efficient. The mobile telephony covers more than 90% (Thierry Oscar Edoh, 2010b) of the country.

Knowledge Management, within MCSCW in sharing information and data, communicating and being instructed or assisted on a medical case guarantees that right information and/or data reach the right member(s) of the multidisciplinary remote healthcare team at the right time independent of his/their stay.

Table 4. A two-dimensional collaboration framework with used technology

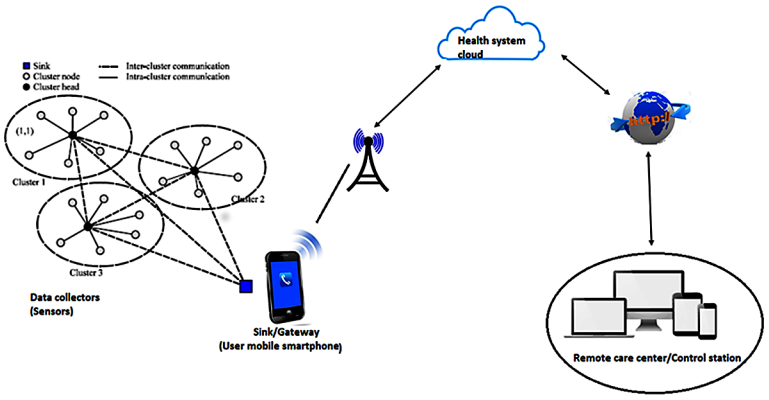
	Communication	Data & Information Sharing	Coordination /Instruction/Assistance
Real Time/Synchronous	Mobile phone/Line phone Video conferencing (Skype/Hangout)	Electronic Whiteboards (electronic/presence) Meeting facilitation (Trello & Slack)	Mobile phone Video conferencing (Skype/Hangout)
Asynchronous	Email SMS/MMS	Document repositories Team workspaces	Email SMS/MMS Document repositories

Billing and Payment Unit

This functionality is the same as that was described in (Thierry Oscar Edoh & Teege, 2011). Additionally, external existing payment/money-Transfer services such M-Pesa, Mobile-Money, and PayPal are called using web-service technology.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 14. Measuring infrastructure for a pervasive computing (monitoring)



Diseases Spreading Prevention

The risk of spreading diseases within (ad-hoc) crowds and the need to pervasively screen asymptomatic individuals to protect the population against emerging infectious disease request permanent crowd surveillance, particularly in high-risk regions. The case of Ebola epidemic in Africa in recent years has shown the need of pervasive screening. Infectious disease can quickly spread in a crowd such as in a supermarket, the market in Africa, festivities, dancing crowd, etc. It is therefore important to surveil crowds during their life-cycle collect and process the crowdsourced data to determine any risk of emerging infectious diseases.

Crowdsensing is a critical component of Internet of Things.(J. Liu, Shen, & Zhang, 2016) Crowdsourced data can be collected using participatory or opportunistic crowd sensing paradigms, where participants' smartphone sensors are used to collect information/data. Smartphone sensors or sensor systems are increasingly used for measuring the quality of ambient air (Dutta, Gazi, Roy, & Chowdhury, 2016), temperature and particularly sensing bio-signals within an in- or outdoor crowd. Most traditional sensors (i.e. smartphone embedded sensors (Carpenter & Frontera, 2016)) are based on electrical working principles (Van Hoe et al., 2012), where they measure the quantity items using electrical means. (Marika & Di, 2012) These sensors present limitations, that optical sensors overcome (Carpenter & Frontera, 2016)

We propose a smart health system that collects and transforms raw data into useful information, communicates with other smart devices and the people (e.g. emergency teams) to monitor ***outdoor*** (ad-hoc) crowd to prevent the spread of diseases. The proposed smart health system will integrate the physical and digital world (IOT/IOHT), where they interact with each other using object with network connectivity.

The smart health system, an Internet of Health Things, combines two paradigms: (i) crowdsensing and (i) Internet of Things. IOT is defined as a paradigm in which computing and networking are embedded in objects, (Pena-Lopez et al.) and are equipped with embedded sensors, which in turn could be used to collect crowdsourcing data.

In the scope of this project, we foresee to use balloons and drones provided with fiber optic sensors and infrared cameras. The balloons and/or drones equipped with infrared cameras (IRC) and fiber Bragg grating sensors (FBGS) will permanent overfly cities in seeking for the (ad-hoc) crowd in order to collect crowdsourcing data such as temperature. Our system application would able to detect outdoor overcrowding (congestion) and thus contextually start collecting crowdsourcing data, which would be

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

transformed into useful information. Fiber-optic sensing is an excellent solution to overcome the limitations of smartphones embedded sensors.(National Instruments, 2016). Furthermore, a pedestrian detection method in infrared images would be implemented for automatic crowd detection using the images produced by the IRC fixed on the balloon. A shape-based pedestrian detection method is presented in (S. Liu, Luo, & Yang, 2007) and a real-time pedestrian detection system that works on low-quality infrared videos is implemented in (Nanda & Davis, n.d.).

A promising test was taken place and shows the feasibility of the planned system. In the upcoming research, the experiment and results will be presented and discussed.

SYSTEM MAIN FUNCTIONALITIES

The following services and functionalities are offered in different types and manners: Patient-to-Physician/Nurse or Nurse-to-expert (physician) and Physician-to-Physician Service.

Teleconsultation, Telediagnostic, and Emergency Service

In the case of emergency or acute affection, patients can use the video conferencing component of the remote care system for a *synchronous and asynchronous* teleconsultation. The patients can, in the case of an asynchronous consultation, use Short Message Service (SMS) or Multimedia Messaging Service (MMS) technology to ask the doctor. With MMS, patients can send a small picture to the medical doctor. In the case of sending big pictures or video material using MMS technology, the client application located on the patient device such as mobile phone can chunk the picture in small package, send it, in MMS allowed package size, to the server, which would merge the received message, processes a virus scan, and send it then to the given medical doctor.

A medical doctor has the possibility to conduct a synchronous or asynchronous diagnostics. In the case of asynchronous diagnostic, the medical doctor reports his clinical findings, prescription, and recommendations to the multidisciplinary team member close to the patient. He also saves his results into the patient medical dossier. A medical dossier within the system is distributed and can be viewed and recorded from anywhere by any authorized person. The patient can read his own data but cannot change or enter new data into his dossier. Thus, patients cannot falsify the data.

An application on patient's mobile phone can dial in case of emergency the services telephone number. This application is event driven and only provided to chronic patients. The application on the mobile phone listens to the measuring devices and analyses in real time all received data according to a defined pattern. In the case of critical measured value, a standard message (Table 5) is sent via SMS and/or MMS to the treating physician, and to registered family members. The message contains additionally geolocation information so that the patient can be quickly reached by the emergency team.

Ubiquitous and Pervasive Screening and Telemonitoring Unit

A study (Hersh, JA, PK, & Al., 2001) shows that Telemonitoring particularly home care and pervasive computing, even in developed countries, can improve access to health care; increases satisfaction with delivered care, and may be cost-effective. The study report identifies health care services that could

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Sample of a standard message

```
<? xml version="1.0"?>
<emergency>
       <personal data>
              <First name>xxx</ First name >
              <Last name>xxxxx</Last name>
              <health ID>yyyy</health ID>
<current affection> aaaaa </current affection >
              <geolocation Position =”Geographic position”>
<location>Name of Location</location>
<longitude>xxxxx</longitude>
<latitude>xxxxx</latitude>
</geolocation>
       </ personal data >
       <measured data>
              <blood pressure =”bbbbb”>
<measured at> hhh</ measured at >
</blood pressure >
              <temperature degree =”ttt”>
<measured at> hhh</ measured at >
</temperature>
       </ measured data>
<patient provided data>
              <medication>
<date> ddd</date>
<drug name>xxxxx</drug name>
</medication>
       </ patient provided data>
</emergency >
```

be provided using telemedicine. This report shows the existence of patient education, self-control, and summarizes scientific evidence on the efficacy, safety, and cost-effectiveness of these services.

Self-monitoring/testing telemedicine is used less frequently than the other two types of telemedicine studied in this report. It is most commonly used for management of chronic diseases or specific conditions, such as heart disease, diabetes mellitus, or asthma. As with store-and-forward telemedicine, programs operate in many clinical domains, but with little evidence from peer-reviewed studies to support its use. The best evidence comes from studies with problematic designs, and even in those areas, the benefit is inconsistent. Some studies show it improves access; increases satisfaction with care delivered and may be cost-effective (Hersh et al., 2006).

Chronic patients can be monitored anywhere anytime by using modern measuring instruments (for example, insulin measuring instrument, etc.) connecting to the patient's mobile phone. The measuring instrument will communicate with the treating physician over the patient's mobile phone. The patient's mobile phone will be used as a terminal that saves the received data into the central database using a Remote Procedure Call (RPC) for standard applications (low-level safety and security) and Restful Services for safety- and security-critical applications. A physician can see the data immediately after the entrance on his computer (a real-time system). The physician can also reroute critical values to his mobile phone if he is outside of the hospital. So, he can monitor the patient around the clock. There are two cases to be distinguished:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- The case, where the patient lies at home (Homecare) and
- The case where he is hospitalized.

In the case, the patient is lying at the hospital, there will be two possibilities to collect data: the measuring instruments gather and transmit automatically the data to the system or the nurses collect the data and save them into the system. The system will automatically process the data analysis; send messages to the physician, etc.

According to the current organization of the health system in Benin, the nurses in villages will no longer treat the patient by themselves, but rather by using the Telehealthcare system to be assisted by specially trained physicians from the large cities.

In the case of a Homecare, the treatment will similarly be processed. A nurse comes to the patient only if required and on the arrangement of a physician. The patient in the Homecare treatment is also connected with a measuring instrument. If necessary, the family members must be instructed to be able to give elementary treatment to the patient. The gathered data will be sent to the next hospital. The nurses verify the values and can contact immediately a physician. For entirely urgent cases, the nurse will perform the first aid. The physician receives all values of the patient and takes decisions on immediate treatment. In the decision, the illness histories (the patient's health documentation must be retrieved) will be included/considered. The physician gets an access to the patient dossier and can initiate suitable therapy and treatments.

Telehealthcare System as Data Basis for Exchange of Experience

In the scope of the Telemedicine and eHealth system in the entire country, a database for medical intervention, treatments as well as experimental treatment procedures will be generated. This database will also contain anonymous data of patients and will be accessible for every physician. Data from the Telehealthcare system will be stored in this database, and therefore used for the experience exchange. As a multimodal database, the proposed database provides interfaces such as camcorder (for Image capturing), audio-module and Text-module. It will also provide VoiceXML based application to guide the user in inserting new data or retrieving information.

Patient Education and Continuous Education for the Medical Personnel

Every involved physician should learn through physician-to-physician communication and discussions over medical cases. Experiences would be acquired through "Learning by doing". Discussions on medical cases will be recorded and used later, on one hand for capacity building and educate. On another hand, the recorded discussion will serve as a treatment protocol. The system provides a voice over IP component to hold audio and video discussion through the system.

Improvement of Adherence to Treatment (A Reminder)

According to WHO, improving adherence to treatment results in a much larger impact on overall global health than any other improvement of specific medical treatment. (Hope, 1999).

WHO defines the adherence to treatment as the extent to which the patient's history of therapeutic drug-taking coincides with the prescribed treatment. Process-oriented or outcome-oriented are two

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

methodologies and/or definitions that can be used to measure the adherence to treatment. While end-results of a treatment, e.g. cure rate, are the outcome-oriented indicator of success used to measure the adherence, Process-oriented indicators of success are used to measure the adherence by dealing with intermediate variables such as appointment-keeping or pill counts (Scott & Mars, 2015).

Our on-site study found out that non-adherence to treatment mostly in rural areas is due to the illiteracy, poor access to pharmaceutical and/or medical care, lack of health insurance or the high medical fees patients must pay.

A reminder system is therefore designed and implemented. It is set at the start of any treatment so that it reminds the patient to take his treatment. In addition, it also reminds the caregiver to check whether the patient follows the treatment properly and visits the medical doctor for scheduled appointments. It is possible to include the patient relatives into this process so that they can also look at the patient and be sure that the patient regularly adheres to the treatment. A workflow is designed and can be adapted to each case. Patient, treating health professionals or the patients relative can record the patient's adherence to treatment. The authors are working on an extension of this component, where video-modules would be used to control and improve the adherence to treatment.

The adherence workflow requires the medication parameter such as start and end date, time and time interval where the medicine should be taken. The system calls at the set time and requests the patient to take his medicine and notify the system about this. The patient will be reminded three times. The system would then call a patient's relative or the next health center or the treating doctor/nurse. The third person should bring the patient to adhere to the medication. Once the patient takes the medicine, he has to record this into the system (warehouse) so that at the end of the medication the treating doctor can analyze the recorded data and take accordingly a decision in the case of unsuccessful treatment.

EXPERIMENTS AND RESULTS

Access to Pharmaceutical Care Services

Problem Understanding

We collected huge information during the test, both from interviews and conversations and from own experience. A major part concerned security aspects (see details in (Thierry Oscar Edoh & Teege, 2011)).

Feasibility

The mobile phone network provided a sufficient communication basis for the system. Network coverage existed in all test areas. The test showed that mobile phones are appropriate for processing an order, particularly in rural regions or regions without cyber cafés. The communication costs are reasonably low.

The test also confirmed the problems of delivery and payment, especially in rural regions. One specific problem occurred with cash payment on delivery. For security reasons, pharmacies prefer to hand out ordered medicine to a carrier only against prepayment. However, often the carrier had not enough cash. The alternative would have been to first collect the money from the customer and then fetch the medicine at the pharmacy. This may require additional tours by the carrier. The problem should disappear with an organized carrier service which is better trusted by the pharmacies.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Action Research

The test was conducted for about 2 weeks simultaneously in the test areas. During this time, a total of 434 volunteer patients used the system (Table 6). We interpret this as support for our hypothesis 95.6% of the test participants were villagers and many of them were women, predominantly mothers with small children from baby to children of 6 years of age. The highest participation was in test area I, as expected. However, the system was also used in the other two test areas and the participants were satisfied with the experience. We also succeeded in the purpose of the system implementation. Compared to the normal process, when the patients had to search and purchase the medicines by themselves, time and effort were substantially reduced.

Without the system, people, mainly in rural regions need one to three weeks to purchase a medicine. In addition, they must pay high transportation costs for traveling to several pharmacies. Using the system, the participants received the ordered medicine within two days. We thus reduced the time by up to 90%. Also, the transport expenses have been reduced.

Table 6. Test participants and results

Participants	Genre	Large cities	Villages/Slum	Total
N=434	Females	6 (37,5%)	406 (97,13%)	412 (94,93%)
	Males	10 (62,5%)	12 (2,87%)	22 (5,07%)
Total		16 (100%)	418 (100%)	434 (100%)

Resistance

We encountered relatively few resistances to EpharmacyNet usage. The women accepted the system sooner than the male patients and appeared very satisfied with it. Some cases of refusal to use the system were due to a lack of trust. We address the general aspect of trust in "The trustee concept".

Access to Healthcare Care Services

Rapid Prototyping and Problem Understanding

For the test purpose, we implemented a prototype of the proposed system. We simulate a medical case and built a multidisciplinary team (MP). Each team member received a mobile smartphone. As communication platforms, we select Skype, WhatsApp, and Google Hangout.

We involved an experienced traditional practitioner. He can read and write. He also speaks and understands French.

Scenario 1

The rural population is informed about the test. The traditional practitioner (TP) can speak and understand the local tongue, so he communicates with the villagers in the local tongue.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The population visits the TP for any affection. The TP contact the head of the MP on one hand to define the tasks and in another to proceed with the diagnostics assisted by the (remote) care expert.

The MP defines and assigns to each member a task with exactly defined workflow.

Scenario 2

The patient uses his (smart)phone to contact directly the next care unit for a teleconsultation. The patient is requested to provide pictures and supplement materials to ease the diagnostics.

The MP is built and defines, in turn, the tasks and assigns them to the team members.

Data Gathering

We collected different data during the prior stages. The collected data helped to design the present prototype of the remote care provision system. The collected data concern the care accessibility.

During the test, we collect again several data about the accessibility so that we can compare them with the previously collected data and perform a data analytics.

Feasibility

We used all selected instant message tools (skype, WhatsApp, and Hangout) for simulating the mobile computer supported collaborative work. All the tools performed good results. We could send and receive large files, asynchronously and synchronously discuss. However, sending large files consumes many resources and take longer because of too small bandwidth in the entire country. We faced also high latency issues.

The test reveals that the organization must be accurate, the tasks must be good planned and assigned to the person with the needed competence. Additionally, a workflow is needed to be presented before starting the treatment.

Obviously, the TP involved in the test faced certain understanding issues due to the weak knowledge of the French tongue. One-third (1/3) of the instructions from the remote physician were wrongly implemented. This shows the limitation of the system and the need of an automated translator and medical dictionaries for each local tongue. Beyond this, two-third (2/3) all written messages from the TP were incomprehensible. So, he was requested to only use the vocal message in his mother tongue.

We figure out that the TP could provide better diagnosis using this system and with the help of the remote physician. The treated patients (88%) have appreciated the treatment process as they were supported by a multidisciplinary team and can facilitate access to pharmaceutical products. 12% claim that a lot of people are involved in their treatment and thus fear to lose their intimacy and privacy and a lot of people would know more than necessary on the healthy.

The test is still in progress. Till now, only 35 patients and 86 medical treatment are recorded into the system.

Action Research

The challenges facing during the test are collecting and analyzing. The prototype is improving regarding the results of the running analysis.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Our goal is to attend 5000 patients and about 15000 medical treatment cases and collect significant data so that we can perform a good action research.

FUTURE WORKS

Impact of Involving the Traditional Practitioners

The focus of our future work will be to investigate the impact of involving the traditional practitioners on (i) the quality of the health care provision and (ii) workforce shortage. Since we are dealing with a multidisciplinary team, which work on a project (medical treatment), or one team member works on different projects at the same time, we could face many-to-one (many health caregivers, one patient) or many-to-many (many caregivers, many patients) relationship. So, it will be important to optimize the scaling problem that will be issued by the proposed system. The objective of the work will be to scale the agility in the care provision process. We have in mind to use the scaling agile approach practiced in IT world.

Adherence to Treatment

The adherence to treatment is a matter pre-requisite for successful treatment. It is then important to investigate how the proposed system impacts the adherence to treatment.

Understanding Barriers (Tongue Issues)

Speech-based applications and systems (spoken dialogue and multimodal systems) are actually being implemented for a broad range of domains and applications such as medical applications, tourist guide systems, and so on (Bell, 2003)(Green, 2009). These kinds of systems or applications using speech as the principal mode of interaction will become increasingly prevalent (Fitzgerald, College, Net, & Firby, 2002).

To increase the usability of the proposed system, we would design and provide a multimodal interface and spoken dialogue interface to the users.

CONCLUSION

In developing countries, the challenges facing health systems are caused by the lack of organization, poor health care infrastructure, lack of qualified personnel, and weak funding (e.g. lack of adequate health insurance). These challenges could be addressed by information technology solutions; however, it is often not possible to implement solutions from developed countries without adapting them, because of the technology level in these countries and the cultural manner.

In this chapter, the authors have proposed a virtual Hospital-network Solution that uses Telehealth-care and wireless sensor network technologies to provide pervasive/ubiquitous healthcare service to the population. It is aimed at enabling remote assistance to the undertrained caregivers, collaborating work between care professionals, provision of remote health care to the patient at home, and educate the patient. The system additionally involves traditional practitioners and trains them to perform medical diagnostic.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In a prior study (Thierry Oscar Edoh & Teege, 2011), the access to pharmaceutical care was investigated. An E-commerce solution was proposed to overcome the issues. However, the implementation faced a set of obstacles for launching a standard E-commerce system. The obstacles were then analyzed and workaround solutions were elaborated so that an adapted E-commerce system can be implemented.

A practical test has shown that the adapted E-commerce system has the potential to improve the pharmaceutical care delivery in the entire country no matter where the patient is living or resides. The adapted E-commerce system therefore extended to a multidisciplinary remote health care system to improve and increase the access to health care services.

The proposed solution approaches are based on ICT networking technology, which in turn needs a high and stable internet connection and reliable network services, high latency. However, the country is not yet entirely covered for the use of mobile internet and thus mobile data services. Though, since SMS and MMS are well implemented, available and stable, the authors combine both mobile internet, where it available, and mobile phone services to provide the telehealth care to the population.

Regarding the internet connection challenges facing, the upcoming experimental will focus on the use of LI-WI to overcome the challenges.

Further, a novel Internet of Things technology to improve the efficiency of data collection from sensors to a collector in a low-power lossy network (i.e., the sensor network) will be implemented. A de-verticalized middleware to expose the different data and services with a unique interface, on top of which vertical application can also be created.

REFERENCES

Adeya, G., & Cavanaugh, K. (2007). Rapid Assessment of the Health System in Benin, April 2006. U.S. Agency for International Development.

Africa, W. R. O. (2011). African Health Monitor. *Serial Publication of the World Health Organization Regional Office for Africa*, (14). Retrieved from https://www.aho.afro.who.int/sites/default/files/ahm/issues/27/ahm-issue-14.pdf

AHRQ. (n.d.). *Health Literacy Measurement Tools (Revised)*. Retrieved from https://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/literacy/index.html

Bell, L. (2003). *Linguistic Adaptations in Spoken Human – Computer Dialogues Empirical Studies of User Behavior*. Academic Press.

Braa, J., & Hedberg, C. (2000). *Developing district-based Health Care Information Systems: The South African experience*. Iris.

Braa, J. J., & Hedberg, C. (2002). The struggle for district-based health information systems in South Africa. *The Information Society*, *18*(2), 113–127. doi:10.1080/01972240290075048

Carpenter, A., & Frontera, A. (2016). Smart-watches: A potential challenger to the implantable loop recorder? *Europace*, *18*(6), 791–793. doi:10.1093/europace/euv427 PMID:26847074

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chib, A., Velthoven, M. H. Van, Car, J., & Helena, M. (2015). mHealth Adoption in Low-Resource Environments : A Review of the Use of Mobile Healthcare in Developing Countries mHealth Adoption in Low-Resource Environments : A Review of the Use of Mobile Healthcare in Developing Countries. *Journal of Health Communication, 20*, 4–34. doi:10.1080/10810730.2013.864735

Darkin, A. W., & Cary, M. A. (2000). *No Telemedicne and Teleheath Principles, Policies, Performances, and pitfalls*. Academic Press.

Development, A. I. for G. H. and, Development, A. I. for I., Hospital, U. of I. T., & Hospital, L. U. T. (2015). *The Impact of Access to Quality Healthcare in Africa Research findings on Health Insurance Fund supported programs*. Retrieved from http://aiid.org/website/wp-content/uploads/2015/12/The-Impact-of-Access-to-Quality-Healthcare-in-Africa-Research-findings-on-Health-Insurance-Fund-supported-programs.pdf

Dutta, J., Gazi, F., Roy, S., & Chowdhury, C. (2016). AirSense: Opportunistic crowd-sensing based air quality monitoring system for smart city. In 2016 IEEE SENSORS (pp. 1–3). IEEE. doi:10.1109/ICSENS.2016.7808730

Edoh, T. O. (2010a). *ICT-Systeme zur Verbesserung der Gesundheitsversorg ung in den Gesundheitssystemen der afrikanischen Entwicklungsl änder. Fallstudien: Benin*. Universität der Bundeswehr. Retrieved from https://athene-forschung.unibw.de/doc/88986/88986.pdf

Edoh, T. O. (2010b). *ICT-Systeme zur Verbesserung der Gesundheitsversorgung in den Gesundheitssystemen der afrikanischen Entwicklungsländer.* Universität der Bundeswehr München: Athene-Forschung. Retrieved from https://athene-forschung.unibw.de/node?id=88986

Edoh, T. O., & Teege, G. (2010). EPharmacyNet: An approach to improve the pharmaceutical care delivery in developing countries-study case - BENIN. In *IHI'10 - Proceedings of the 1st ACM International Health Informatics Symposium* (pp. 859–863).Academic Press. 10.1145/1882992.1883125

Edoh, T. O., & Teege, G. (2011). Using information technology for an improved pharmaceutical care delivery in developing countries. Study case: Benin. *Journal of Medical Systems*, *35*(5), 1123–1134. doi:10.100710916-011-9717-y PMID:21519942

Edoh, T. O. C., Atchome, A., Alahassa, B. R. U., & Pawar, P. (2016). Evaluation of a Multi-Tier Heterogeneous Sensor Network for Patient Monitoring – The Case of Benin. In *MMHealth '16 Proceedings of the 2016 ACM Workshop on Multimedia for Personal Health and Health Care* (pp. 23–29). Amsterdam, The Netherlands: ACM Digital Library. 10.1145/2985766.2985772

Fitzgerald, W., & Firby, R. J. (2002). Dialogue-based human-computer interfaces and active language understanding. *International Journal of Cognitive Technology*, *1*(2), 275–286. doi:10.1075/ijct.1.2.04fit

Green, A. (2009). *Designing and Evaluating Human-Robot Communication.* Doctoral Thesis.

Harrison, R., Cohen, S. A. W., & Walton, M. (2015). Patient safety and quality of care in developing countries in Southeast Asia : A systematic literature review Patient safety and quality of care in developing countries in Southeast Asia : a systematic literature review. *International Journal for Quality in Health Care*, 1–15. doi:10.1093/intqhc/mzv041

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Haus, M., Waqas, M., Ding, A. Y., Li, Y., & Member, S. (2016, December). Security and Privacy in Device-to-Device (D2D). *Communication Review*, 1–27. doi:10.1109/COMST.2017.2649687

Haveman, H., & Flim, C. (2007). eHealth strategy and implementation activities in the Netherlands. *Report in the Framework of the eHealth*, 1–20. Retrieved from http://ehealth-strategies.eu/database/documents/Netherlands_eHealth-ERA_country_report.pdf

Hersh, W. R., Hickam, D. H., Severance, S. M., Dana, T. L., Krages, K. P., & Helfand, M. (2006). Telemedicine for the medicare population: Update. *Evidence Report/technology Assessment*, (131): 1–41. PMID:17900201

Hlungulu, B., & Thinyane, M. (2009). *An Investigation and Development of an e-Health Component for the Dwesa-Cwebe Rural Area*. Retrieved from satnac.org.za/proceedings

Hope, K. R. (1999). *Corruption and Development in Africa* (K. R. Hope & B. C. Chikulo, Eds.). Basingstoke, UK: Palgrave Macmillan. doi:10.1057/9780333982440

Joseph, K. (2003). Installing and Implementing a Computer-based Patient Record System in Sub-Saharan Africa: The Mosoriot Medical Record System. *Journal of the American Medical Informatics Association*, *10*(4), 295–303. doi:10.1197/jamia.M1301 PMID:12668697

Keeton, C. (2012). *Measuring the impact of e-health*. Academic Press. doi:10.2471/BLT.12.020512

Khani, R. (2015). *Improving Waiting Time and Patients' Experience in a Medical Retina Clinic*. Dublin, Ireland: Royal College of Surgeons in Ireland.

Klein, T. (2005). *Befindensweisen und therapeutische Wege in Dendougou* (Doctoral Thesis). Institut für Völkerkunde Universität zu Köln (University of Cologne)

Liu, J., Shen, H., & Zhang, X. (2016). A survey of mobile crowdsensing techniques: A critical component for the internet of things. *2016 25th International Conference on Computer Communications and Networks, ICCCN 2016*. 10.1109/ICCCN.2016.7568484

Liu, S., Luo, Y., & Yang, S. (2007). Shape-based pedestrian detection in infrared images. *Journal of Information Science and Engineering*, *23*(1), 271–283.

Mackey, T. K., & Liang, B. (2012). Combating healthcare corruption and fraud with improved global health governance. *BMC International Health and Human Rights*, *12*(1), 23. doi:10.1186/1472-698X-12-23 PMID:23088820

Maniatopoulos, G., Maniatopoulos, G., Mcloughlin, I., Mcloughlin, I., Wilson, R., Wilson, R., ... Martin, M. (2009). Developing Virtual Healthcare Systems in Complex Multi- Agency Service Settings: The OLDES Project. *Electronic Journal of E-Government*, *7*(2), 163–170.

Marika, P., & Di, D. (2012). Sensors. *Signal Processing & Applications, 5*(3).

Mars, M., Seebregts, C., & Rockefeller Foundation. (2008). Country Case Study for e-Health: South Africa. *E-Health Connections: Country Case Study Reports*, 1–46. Retrieved from http://ehealth-connection.org/files/resources/County Case Study for eHealth South Africa.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mayosi, B. M., Ch, B., Phil, D., Benatar, S. R., Ch, B., & Med, D. S. (2014). special report Health and Health Care in South Africa — 20 Years after Mandela. *The New England Journal of Medicine*.

Ministere de la Santé, Repiblique du B. (2007). *Evaluation du systeme national d ' information et de gestion sanitaires (SNIGS) du Benin*. Retrieved from http://www.who.int/healthmetrics/library/countries/HMN_BEN_Assess_Draft_2007_05_fr.pdf

Nanda, H., & Davis, L. (n.d.). Probabilistic template based pedestrian detection in infrared videos. In *Intelligent Vehicle Symposium* (Vol. 1, pp. 15–20). IEEE. 10.1109/IVS.2002.1187921

National Instruments. (2016). *Fundamentals of Fiber Bragg Grating (FBG) Optical Sensing*. Retrieved from http://www.ni.com/white-paper/11821/en/

NEPAD. (2007). *Africa Health Strategy : 2007 – 2015*. Retrieved from http://www.nepad.org/system/files/AFRICA_HEALTH_STRATEGY(health).pdf

Niclasen, B., & Mulvad, G. (2010). Health care and health care delivery in Greenland. *International Journal of Circumpolar Health*, *69*(5), 437–447. doi:10.3402/ijch.v69i5.17691 PMID:21118636

Rotich, J. K. (2003). Installing and Implementing a Computer-based Patient Record System in Sub-Saharan Africa: The Mosoriot Medical Record System. *Journal of the American Medical Informatics Association*, *10*(4), 295–303. doi:10.1197/jamia.M1301 PMID:12668697

Schrott, G., & Gluckler, J. (2004). What makes mobile computer supported cooperative work mobile? Towards a better understanding of cooperative mobile interactions. *HCI Issues in Mobile Computing, 60*(5–6), 737–752.

Scott, R. E., & Mars, M. (2015). *Telehealth in the developing world: Current status and future prospects*. Academic Press.

Sluizer, S., & Cashman, P. (1984). XCP: An experimental tool for supporting office procedures. *Proceedings IEEE-CS Press First International Conference on Office Automation*, 73–80.

Srivastava, A., Bilal, I. A., Preety, R., & Sanghita, B. (2015). Determinants of women ' s satisfaction with maternal health care : a review of literature from developing countries. *Biomed Central*, 1–12. doi:10.118612884-015-0525-0

Van Hoe, B., Lee, G., Bosman, E., Missinne, J., Kalathimekkad, S., Maskery, O., ... Van Steenberge, G. (2012). Ultra small integrated optical fiber sensing system. *Sensors (Switzerland)*, *12*(9), 12052–12069. doi:10.3390120912052

Williamson, L., Heywood, A. B., Williamson, L., Stoops, N., & Heywood, A. (2015). *Developing a District Health Information System in South Africa: A Social Process or Technical Solution?* IOS Press. Retrieved from http://iospress.metapress.com/content/2mtquupfwbj5amyf/

This research was previously published in the Handbook of Research on Emerging Perspectives on Healthcare Information Systems and Informatics; pages 515-559, copyright year 2018 by Medical Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 77
Rife Information Pollution (Infollution) and Virtual Organizations in Industry 4.0:
Within Reality Causes and Consequences

Qaisar Iqbal
https://orcid.org/0000-0002-6619-7243
Universiti Sains Malaysia, Malaysia

Rashid Nawaz
University of Education, Pakistan

ABSTRACT

Information pollution, which usually refers to the overabundance of irrelevant, unsolicited, unwanted messages, is a major cause of concern for practitioners and academic researchers. Advances in the information and communication technologies has proliferated the production of information. Consequently, people are suffering from information pollution. Information pollution has made it difficult for employees and individuals to find the quality information quickly and conveniently from diverse information sources including print and electronic sources. This chapter sheds light on the relevant literature of information pollution and analyzes its causes in the Industry 4.0 era and puts forward suggestions for tackling this problem. This chapter emphasizes the significance of concrete efforts from computer scientists, academic professionals, and information professionals to devise strategies and techniques for refuting the effects of information pollution.

INTRODUCTION

Industries are undergoing a historic turning point (Laudante, 2017). People, machines, and products are now communicating with one another via the internet within the context of industry 4.0. Industry 4.0 refers to the convergence between industries and the Internet technology (Fernández-Miranda, Marcos,

DOI: 10.4018/978-1-7998-7297-9.ch077

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Peralta, & Aguayo, 2017). Industry 4.0 offers opportunities in the form of resource efficiency, energy efficiency, and increased productivity. It also solves industry challenges by shortening the innovation creation process; and time-to-market cycles, facilitated through horizontal integration, vertical integration and end-to-end digital integration (Kagermann, Helbig, Hellinger, & Wahlster, 2013). For the most part, both manufacturers and technology suppliers do have a very positive outlook towards industry 4.0 (de Sousa Jabbour, Jabbour, Godinho Filho, & Roubaud, 2018).

Industry 4.0 is made up of different components which includes, 3D printing, big data, Internet of Things (IoT), and the Internet of Services (IoS). These components individually and collectively facilitate smart manufacturing and logistics processes (Kagermann et al., 2013). These components enable and support the management and the production processes within Industry 4.0. The industry 4.0 context in this chapter is its managerial aspect and not the technical and automation process. The managerial aspect is discussed within the context of virtual organizations.

Industry 4.0 is driven by big data generated and used in the processes within this industry. Therefore the prospect of managing big data is this industry becomes challenging. However, currently new ways of managing big data are now evident in Industry 4.0. But these new approaches towards managing big data are not sufficient. This is because most of the information harvested from the big are not credible and useful to the management and administrative employees in virtual organizations utilizing industry 4.0. What makes big data challenging are its characteristics. Big data is made up of the 4Vs, i.e. velocity, veracity, volume, and variety of information. The 4Vs have increased significantly in the contemporary age resulting in increased information pollution or infollution. *Information pollution refers to the information that is irrelevant, outdated, inaccurate, hidden and unsolicited*. How infollution is handled in an industry is important to the value derived from big data in the context of industry 4.0. Therefore, the successful realisation of benefits associated with virtual organizations in industry 4.0 relies on how a firm's Research and Development (R&D) process is directed towards the reduction or mitigation of infollution caused by the 4Vs. This idea is supported by Prause (2015), who based on the glueing function, emphasised the management of the 4Vs to reduce information pollution or infollution within the context of industry 4.0 (see (Jay Lee, Kao, & Yang, 2014)).

The focus of this chapter is on how infollution could affect the decision makers and administrative employees working in a virtual organization delivering an industry 4.0 service. The chapter is designed in a progressive manner. Here the discussion begins with general overview of the central concepts of the chapter. This is followed by how these concepts are seen within virtual organizations and Industry 4.0. The chapter is designed as follows. The first section is the introduction. This is followed by an overview of the concept of infollution. As industry 4.0 is an ICT enabled industry, the next discussion is on the influence of ICT on infollution. This is followed by a discussion on infollution and Industry 4.0; a discussion on the interplay between infollution, virtual organizations and industry 4.0; and the conclusion of the chapter. In this chapter the words "information pollution" and "infollution" are used interchangeably.

INFORMATION POLLUTION: NATURE AND SIGNIFICANCE

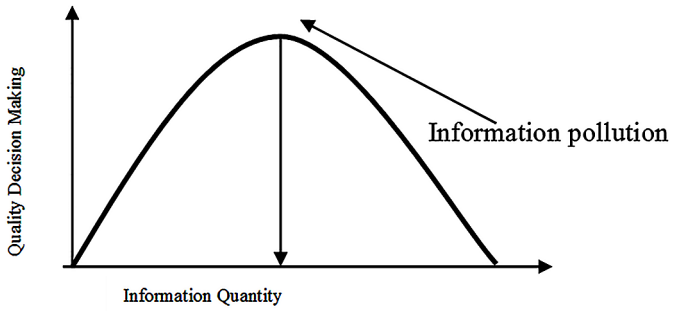
In this section, a general overview on infollution as a concept and how it impacts organizations in general is discussed. The context of the discussion in this section is broad, because information pollution is assumed to emerge from divergent sources. This includes online and offline sources.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Overview on Information (Infollution)

Presently, information is increasing exponentially while quality information is increasing linearly (Kirsh, 2000). Based on this fact, polluted information also increases exponentially (Iqbal et al., 2018) (See Figure 1).

Figure 1. Graph-01



The increasing quantity of information has an influence on the information processing behaviour of individuals (Swar, Hameed, & Reychav, 2017), and it also has an influence on the managerial and operational processes within an organization. Yet, the amount of information that is credible is not much because there is a great deal of polluted information available compared to quality information. These polluted information are often *irrelevant, outdated, inaccurate, hidden and unsolicited*. This actually becomes problematic when dealing with Big data.

Therefore in ordinary lingo, information pollution refers to the situation where individuals receive irrelevant, useless and outdated supply of information, resulting in dysfunctional consequences and diminished decision quality (Eppler & Helfert, 2004).

Nature of Information Pollution

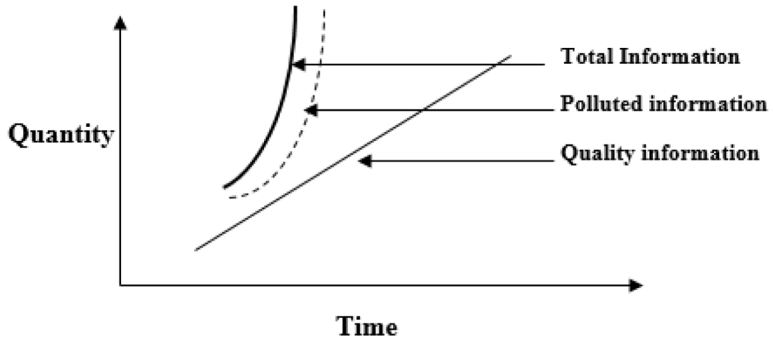
Information pollution has an effect on decision makers and employees in an organization. Furthermore, it has an effect on individuals working in the organization and the organization as a whole.

1. **Individual Level:** On an individual level, once, the information supply exceeds the information processing capacity; individuals start facing problems in the sifting of relevant and updated information. Information imbibed by the individual therefore becomes overtly selective which means that it becomes incomplete. A large amount of polluted information makes it hard for people to understand the association between details and the overall perspective (Eppler & Helfert, 2004). Therefore, with increasing infollution, efforts to secure quality information is also on the increase. But the information processing capacity and response rate of humans are not always efficient resulting in a failure to secure quality information (Chen, Shang, & Kao, 2009).
2. **Organizational Level:** The effect of infollution on the organizational level stems from a spill over effect from the individual level. This is because, information acquired at the individual level is

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

used for decision making, which affects the organizational level. The adoption of lack of credible information will result in bad consequences for the organization. These effects are discussed in the next sub-section. Literature suggests that information quantity, quality decision-making and polluted information move in one direction up to a certain point. Beyond that point the quality of decision will decline (Sasaki, Kawai, & Kitamura, 2015) after which infollution becomes a critical concern (See Figure 2).

Figure 2. Graph-02



Effect of Information Pollution on Organizations

As mentioned in the previous sub-section, information pollution has an effect on the organization level. When information pollution exists, it affects the opportunity cost of the company; it affects the accuracy of the information used for decision making; it affects the organization's ability to forecast in its processes and it magnifies the downside organizations experience with imperfect information. Let's look at each effect, one by one.

1. **The Effect of Infollution on Opportunity Cost:** From an organizational perpective, infollution causes organisations to incur substantial costs. Employees waste a lot of time searching for and sorting irrelevant information into meaningful knowledge (Kutty, 2006). Managers have also reported delays in quality decision-making processes due to *"analysis paralysis"* or the presence of too much-polluted information (Jackson & Farzaneh, 2012). Infollution distracts employees from their core job responsibilities and employees and makes it hard to develop effective organisational strategies (Kutty, 2006).
2. **The Effect of Infollution on Information Accuracy:** Information pollution has been investigated in a substantial body of literature. More than 60% of 500 medium-size firms have been found suffering from infollution (Han, Pei, & Kamber, 2011). 1% to 10% of organisational information are inaccurate (Nelson et al., 2005; Klein 1997). The 30% error rate within industrial information is typical and that can rise up to 75% (Zaveri et al., 2016). 70% of orders in the manufacturing sector are based on polluted information (Preece, Missier, Embury, Jin, & Greenwood, 2008). 40% of the credit-risk management database in a New York bank was found to be incomplete (Ge & Helfert, 2008). Between 50% and 80% of computerised U.S. criminal records are estimated to be

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

incomplete, inaccurate and ambiguous (Strong, Lee, & Wang, 1997). The above literature suggests that the pervasiveness of infollution has made it difficult for organisations and individuals to make quality decisions.

3. **The Effect of Infollution on Forecasting:** Infollution facilitates the likelihood of harmful disasters. Across many organisations, many business initiatives have been delayed or even cancelled due to poor information quality (Ge & Helfert, 2008). In other areas of life, the same trend can be identified. On January 28, 1986, seven astronauts were killed in the explosion of the space shuttle challenger soon after lift-off (Madnick et al., 2009). Seventeen years later, seven other astronauts were killed when the space shuttle Columbia exploded (Mahler, 2009). In July 1988, the U.S. Navy Cruiser USS Vincennes had shot down an Iranian Airbus killing all 290 people aboard. On September 11, 2001, 19 hijackers entered an airport and converted four commercial passenger jets into guided missiles where approximately 3000 people were killed (Kean, 2011). These events occurred because they were difficult to predict due to infollution.
4. **The Effect of Infollution on the Consequences of Imperfect Information:** Infollution magnifies the consequences of imperfect information. Decision-making based on polluted information is associated with high costs. In an Australia hospital, inadequate prognostic information resulted in the fatal overdose of a paediatric patient (Madnick et al., 2009). An eyewear company faced a 15% lens grinding rework rate because of information errors that cost them at least $1 million annually (R. Y. Wang, 1998). One healthcare organisation that had consistently overpaid $4 million per annum in claims to non-eligible patients (Levis, 2011). Organisations fail to make an adequate profit due to incomplete information (Alenezi, Tarhini, & Sharma, 2015). They also lose clients because of infollution on their website (Jumin Lee, Park, & Han, 2008). A telecommunication company lost $3 million because of wrong financial analysis based on polluted information in customer bills (Kurniati & Surendro, 2010). Decisions based on poor information results in 8% to 12% loss of revenue in a typical enterprise. Service organisations bear from 40% to 60% of their expenses because of low-quality decision-making (Madnick et al., 2009). Some 599 surveyed organisations lose more than $1.4 billion annually because of infollution(Ge & Helfert, 2008). Hence, managing polluted information is beneficial to organisations.

Overall, infollution causes damages that amount to billions of dollars annually. It sometimes results in either loss of live or permanently altered life. Hence, the pervasiveness of infollution is evident (Wang et al. 2001). It is costly (Eppler & Helfert, 2004) and even disastrous (Madnick et al., 2009). The common thread in all these events is poor information quality or infollution.

In the next section, the discussion is on how Information and Communication Technologies (ICT) affect infollution. This discussion is important because, Industry 4.0 and virtual organizations are enabled by ICT.

INFORMATION POLLUTION (IP) AND INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

ICT has a general effect on infollution. Information and Communication Technologies (ICT) is now one of the major conduits of information globally. Organizations and individuals are now depending on information extracted from ICT informational applications and services. Due to the geographical cover-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

age of ICT, tons of information are available now than it has ever been. This has given rise to big data. Unfortunately, ICT informational services are a major source of infollution (Pandita, 2014) (Bawden & Robinson, 2009). In this section, the discussion is on the effect of ICT on infollution generally. This is followed by the effect of ICT on infollution and how it affects decision making in an organization.

Effect on ICT on Infollution

ICT has its various subcategories, contributing to information pollution. However, a major sub-category with a significant infollution problem is the World Wide Web. The World Wide Web is one of the largest sources of information. Most of the information it contains are unstructured and unsolicited. However, what constitute infollution on the World Wide Web is the low level of relevant information delivered either structurally or unstructurally to end users. In the case of this chapter, organization and virtual organizations in the industry 4.0. On the World Wide Web, the irrelevant information could be on Social media and via spam electronic messages etc. Spam is defined as electronic messages received from unknown senders. The abundance and frequent delivery of junk emails undermine the merits of email communication.

It is important to note that irrelevant information could result in health problems for employees which could in turn affect the organization. As an example, irrelevant information on social media has a significant association with certain chronic diseases (Soucek & Moser, 2010). Therefore the authenticity of information in cyberspace is a major concern for researchers (Iqbal et al., 2018). And this has led researchers to emphasise on individuals and organization checking on the reliability and validity of information they consume (Kelton, Fleischmann, & Wallace, 2008).

Effect of ICT on Infollution in Organizations

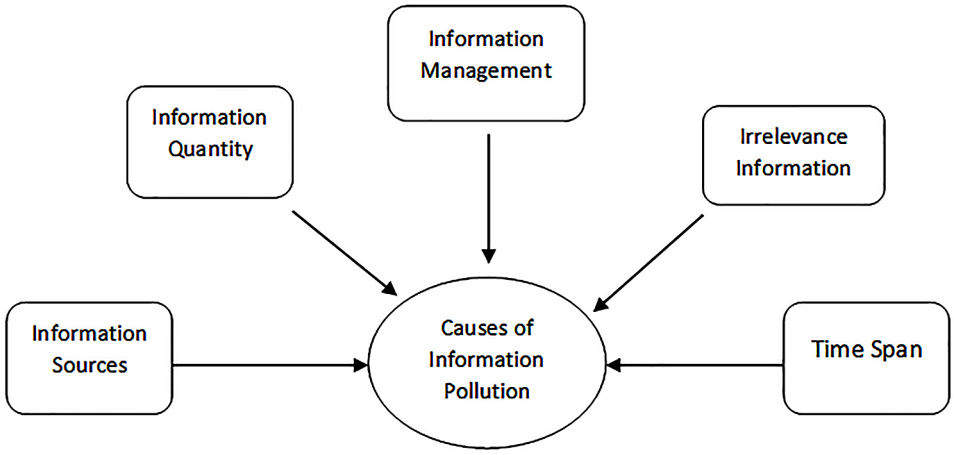
In an organizational context, decision makers and employees are exposed to varied channels of information delivered via ICT. In the presence of this excessive supply of information, employees find it difficult to identify the relevant information (Ozdemir, 2016). These employees and decision makers are bombarded with information from all corners. These information are presented in different format. This implies that infollution constantly takes on new shapes and manifestations, making it increasingly difficult to find the right information at the right time in the right format. What makes the matter worse is the fact that employees working with computers suffer from cognitive loads and are therefore more susceptible to interference from interruptions. These problems affects the manner in which they sift through the needed information, turning ICT into a source of interruption and distraction. As the distraction increases, there is a high probability in the decrease in decision accuracy. Such interruptions are detrimental to decision-making processes (Ou & Davison, 2011). Given the above, Eppler & Helfert (2004) identified five factors of information overload that contribute to the infollution as shown in Figure 3.

The existence of multiple information sources, over-abundance of information, inefficient information management, irrelevant information, and scarcity of time on the part of information users are factors that enable information pollution.

A solution to the problem would be that decision makers and employees in an organization possess information literacy skills. In a case where the information literacy skills are lacking, it is hard for the individual to manage the ever-increasing quantity of information acquired.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Diagram: Causes of information pollution



Infollution has been categorised into that which provokes disruption and those that affect the quality of information. Disruption infollution constitutes unsolicited messages and instant messages particularly in the context of a workplace (Wardle & Derakhshan, 2017). Mobile phones also contribute to this category (Neilson & Chadha, 2008). Reduction in the quality of information is considered infollution because information is inaccurate and outdated (Widen, Steinerová, & Voisey, 2014).

Now as Industry 4.0 is ICT driven and the amount of information available constitutes Big data, how does Infollution affect industry 4.0. That is the discussion of the next chapter.

INFOLLUTION AND INDUSTRY 4.0

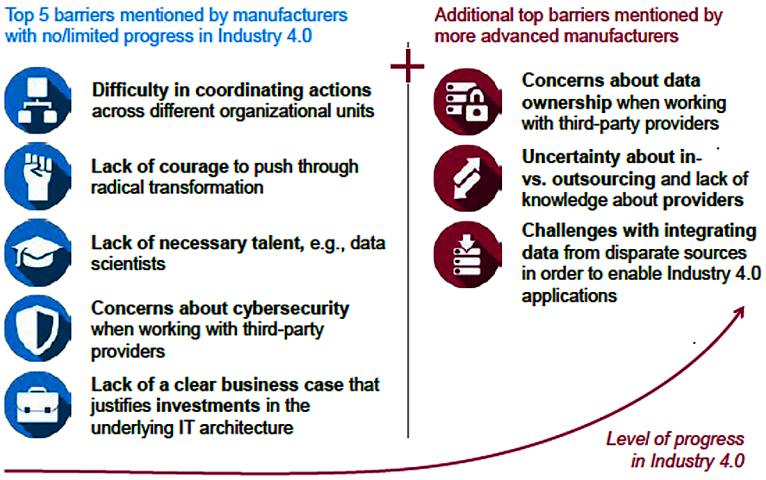
In the previous 2 sections, a general overview of Infollution and how it affects organizations and how ICT enables infollutions in organizations were discussed. In this section infollution is contextualized within the context of organizations and virtual organizations operating in industry 4.0 sector. For starters, it is important to note that infollution is not the only challenge facing Industry 4.0. The top five barriers towards the implementation of industry 4.0, as seen by manufacturers, are exhibited in figure 4, highlighted in blue. However, advanced manufacturers have added three more issues to the context of industry 4.0 as shown in figure 4, highlighted in red.

Despite these major challenges, the challenges caused by Infollution cannot be ignored. Industry 4.0 is enabled by ICT, it is data driven both in its management and operational aspects. Consequently there is a dramatic increase in the variety of information sources in industry 4.0, resulting in big data. Hence there is an increase in the risk and uncertainty associated with the quality of information available in this industry. As this industry is data driven the credibility of the information quality becomes paramount (Iqbal, Hassan, & Ahmad, 2018). Having realised this problem, academic researchers have recommended the need for an effective evaluation of information sources and information assessment (Flanagin, Metzger, Pure, Markov, & Hartsell, 2014).

In the context of virtual organizations, the credibility of the information in industry 4.0 becomes critical. Before industry 4.0, information credibility was a function of face-to-face interaction. In that setting

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 4.
Source: (McKinsey Digital, 2016)



in an organization, employees depended on diverse sources of information. They even solicited personal advice from friends and family members (Samadi & Yaghoob-Nejadi, 2009) as well as rely on information channels predating the internet such as books, television, and radio. But in virtual organizations, although these functions still exist, there is a greater need to acquire credible information from remote teams. This is because, a team could constitute remote employees working together. And if the virtual organization is an industry 4.0 organization, then this becomes challenging. This is because in industry 4.0, information sources vary. Similarly, the perception on the credibility of information sources also varies along with categories of information in industry 4.0 (Iqbal et al., 2018). An information category could be that needed for machine-to-machine communication, machine-to-human communication, human-to-human communication etc. Despite the diverse perception of credibility in the Industry 4.0 context, the credibility of information sources still plays a vital role in the persuasion of quality information (Flanagin et al., 2014). And this is especially so for virtual organizations.

As most industry 4.0 applications require information from disparate information sources (mentioned in the previous paragraph), one of the major challenges in the implementation of industry 4.0 is the integration of information from disparate information sources with the prevalence of information pollution (Bauer et al., 2016). This also becomes more challenging if the industry 4.0 organization is a virtual organization. The reason for the information integration challenge is the exponential increase in infollution, resident in the big data generated an industry 4.0 organization. Currently virtual organizations are still searching for the perfect means for sifting through big data for credible information needed by virtual teams. Therefore with the exponentially increasing infollution, employees in the organizations and virtual organization are unable to integrate quality information into their decision-making processes (Eppler & Helfert, 2004). Thus, infollution is a critical problem in today's world and industry 4.0 (Iqbal et al., 2018). This is more so as organisations become more and more dependent on information to achieve their objectives. (Iqbal et al., 2018).

In conclusion to this section, poor information quality is pervasive and costly. Information within organisational stores are neither entirely accurate nor complete (Nelson, Todd, & Wixom, 2005). Error rates up to 75% are being reported, while error rates up to 30% are customary (Batini, Cappiello, Fran-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

calanci, & Maurino, 2009). Infollution may lead to real losses both economically and socially. When people select alternatives based on limited resources (information), these misinformed individuals are more likely to make poor decisions (Madnick et al., 2009). Decisions based on low-quality information can cost organisations billions of dollars (Madnick, Wang, Lee, & Zhu, 2009).

Now, let's narrow down the discussion specifically to how Infollution affects Virtual organizations in industry 4.0. So far, the aim has been to build a preamble to this discussion.

INFOLLUTION, VIRTUAL ORGANIZATIONS AND INDUSTRY 4.0

In this section, the discussion will be on how infollution affects virtual organizations in the industry 4.0 sector. The discussion begins with the description of a virtual organization. This is followed by the impact of big data on industry 4.0 virtual organizations and how infollution affects virtual organization in industry 4.0.

Virtual Organizations

Virtual organizations are made up of virtual teams or group of employees in an organization dispersed geographically, organisationally and across time zones. These teams and their employees work together collaboratively using ICT to complete one or more assignments (Corvello & Migliarese, 2007). Advances in ICT sector, have enabled the organisations to operate virtually (Chumg, Seaton, Cooke, & Ding, 2016) to achieve a common goal through the flexible allocation of resources. In the same vain, virtual teams exist in industry 4.0 organizations. These teams could be part of the management, administrative or production processes. It is important to note that the context of this chapter is not in the production processes. However, there are more virtual organizations today due to the advancement in ICT. And researchers are now recommending the establishment of more flexible organisational structures, such as virtual organisations, in order to adapt to the technological changes in the business environment (W. Y. Wang & Chan, 2010). Never the less, as industry 4.0 is driven by big data, what do virtual industries use big data for? This is discussed in the next section.

Industry 4.0 Virtual Organizations and Big Data Usage

Virtual organizations also exist in the industry 4.0 context as alluded to in the previous section. These organizations utilize a big data for their management, administrative and production processes. Big data in Industry 4.0 virtual organizations has an impact on the decision making process in the area of the organization's management, organisational structure, and the evolutionary game theory processes used in the organization. In addition, it also enables virtual organizations to identify new business opportunities. Therefore the big data creates the possibility for the virtual organisation to find more suitable partners; use technology effectively; enable industry integration; and search for business cooperation benefits. Let's take the finding of new partners as an example. The quick identification of potential partners with required competencies from a broad spectrum of possible partners is vital for any organization. This is not different in the case of an industry 4.0 virtual organization. Such a virtual organisation may use coping strategies such as filtering, and withdrawal strategies, based on the criteria of information required and the reduced number of information sources respectively, to deal with the big data. Now knowing what

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

we know now about infollution and big data. The next question is how does infollution affect virtual organizations? This is discussed in the next section.

Virtual Organisation and Information Pollution in Industry 4.0

As organizations generate big data, information pollution becomes a problem. As mentioned in the previous section, industry 4.0 facilitate exponential infollution. Nevertheless, industry 4.0 virtual organisations may not suffer the adverse effect as other organizations. This is because these virtual organizations may easily get quality information in the presence of proliferating infollution, since they themselves are producing big data themselves. They will have a mechanism for filtering the data. The challenge for them will arise in a situation where the data is externally generated and delivered to them.

In the same vain, smaller industry 4.0 virtual organizations may also fell a lesser effect of infollution. This is because they might be concerned with the organisational structure where enhanced effectiveness and efficiency of the management practices are promoted by handling them in a flexible way (Ferreira, de Lima, & da Costa, 2012). However in a larger industry 4.0 virtual organization, there are bound to be challenges due to the complexities of their internal procedure and operations.

Although infollution will affect different industry 4.0 virtual organizations in different ways, it is likely that Industry 4.0, which is advanced ICT, will further enhance some positive transformation in virtual organizations with respect to dealing with infollution. As new tools and applications are being developed, it is likely that the transformation will be focused on the delivery of more enhanced value, credible and quality information. This transformation will enhance internal operations as well as enhance the external operations of the virtual organization. It will also solidify external partnerships between virtual companies which will enable access quality information; acquisition and jointly building of information sources and risk sharing in decision-making. The internal transformation will enable the adoption of internal processes that will enable the ability to gather quality information; and the promotion of knowledge sharing activities - where employees share information through email and sometimes opt for video conferencing, thereby facilitating the redistribution of credible information within the organization.

Although certain industry 4.0 virtual organizations are expected to fare better when it comes to dealing with infollution, this does not imply that there will be no challenges. A challenge that could degrade the quality of information shared in any virtual organization could be the trust deficit among staff members (McCarter & Northcraft, 2007). Another challenge is that the internal competition among stakeholders in a virtual organisation could raise further objection about information quality. This requires balancing the self-interest of different stakeholders which can be achieved by effectively managing infollution.

CONCLUSION

The preceding discussion depicts that infollution is here to stay. As big data is generated in industry 4.0 virtual organizations, it is likely that infollution will be on the increase. This chapter focused on the managerial significance of Infollution in such organizations. However, infollution will also affect the technical aspect of virtual organizations in industry 4.0, since they are data driven as well. But as that is not the scope of the chapter, nothing is mentioned about it. However, there are a need for information professionals, academicians, computer scientists, and knowledge management specialists to develop

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

strategies to keep the adverse effects of infollution to a minimum. This will provide new effective and innovative techniques for information seekers to manage infollution and secure, reliable information.

REFERENCES

Alenezi, H., Tarhini, A., & Sharma, S. K. (2015). Development of quantitative model to investigate the strategic relationship between information quality and e-government benefits. *Transforming Government: People*, *Process and Policy*, *9*(3), 324–351.

Association, A. L. (2008). *Presidential committee on information literacy*. Retrieved from http://www.ala. org/ala/acrl/acrlpubs/whitepapers/presidential. cfm

Batini, C., Cappiello, C., Francalanci, C., & Maurino, A. (2009). Methodologies for data quality assessment and improvement. *ACM Computing Surveys*, *41*(3), 16. doi:10.1145/1541880.1541883

Bauer, H., Baur, C., Mohr, D., Tschiesner, A., Weskamp, T., Alicke, K., & Kelly, R. (2016). *Industry 4.0 after the initial hype–Where manufacturers are finding value and how they can best capture it*. McKinsey Digital.

Bawden, D., & Robinson, L. (2009). The dark side of information: Overload, anxiety and other paradoxes and pathologies. *Journal of Information Science*, *35*(2), 180–191. doi:10.1177/0165551508095781

Chen, Y.-C., Shang, R.-A., & Kao, C.-Y. (2009). The effects of information overload on consumers' subjective state towards buying decision in the internet shopping environment. *Electronic Commerce Research and Applications*, *8*(1), 48–58. doi:10.1016/j.elerap.2008.09.001

Chumg, H.-F., Seaton, J., Cooke, L., & Ding, W.-Y. (2016). Factors affecting employees' knowledge-sharing behaviour in the virtual organisation from the perspectives of well-being and organisational behaviour. *Computers in Human Behavior*, *64*, 432–448. doi:10.1016/j.chb.2016.07.011

Corvello, V., & Migliarese, P. (2007). Virtual forms for the organization of production: A comparative analysis. *International Journal of Production Economics*, *110*(1-2), 5–15. doi:10.1016/j.ijpe.2007.02.006

Coult, G. (2008). Managing the 'information pollution'. *Managing Information, 14*(10), 10-12.

de Sousa Jabbour, A. B. L., Jabbour, C. J. C., Godinho Filho, M., & Roubaud, D. (2018). Industry 4.0 and the circular economy: A proposed research agenda and original roadmap for sustainable operations. *Annals of Operations Research*, 1–14.

Edmunds, A., & Morris, A. (2000). The problem of information overload in business organisations: A review of the literature. *International Journal of Information Management*, *20*(1), 17–28. doi:10.1016/S0268-4012(99)00051-1

Eppler, M., & Helfert, M. (2004). *A classification and analysis of data quality costs.* Paper presented at the International Conference on Information Quality.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Fernández-Miranda, S. S., Marcos, M., Peralta, M., & Aguayo, F. (2017). The challenge of integrating Industry 4.0 in the degree of Mechanical Engineering. *Procedia Manufacturing*, *13*, 1229–1236. doi:10.1016/j.promfg.2017.09.039

Ferreira, P. G. S., de Lima, E. P., & da Costa, S. E. G. (2012). Perception of virtual team's performance: A multinational exercise. *International Journal of Production Economics*, *140*(1), 416–430. doi:10.1016/j.ijpe.2012.06.025

Flanagin, A. J., Metzger, M. J., Pure, R., Markov, A., & Hartsell, E. (2014). Mitigating risk in ecommerce transactions: Perceptions of information credibility and the role of user-generated ratings in product quality and purchase intention. *Electronic Commerce Research*, *14*(1), 1–23. doi:10.100710660-014-9139-2

Ge, M., & Helfert, M. (2008). *Data and information quality assessment in information manufacturing systems.* Paper presented at the International Conference on Business Information Systems. 10.1007/978-3-540-79396-0_33

Han, J., Pei, J., & Kamber, M. (2011). *Data mining: concepts and techniques*. Elsevier.

Hoq, K. M. G. (2016). Information Overload: Causes, Consequences and Remedies-A Study. *Philosophy and Progress*, *55*(1-2), 49–68. doi:10.3329/pp.v55i1-2.26390

Huang, G. Q., Zhang, Y., & Jiang, P. (2007). RFID-based wireless manufacturing for walking-worker assembly islands with fixed-position layouts. *Robotics and Computer-integrated Manufacturing*, *23*(4), 469–477. doi:10.1016/j.rcim.2006.05.006

Iqbal, Q., Hassan, S. H., & Ahmad, N. H. (2018). The assessment of perceived information pollution in banking sector: A scale development and validation study. *Business Information Review*, *35*(2), 68–76. doi:10.1177/0266382118772891

Jackson, T. W., & Farzaneh, P. (2012). Theory-based model of factors affecting information overload. *International Journal of Information Management*, *32*(6), 523–532. doi:10.1016/j.ijinfomgt.2012.04.006

Kadiri, J. A., & Adetoro, N. A. (2012). Information Explosion and the Challenges of Information and Communication Technology Utilization in Nigerian Libraries and Information Centres. *Ozean Journal of Social Sciences*, *5*(1), 21–30.

Kagermann, H., Helbig, J., Hellinger, A., & Wahlster, W. (2013). *Recommendations for implementing the strategic initiative INDUSTRIE 4.0: Securing the future of German manufacturing industry; final report of the Industrie 4.0 Working Group*. Forschungsunion.

Kean, T. (2011). *The 9/11 commission report: Final report of the national commission on terrorist attacks upon the United States*. Government Printing Office.

Kelton, K., Fleischmann, K. R., & Wallace, W. A. (2008). Trust in digital information. *Journal of the American Society for Information Science and Technology*, *59*(3), 363–374. doi:10.1002/asi.20722

Kirsh, D. (2000). A few thoughts on cognitive overload. *Intellectica*, *1*(30), 19–51.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Koh, S., Gunasekaran, A., & Rajkumar, D. (2008). ERP II: The involvement, benefits and impediments of collaborative information sharing. *International Journal of Production Economics*, *113*(1), 245–268. doi:10.1016/j.ijpe.2007.04.013

Kurbanoglu, S., Grassian, E., Mizrachi, D., Catts, R., & Spiranec, S. (2013). *Worldwide Commonalities and Challenges in Information Literacy Research and Practice: European Conference, ECIL 2013*, *Istanbul, Turkey*, *October 22-25, 2013*. *Revised Selected Papers* (*Vol. 397*). Springer. 10.1007/978-3-319-03919-0

Kurniati, A. P., & Surendro, K. (2010). *Designing IQMM as a maturity model for information quality management.* Paper presented at the Informing Science & IT Education Conference (InSITE).

Kutty, A. D. (2006). *Managing Information Overload for Effective Decision-Making: An Empirical Study on Managers of the South Pacific (Master of Arts)*. The University of the South Pacific.

Laudante, E. (2017). Industry 4.0, Innovation and Design. A new approach for ergonomic analysis in manufacturing system. *The Design Journal, 20*(sup1), S2724-S2734.

Lee, J., Kao, H.-A., & Yang, S. (2014). Service innovation and smart analytics for industry 4.0 and big data environment. *Procedia Cirp*, *16*, 3–8. doi:10.1016/j.procir.2014.02.001

Lee, J., Park, D.-H., & Han, I. (2008). The effect of negative online consumer reviews on product attitude: An information processing view. *Electronic Commerce Research and Applications*, *7*(3), 341–352. doi:10.1016/j.elerap.2007.05.004

Levis, M. (2011). *Information quality training requirements analysis guideline demonstrated in a healthcare context*. Dublin City University.

MacDonald, J., Bath, P., & Booth, A. (2011). Information overload and information poverty: Challenges for healthcare services managers? *The Journal of Documentation*, *67*(2), 238–263. doi:10.1108/00220411111109458

Madnick, S. E., Wang, R. Y., Lee, Y. W., & Zhu, H. (2009). Overview and framework for data and information quality research. *Journal of Data and Information Quality*, *1*(1), 2. doi:10.1145/1515693.1516680

Mahler, J. G. (2009). *Organizational learning at NASA: The Challenger and Columbia accidents*. Georgetown University Press.

McCarter, M. W., & Northcraft, G. B. (2007). Happy together? Insights and implications of viewing managed supply chains as a social dilemma. *Journal of Operations Management*, *25*(2), 498–511. doi:10.1016/j.jom.2006.05.005

McKinsey, D. (2016). Industry 4.0 after the initial hype. Retrieved from McKinsey&Company: https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/getting%20the%20most%20out%20of%20industry%204%200/mckinsey_industry_40_2016.ashx

Neilson, L. C., & Chadha, M. (2008). International marketing strategy in the retail banking industry: The case of ICICI Bank in Canada. *Journal of Financial Services Marketing*, *13*(3), 204–220. doi:10.1057/fsm.2008.21

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Nelson, R. R., Todd, P. A., & Wixom, B. H. (2005). Antecedents of information and system quality: An empirical examination within the context of data warehousing. *Journal of Management Information Systems*, *21*(4), 199–235. doi:10.1080/07421222.2005.11045823

Ou, C. X., & Davison, R. M. (2011). Interactive or interruptive? Instant messaging at work. *Decision Support Systems*, *52*(1), 61–72. doi:10.1016/j.dss.2011.05.004

Ozdemir, Ş. (2016). Individual contributions to infollution (information pollution): Trust and share. *International Journal on New Trends in Education and Their Implications*, *7*(3), 23–33.

Pandita, R. (2014). Information pollution, a mounting threat: Internet a major causality. *Journal of Information Science Theory and Practice*, *2*(2), 49–60. doi:10.1633/JISTaP.2014.2.4.4

Prause, G. (2015). Sustainable business models and structures for Industry 4.0. *Journal of Security & Sustainability Issues*, *5*(2), 159–169. doi:10.9770/jssi.2015.5.2(3)

Preece, A., Missier, P., Embury, S., Jin, B., & Greenwood, M. (2008). An ontology-based approach to handling information quality in e-Science. *Concurrency and Computation*, *20*(3), 253–264. doi:10.1002/cpe.1195

Reedy, K., Mallett, E., & Soma, N. (2013). iKnow: Information skills in the 21st century workplace. *Library and Information Research, 37*(114), 105-122.

Samadi, M., & Yaghoob-Nejadi, A. (2009). A survey of the effect of consumers' perceived risk on purchase intention in e-shopping. *Business Intelligence Journal*, *2*(2), 261–275.

Sasaki, Y., Kawai, D., & Kitamura, S. (2015). The anatomy of tweet overload: How number of tweets received, number of friends, and egocentric network density affect perceived information overload. *Telematics and Informatics*, *32*(4), 853–861. doi:10.1016/j.tele.2015.04.008

Soucek, R., & Moser, K. (2010). Coping with information overload in email communication: Evaluation of a training intervention. *Computers in Human Behavior*, *26*(6), 1458–1466. doi:10.1016/j.chb.2010.04.024

Stover, A., & Nielsen, J. (2002). *E-mail newsletter usability: 79 design guidelines for subscription, newsletter content and account maintenance based on usability studies*. Fremont, CA: Nielsen Norman Group.

Strong, D. M., Lee, Y. W., & Wang, R. Y. (1997). Data quality in context. *Communications of the ACM*, *40*(5), 103–110. doi:10.1145/253769.253804

Swar, B., Hameed, T., & Reychav, I. (2017). Information overload, psychological ill-being, and behavioral intention to continue online healthcare information search. *Computers in Human Behavior*, *70*, 416–425. doi:10.1016/j.chb.2016.12.068

Wang, R. Y. (1998). A product perspective on total data quality management. *Communications of the ACM*, *41*(2), 58–65. doi:10.1145/269012.269022

Wang, W. Y., & Chan, H. K. (2010). Virtual organization for supply chain integration: Two cases in the textile and fashion retailing industry. *International Journal of Production Economics*, *127*(2), 333–342. doi:10.1016/j.ijpe.2009.08.006

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wardle, C., & Derakhshan, H. (2017). *Information Disorder: Toward an interdisciplinary framework for research and policymaking.* Council of Europe report, DGI(2017), 9.

Widen, G., Steinerová, J., & Voisey, P. (2014). Conceptual modelling of workplace information practices: a literature review. *Information Research, 19*(4).

Zaveri, A., Rula, A., Maurino, A., Pietrobon, R., Lehmann, J., & Auer, S. (2016). Quality assessment for linked data: A survey. *Semantic Web*, *7*(1), 63–93. doi:10.3233/SW-150175

Zhang, Y., Qu, T., Ho, O. K., & Huang, G. Q. (2011). Agent-based smart gateway for RFID-enabled real-time wireless manufacturing. *International Journal of Production Research*, *49*(5), 1337–1352. doi:10.1080/00207543.2010.518743

Zhang, Y., Zhang, G., Wang, J., Sun, S., Si, S., & Yang, T. (2015). Real-time information capturing and integration framework of the internet of manufacturing things. *International Journal of Computer Integrated Manufacturing*, *28*(8), 811–822. doi:10.1080/0951192X.2014.900874

This research was previously published in Big Data and Knowledge Sharing in Virtual Organizations; pages 117-135, copyright year 2019 by Engineering Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 78
Enterprise Systems, Power and Improvisation:
Equipping Universities for Mass Production?

David W. Wainwright
Northumbria University, UK

Teresa S. Waring
Northumbria University, UK

ABSTRACT

Enterprise systems (ES) have been extensively procured in large organizations but much research fails to develop sociotechnically informed approaches that facilitate their implementation whilst understanding the impact of integrated technology on professional working practices within complex organizational environments. This chapter takes a critically informed sociotechnical approach to power and improvisation in ES implementation. The contribution is a combined "circuits of power-improvisation" (CPI) framework which can facilitate a better understanding of ES implementation, sociotechnical theory, and practice. Practical lessons learned from the study may potentially be used to avoid some of the problems experienced with the over-zealous and rapid introduction of digital technologies into university organizations where the risk is that they become a student mass production system. It highlights the important role of power and improvisation, enabled and afforded by new digital technologies, in what may be misrepresented as planned strategic and deliberate organizational change.

INTRODUCTION

In the last two decades, increasingly complex forms of organization have developed in response to the pressures from globalisation, economic uncertainty and market instability. In addition, rapid technological developments, especially in information and communications (now commonly termed digital) technologies, have provided opportunities for the adoption of new management practices - especially

DOI: 10.4018/978-1-7998-7297-9.ch078

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

those based on principles of performance monitoring, reporting, staff accountability and control. This is particularly prominent in both the private and public sectors, where objectives focusing on efficiency, competitiveness, quality, and accountability have led to an emphasis on the development of new metrics underpinned by a culture of performance management, greater centralisation and hierarchical systems. In order to facilitate and reinforce these new management regimes, deliberate organizational strategies have often entailed the procurement, adoption and implementation of Enterprise Systems (ES). This is particularly evident in sectors such as Higher Education in the UK where, in the past, there have been more professional and collegial forms of work organization, professional autonomy and localised decision making (Fowler & Gilfillan, 2003; Pollock & Cornford, 2004; Oliver & Romm, 2009; Wagner et al., 2010). The rise of managerialism, underpinned by ES technology and more recently artificial intelligence and machine algorithms, has given rise to a new form of technocracy based on key drivers of machine efficiency and effectiveness that has begun to dominate the human and social aspects of work and knowledge based systems that have been developed over many years in organizations. This raises new issues regarding the maintenance of an appropriate balance between human, social and technical aspects of work thus giving rise to the need for more informed sociotechnical approaches and methods to be adopted in ES implementations that also now extends to digital transformation strategies.

Emerging research (Wagner et al., 2010; Dong et al., 2009) would also appear to indicate that many organizations, although having ambitious Information Technology (IT) strategic plans in place, find large scale enterprise systems overwhelming during implementation and may adopt organizational actions which respond to unfolding events resulting in unexpected and unintended consequences of the implementation as it progresses. One such consequence may be the ability to engage in opportunistic re-organization strategies afforded by the assimilation of 'new managerialism' (Clarke & Newman 1997) within the organization and, with it, a culture of command and control that is often incongruent with existing management cultures and organizational structures (Deem, 2004; Deem & Brehoney, 2005). The effects of ES adoption and its relationship to the redistribution of power and the alteration of political structures may lead to new policies, strategic opportunities and threats within organizations. This is an area that appears to be under researched. However, ES, once adopted, can also act as a catalyst for organizational and work based improvisation, thereby creating new and unanticipated power relations, managerial roles and structures.

The aim of this chapter is to contribute both to sociotechnical theory and practice, by examining IS improvisation practice through the lens of a power and improvisation model that explicitly recognises the concept of power and its role in IT enabled organizational change within the wider context of enterprise systems adoption and implementation. Unlike Orlikowski's (1996) 'open-ended' highly configurable groupware IT, and Elbanna's (2006) 'successful' manufacturing ERP implementation, the ES under consideration here is one implemented within a highly complex UK Higher Education (HE) organizational environment. This critically informed and sociotechnical approach adopts the 'circuits of power' framework (Clegg, 1989; Silva, 2007) and relates this to an improvisational model of change to surface issues and actions that bring with them unintended consequences for organizations. This chapter is an updated version of our previous research study (Waring, Wainwright & Skoumpopoulou, 2016) with an extended discussion section that demonstrates the rapid acceleration of digital technology adoption in a university and the accompanying transformational and strategic changes; subsequently resulting in work force changes, deskilling and reskilling. Hence the notion of universities being increasingly viewed as a metaphorical 'production machine' to enable the mass production of students (Morgan, 2006).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The next section discusses the theoretical concepts that underpin this work and examines the fundamental ideas around improvisation and power and how the two may be linked. The primary research involved a longitudinal case study of a UK HE institution which implemented an ES and this is presented in the third section. The case is then deconstructed and analysed by relating it to the improvisation and power concepts previously formulated. The next section provides an updated account of the digital transformation strategy and its impact on the organization that was in many ways facilitated by the ongoing ES adoption. The final section presents the implications of this research for future ES adoption and implementation, and reflects on the utility of developing improved theoretical models of improvisation to surface issues of power and political relations in organizations. It is proposed that this will add to the body of sociotechnical theory and lead to a better understanding of improvisation enabling opportunities and actions to be taken that result in more ethical practice and increased value for stakeholders who may be the potential users and benefactors of ES applications and digital transformation programmes.

IMPROVISATION AND ENTERPRISE SYSTEMS

Both the research and practitioner literature concerning the implementation of enterprise wide systems (ES) in large organizations are replete with normative models, methods and guidelines providing prescriptions for implementation success. One area of research which appears to have relevance to the ES implementation debate, but which has tended to be largely overlooked, is the important role of organizational actors and improvisation during the process. This lack of formal recognition is rather paradoxical however, as it appears that no matter how highly structured and well managed the organization is, or how experienced the project teams are in terms of IS/IT implementation, improvisation is often brought to bear in situations where rubrics, formally planned approaches and methods fail (Cibbora, 1996). Research on improvisation has received increased recognition within the contexts of organizational change (Ciborra, 1996; Moorman, 1998), punctuated sociotechnical change and information systems (Lyytinen and Newman, 2008), management (Mangham & Pye 1991; Weick,1998), bricolage (Lanzarra, 1999), tailorability (Morch & Mehandjiev, 2000) and information systems development and implementation (Orlikowski, 1996; Elbanna, 2006). The literature also defines its other foundational areas as sense making (Weick 1995), innovation (Weick 1999; Kamoche & Cunha, 2001), emergent change (Mintzberg, 1994) and adaptive structuration (Desanctis & Poole, 1994). Nevertheless, what is often missing from this literature is a formal consideration of the power and political environment within which these improvisations occur.

Before considering how improvisation can inform ES implementation theory it is essential to better understand the concept, and its historical research context.

Defining the Concept and the Language of Improvisation

The concept and hence the language of improvisation is not only restricted to the information systems field and there has been a great deal of research carried out in anthropology, arts and management studies generally and organizational change management more particularly. Early organizational researchers grounded their studies of improvisation in the arts, especially jazz music owing to improvisation and the centrality of 'bricolage' (Cunha et al., 1999; 2012). Researchers then moved the debate away from the arts into management and organizational settings where they attempted to develop definitions of organizational improvisation and show its relevance in competitive environments (Ciborra, 1996).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

When one considers the totality of definitions available some common themes relevant to management can be identified. First, in these contexts, improvisation must be *organizational* because actions are carried out by organizational actors within teams, on their own or on behalf of the organization. Second improvisation can also be seen as the *conception of action as it unfolds* and finally improvisation implicitly suggests that it can only take place where there are *resources* and individuals able to make use of these resources. This is where the concepts of '*improvisation*' and '*bricolage*' are closely related. For example, improvisation implies the pre-existence of a set of resources, be it a 'plan of action', knowledge or a social structure, upon which variations can be built (Orlikowski & Hoffman, 1997). Also, if improvisation means to respond in real time then it follows that improvisers cannot wait for optimal resources to be deployed and have to tackle the issues at hand with what is currently available (Cunha et al., 1999). *Bricolage* on the other hand has been defined as "making things work by ingeniously using whatever is at hand, being unconcerned about the 'proper' tools and resources" (Thayer, 1998:239). These concepts build upon original notions identified in anthropology, cultural studies and the work of Claude Lévi-Strauss.

Improvisation Research and Its Context Within the IS Field

One of the most influential conceptual thinkers and writers within IS on improvisation and IS development is Claudio Ciborra. Working between the interstices of the management, information systems and organizational behaviour fields, Ciborra (2002, p.49) expands on the essential differences and nuances between the terms bricolage, improvisation and hacking. He defines this as*:*

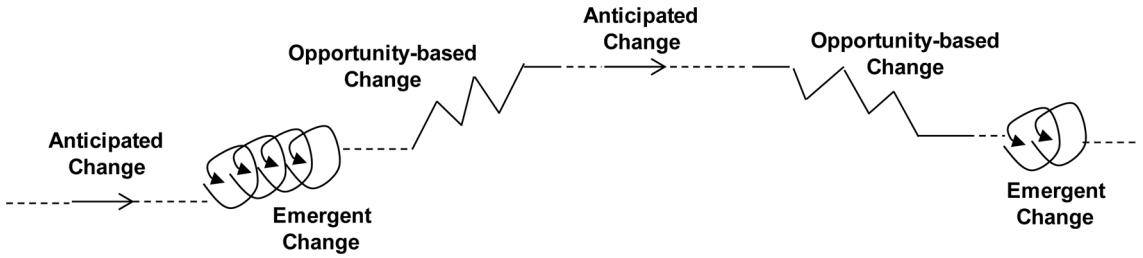
Bricolage means tinkering through the combination of resources at hand. These resources become the tools and they define in-situ the heuristic to solve the problem. ..With bricolage, the practices and the situations disclose new uses and applications of the technology and things…….Improvisation puts an emphasis on the suddenness, extemporaneity and unpredictability of the human intervention, though highly situated….hacking is devising and implementing a program to perform a certain useful function by making use of any technology in an original, unorthodox, and often playful way….where hacking stands to software engineering tenets as bricolage stands to organizational procedures…

Ciborra (2002) expresses a caveat that these expressions can signify or be interpreted as derogatory practices or deviant management behaviours. He calls for a *'Copernican revolution'* where improvisation and bricolage is seen as the norm in strategy and systems implementation representing a valid alternative to rational and deterministic planning and decision making. These practices are particularly relevant to the adoption of ES providing a cognitive and organizational capability to convert these systems, applications and data into practical, situated, and unique knowledge for action. Ciborra (2002) also stresses the importance of considering 'mood' as a presupposition for improvisation as situated action. Ciborra's work, although mostly conceptual, acts as a complement to interpret more empirical studies that investigate improvisational change and methods closely related to bricolage.

Recognising that there was a need to develop better theoretical insights into large integrated IT systems implementation, Orlikowski and Hofman (1997) conducted an empirical study of organizational improvisation due to the adoption of IT groupware. Their original aim was to describe how improvised change can take place in a series of deliberate, emergent or opportunistic phases. Here three different types of change are recognised consisting of: anticipated, emergent and opportunity-based change (Figure 1).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. An improvisational model of change management over time (Orlikowski & Hofman, 1997:13)



Anticipated changes are those that are planned ahead of time and occur as intended. Emergent changes arise spontaneously from local innovations and are not planned or intended. Opportunity based changes are those that are introduced purposefully and intentionally in response to an unexpected opportunity, event or breakdown. Orlikowski and Hofman (1997) view these types of change as building on each other iteratively over time. The use of the new technology typically involves a series of opportunity-based, emergent and further anticipated changes the order of which cannot be pre-determined. This is because of the nature and complexity of change and its interaction with events and the environment within which it is taking place. They also suggest that "there is a discrepancy between how people think about technological change and how they implement it....that contributes to the difficulties and challenges that organizations face as they attempt to introduce and effectively implement technology-based change" (Orlikowski & Hofman, 1997:11). However, in their description of the case company Zeta, Orlikowski and Hofman (1997) make no mention or explicit reference to power or political actions that may influence or affect the outcomes of these improvisation types either in the supporting case study analysis or theory reviewed. In their study of groupware (open ended) technology adoption, the anticipated strategy and any unanticipated outcomes are all viewed highly positively. Negative consequences related to actual and potential user resistance, due to power and political issues, are rather 'downplayed' resulting in a 'rose tinted spectacle' view of planned and emergent organizational change. Yet, the power and political implications do not form part of the improvisation framework in Figure 1.

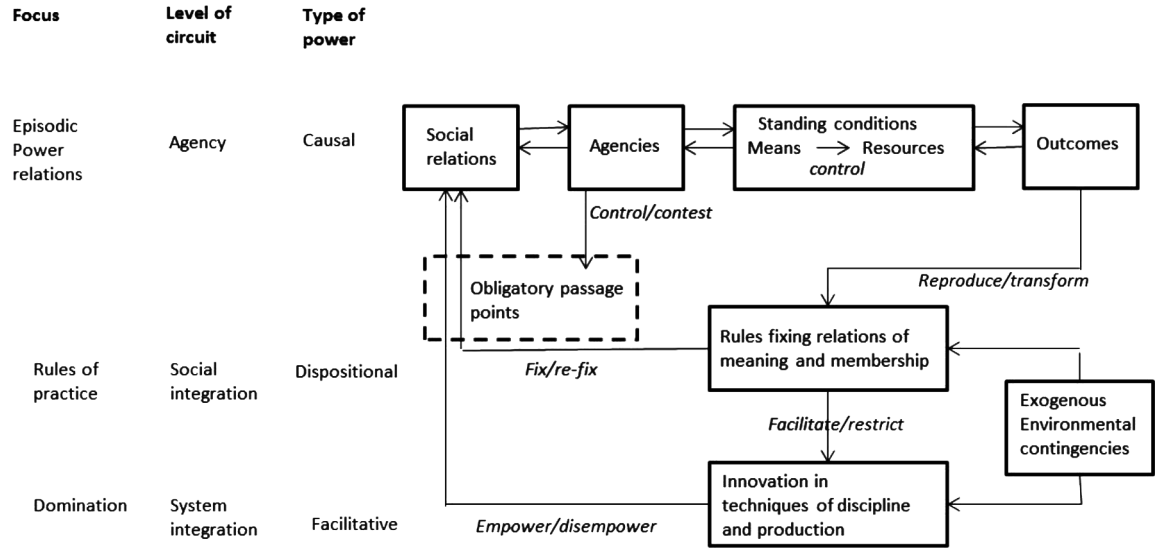
POWER AND IFORMATION SYSTEMS

Although there are IS studies which address power and politics it is not the intention to explore them at any length in this chapter. The intention is to focus upon IS research that is based upon Clegg's (1989) 'circuits of power' (Silva, 2002; Silva & Backhouse, 2003; Silva, 2007). Silva (2007) argues that the 'circuits of power' provides a rich analytical framework for the study of power and IS and has been derived from a number of studies on power within sociology (e.g. Callon, 1986; Law, 1986; Latour, 1987) as well as insights from Foucault's (1977) disciplinary power. This framework (Figure 2) also has the added benefit in that it relates the concepts of power to organizations.

In Figure 2, *episodic power* relates to agency, and, within the context of IS, Silva (2007) suggest that the focus of study may be on 'A's' exercise of power over 'B' (A and B are different agencies) and 'B's' possible resistance to some aspect of an IS adoption. Law (1991) views this as 'power over' or causal power and suggests that individuals have a scope of actions and that specific scope of action is given by the structural characteristics of the individual's particular context. Clegg (1989) complements episodic

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Circuits of Power (Clegg, 1989:214)



power by drawing on the work of actor-network theory and specifically the concept of 'obligatory passage points'(OPP) and the principle of 'symmetry' (Callon, 1986; Latour, 1987). Silva and Backhouse (2003) suggest that OPPs are the results of four 'translational steps', problematization, interessement, enrolment and mobilization, after which B has no other choice but to accept the OPP. The movement between steps is called displacement and involves discursive practices. When displacement occurs, power is exercised. Silva (2007) argues that information systems can be viewed as OPPs.

The 'circuit of *social integration'* addresses dispositional power. This capacity is a characteristic that distinguishes between having and exercising power. Power in this context is a facility that entitles someone to exercise power - but it does not necessarily imply its exercise (Clegg, 1989). Clegg (1989) defines social integration in terms of the relation between rules of meaning and membership. The analysis of this circuit identifies the legitimate (formal rules) and illegitimate (informal rules) dimensions of power within the organization

System integration within the context of power is viewed as facilitative and is understood in terms of its ability to produce and achieve collective goals. In the organizational context, system integration is the technological means of control over the material and social setting and the skills associated with these means (Lockwood, 1964). Besides the material means of production, Lockwood includes in systemic integration the material means of surveillance. In short, system integration is constituted by techniques of production and discipline. System integration deals with facilitative power because the material conditions of production might empower or disempower agencies in their productive activities. The circuit of system integration is the major source of change in the circuits of power framework, particularly when the material conditions of production are altered: hence its relevance to improvisation and our study. Changes in the circuit of systemic integration will entail new agencies, techniques and practices that the circuit of social integration might find difficult to resolve.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Improvisation, Power and Information Systems

Exploring the relationship between power and improvisation is challenging and, within IS, Silva (2002) has been one of the few researchers who have attempted this. Silva's (2002) case study, conducted in the context of a strategic outsourcing of information systems in two hospitals in Guatemala, took a narrow definition of improvisation as defined by Weick (1993) and through the lens of 'facilitative power' examined how the outsourcing was conducted. Although insightful it does not address more specific power issues within IS implementation. We propose that this work can be developed further by utilising Clegg's (1989) original 'circuits of power' framework and more recently Silva and Backhouse's (2003) adaption within the context of a system implementation where improvisation was an important activity at various stages of the project. Our intention is to demonstrate our approach by developing and applying a 'circuits of power – improvisation' (CPI) framework to an Enterprise System implementation within a university. We have identified in Table 1 where exploration of the data will occur.

Table 1. The 'Circuits of Power-Improvisation' (CPI) framework and our interpretation

Circuit	Type of Power	Our Interpretation of the Framework in the Context of Improvisation
Episodic	***Causal Power***: When A makes B do something B otherwise would not do.	Who are the As and Bs when the implementation is initiated? Who are the systems champions and are there resisters? What improvisations occur and who are the As and Bs? What are their objectives? What strategies are employed within the improvisation are adopted by the As and Bs? What resources are mobilised by the As and Bs within the improvisation and what are the outcomes? Can opportunity-based outcomes be explained?
Social Integration	***Dispositional Power:*** Provides the conditions for As to exercise power. Rooted in rules of meaning and membership of the organization.	What are the organizational rules and norms prior to implementation that place the As and Bs within their respective position? How do the improvisations affect these rules and norms? Are there new rules and norms? What are the meanings ascribed to these rules and norms as sense making takes place?
Systemic Integration	***Facilitative Power:*** This power causes the organization to generate outcomes and is defined by techniques of production and discipline.	What techniques are employed by As to ensure Bs compliance during/after an improvisation? What are the work tasks that are affected and how have they changed? Have the improvisations led to the system as a resource to instil discipline? How has this occurred?

IS improvisation does not take place without reference to organizational power and politics. Distinguishing the nature and circuits of power within an improvisation and the resultant changes has the potential to further our understanding of improvisation in an ES context. It is proposed that our understanding of the three types of improvisational changes (anticipated, emergent, opportunistic) identified by Orlikowski (1996) and Orliksowski and Hofman (1997) can be enhanced if examined against the combined circuits of power improvisation framework, Table 1. The three circuits of power, episodic, social integration and systemic integration may provide a richer account of the complex power and political relations within an organization type that contains both micro and macro-level improvisations and high levels of procedural memory. These typically encompass higher levels of routine knowledge

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and well defined rules (Tjørnehøj & Mathiassen, 2010) and are typically resident within a professional and academic led university and HEI culture.

RESEARCH METHODOLOGY

The study of the ES, a university student administration system (USAS), implementation began in 2007 as an ethnographic study and lasted five years. Ethnography can be defined as a 'style of social science writing which draws upon the writer's close observation of and involvement with people in a particular social setting and relates the words spoken and the practices observed to the overall cultural framework within which they occurred' (Watson 2011:205). Watson (2011) argues that ethnography should involve participant observation, content analysis of documents, stories, myths, rituals, symbols and other artefacts. This may be supplemented and strengthened by interviews, statistical analysis and even small surveys. The research began with an in-depth critical analysis of the documentation leading up to the USAS implementation. This was followed during 2008 by 22 interviews averaging one hour each, with university staff who had been in the university for no less than five years. As in the case of Doolin (1998) the interviewees were interviewed more than once over the research time period.

Interviewees were taken from across the university, Modern (pseudonym). A non-directive interviewing technique was used which allowed respondents to express their own views about organizational life in their own words rather than force them into predetermined categories (Hirschheim & Newman, 1991). The interviews involved a discussion of issues surrounding the participants' prior experience of student information systems, the implementation of USAS, life in the organization and change during and after USAS went live. Interviews were audio taped with permission, transcribed and returned to the interviewees for verification. Anything that was felt by the participants to be problematic was removed from the transcript and after one interview a respondent decided to wholly withdraw her transcript.

Participant observation took place throughout the research study and was recorded using a diary. As a member of staff one of the researchers was able to participate in the activities which contributed to the academic role in providing student data. Working alongside other colleagues it was possible to observe the action of various individuals and interpret them in order to gain insight into the cultural manifestations of the organization (Bryman, 2004). Burgess (1984) also argues that participant observation can increase the richness of the research and Waddington (2004) suggests that being part of day to day activities or important events can provide valuable understanding of organizational practice which can become ritualised over time. In order to understand administrative working practices, the same researcher spent a number of periods of observation during peak times in the academic calendar: student enrolment in October, marks recording after assessment in February and examination board preparation time in June. The research team also recorded events and further progress using participative observation and document collection to subsequently update the research programme to record significant events in the associated digital transformation programme through to 2017.

Using a general inductive approach informed by grounded theory (Crabtree & Miller, 1999; King, 2004) the interviews, documentation and diary data were coded according to theoretical concepts suggested by the data rather than imposed by the researcher. The approach used involved a process of developing initial categories, grouping data, identifying patterns and then making comparisons to uncover shared elements and properties (Barley, 1990; Van Maanen, 1979). The documentation and transcripts were also read critically to identify statements which reflected values, beliefs and assumptions about

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

USAS as well as for evidence of organizational stories, myths and rituals which may have arisen over the period of the research. The analysis of the case study is presented in a form of narrative taking into consideration the improvisations which took place and the elements of each circuit. Bearing these in mind the discussion explores what happened during the USAS implementation and the subsequent digital transformation programme. The intention is to identify those possible elements or factors that have resulted in the systems being adopted by Modern University in the manner it has. Our aim is not to arrive at a conclusion isolating certain factors or improvisations which have had maximum impact on the organization but to articulate an explanation covering a number of the power and political factors involved. The framework is a set of concepts that will support researchers of improvisation and power to collect, analyse and interpret data and practitioners to identify elements and processes that can hinder or support the introduction of a new ES and the associated digital transformations.

THE CASE OF MODERN UNIVERSITY: THE ADOPTION OF USAS

Modern University is a large city based university with over 3000 employees and at the beginning of this research was a decentralised organization consisting of nine academic faculties. In the mid-2000s Modern failed to deliver appropriate student information to central government and turned to an ES, called a University Student Administration System (USAS), solution to address their difficulties. However, where research and finance can be a major consideration in other higher education research studies, the focus at Modern was on the students, the courses offered and on the management of related data. A business case was accepted to make USAS the preferred alternative to upgrading an existing Oracle system. USAS is used by over 70% of the UK Higher Education (HE) market, by 25% of the Scottish Further Education (FE) market and has become the de facto standard for student information systems. Like many other integrated systems of its genre it has been built around an 'ideal' model of university administration consisting of modules to support admission of students to university, programmes to manage the curriculum through a standard three-year degree, a student module to manage enrolment, fees, progression throughout the degree and tools to 'enable' users to analyse, process and extract data. These enterprise systems are marketed as being highly flexible with the opportunity to customise to individual university needs. Thus, with other similar universities introducing it and at meetings with the vendors senior university managers were given assurances that the system could provide the solutions for which they were looking. Anticipated change from a senior university management perspective was centralisation of student data management and more efficient use of both academic and administrative staff resources.

Improvisation and Episodic Power

'Episodic power' focuses on the relationship between resources and outcomes and is intrinsically linked to the improvisations which occurred as organizational members drew upon available material, cognitive, affective and social resources (Cunha et al., 2012). Led by the Director of Finance, and supported by the university registrar and two other senior staff as well as representatives from the vendors, the plans for the implementation of USAS started in 2005. In order for USAS to be introduced into Modern University a budget was set up, a number of new groups or teams were established, and material resources released. The two groups that played a major role in the project were the USAS implementation team (technical

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

staff employed from internal university resource and external agencies) and the USAS liaison group (senior administrative staff seconded from each of the departments) both of which were intended to be temporary structures to be dismantled after the system was up and running. There was little academic staff involvement. The USAS implementation team were seen as the technical experts, housed in their own suite of offices, trained by the USAS vendors, who would lead the technical aspects of the implementation. The USAS liaison group would support departments in getting the data into the system and extracting the requisite information. Examination of minutes of their meetings suggest the focus prior to 'going live' was on USAS technical issues and not on organizational change. This approach is not unusual within these types of information technology projects as the initial focus is to ensure that the physical resources are in place and being accessed by the appropriate staff (Coombs, Knights & Willmott, 1992; Parker, 2000). Nevertheless, the decisions on who has access to the new technology are political and subject to control of the dominant group (Doolin, 1998).

The USAS implementation team and the USAS liaison team worked closely together from 2005 until the system went live in 2007 and shared an excellent working relationship. One example of an area that they jointly worked on was student data migration from all the department systems to the new USAS system. USAS has a very rigid set of data structures which cannot be altered. It was the responsibility of the USAS implementation team to transfer the current university student data into the structures available in USAS. This was not easy as each department kept their student records according to their own needs. The USAS team were also faced with determining how the standardised approach to student data collection would be managed going forward. The Director of Finance and his advisors anticipated this would be a simple transfer of common data into structures congruent with university requirements and facilitated by the USAS vendors. However, Pollock and Cornford (2004) suggest that enterprise systems such as USAS overwhelm organizations so that they have little option but to implement 'default' settings which tend to emphasise similarities between organizations and not their differences. Thus, individual departmental needs are disregarded in the quest to be 'up and running'. The USAS liaison group was asked to assist and advise on new degree programme codes which they did without reference to the academic colleagues who actually managed the students. Nicolini (2007) sees this assumption of 'knowing what is best for the rest' as a feature of many ES implementations as a dominant group, in order to make sense of their identity, imposes a view of practice intended to enhance their credibility and competence. Nevertheless, this improvisation within USAS illustrates the use of affective resources where the two teams felt the need to support one another in overcoming a problem. In fact, the lack of academic knowledge was not seen to be an issue (Briefing paper from USAS Project Manager, 2005). What occurred was an unanticipated emergent change which only became visible when the system went live.

Although academic staff had not been consulted in the lead up to 'going live' with USAS it was the administrative staff who were feeling the stress in relation to the new role they were expected to play. It was anticipated that all administrative staff who dealt with student data would be trained on USAS in time for 'going live'. The USAS vendors had a specific approach to training which they passed on to the USAS implementation team. This approach ensured that everyone used the system in the same way. However, this training by the vendors was expensive and could not be rolled out across the university. Therefore, the USAS project manager decided that the USAS implementation team would provide training for all. The problem was there were insufficient trainers to cover every administrator who needed training on USAS. Hence the improvised training was done in large groups in information technology laboratories with little interaction. Staff complained about the content and quality of that training.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Added to this training issue the USAS implementation team would not allow cascade training *'in case the wrong message was given'* so tensions were high as August 2007 approached. The power to determine the nature of the training is an opportunity based improvisation and is indicative of the growing internal credibility of the USAS implementation team not just with the senior management of the university but also over the departmental staff taking part in the training. These staff may never have encountered the USAS team prior to training and this acts to transform and re-enforce their identity and position in the organization (Coombs, Knights, & Willmott, 1992).

Academic staff knew little about USAS until they returned from annual leave in September 2006. Student enrolment had taken place without their input and when term began there was chaos: staff were in the wrong rooms, students were on the wrong degree programmes, class lists were inaccurate. This was a result of a previous decision taken by the USAS implementation team and the USAS liaison team when developing degree programme codes for the system. When the Academic Heads of department approached the USAS implementation team they were told it was 'teething problems' or that they were the only department with that particular problem. The USAS liaison team were overworked trying to sort out problems within the departments; problems that had not been anticipated.

In the context of the USAS system, looking exclusively at the episodic circuit of power provides insight into the strong position of the Finance Director, based on numerous resources, and his ability to manage his expectations for USAS through his appointed teams. Nevertheless, by devolving responsibility, improvisations are made at points in the project which may not be congruent with the sentiment of what is ultimately the target outcome. Also, the result of an improvisation may not be felt for some time when it impacts on another aspect of organizational life. This is dealt with here through looking at the circuit of social integration.

Improvisation and Social Integration

This circuit deals with rules of meaning and membership. The USAS system influenced the way both academic and administrative staff interpreted the management style and priorities. The emphasis on the spending on USAS sent a strong message to all that USAS would be the only way that student data would be managed, that local discretion around student data was not to be tolerated and signalled the end of a more participatory approach to management. Here, we show how new social groups have become important within Modern University as well as the reactions and interactions of other staff with them. Tension between academics and administrative staff were high during 2007 and this was also the case within the administrative teams who were dealing with USAS on a day to day basis. Academic staff began to complain about their lack of information and inability to access the system. When they then tried to contact the USAS team for help they often found the phones 'off the hook' and emails not answered. Even going to their offices was impossible as the USAS team were in a suite of rooms protected by a digital lock. The eventual response of the USAS team was the development of 'rules of access'. Any enquiry or request for information had to be made through appropriate channels and only certain staff had access rights to the USAS team. Even though data was urgently needed to be entered onto USAS they enforced their training and access policy. Nevertheless, even those who had been trained still found USAS difficult to work with.

The improvisation of 'good housekeepers' as an informal group of USAS experts with advanced skills to support early system difficulties has proved to be a very powerful influence within Modern and this group has grown to over 100 strong in 2012. Although in some HE institutions academic staff are able to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

enter their marks into USAS, Modern University have chosen to only allow administrative staff to have direct access to the system. Licence costs have been raised as an issue - yet other more political aspects have been identified e.g. 'good house keepers' have some strong opinions about the ability of academics to deal with USAS if given access and it was not unusual to hear criticism of academics especially with regard to providing correct and timely information and inputting marks.

Improvisation and System Integration

This circuit concentrates on techniques of control, discipline and production and explores who has benefited or been empowered by the improvisation and who has been disempowered. From our research USAS is a system which is not easy to use and has caused a number of challenges for Modern University that were not anticipated at the start of the project. During the two years within which the system was introduced the USAS team built up a lot of technical knowledge and it became obvious that their skills could not easily be lost to the organization. They became a permanent group when departmental staff recognised they needed increasing amounts of student information not readily available without some degree of USAS programming. They play a major role in the university and even have their own newsletters which are sent out to departments when new changes to USAS are to be implemented. Academics have little knowledge of this. The improvised processes and control introduced in 2007 have also impacted upon academic staff. For example, at that time, academics no longer had access to the 'system' for recording of marks for examination boards and have found themselves much more regulated by the departmental USAS administrative requirements:

Examination boards are also conducted in a different manner. USAS uses algorithms to calculate marks for modules and then the overall year average:

Using USAS to calculate degree classifications has allowed management (both academic and administrative) to control academics behaviour at examination boards. Academics find it difficult to challenge the logic of the system and USAS as to do so would be to argue for paternalism and self-interest and deny students fairness (Clarke & Newman, 1997). Added to this are penalties for not abiding by the USAS procedures and rules. Administrators report academics to their managers when they fail to meet USAS marking deadlines and it can be seen from our research that academics are increasingly becoming subjugated to a system that challenges their sense of meaning, identity and reality through their participation in an increasing range of disciplinary practices (Coombs, Knights, & Willmott, 1992).

Within departments administrative staff who work regularly with USAS data have seen their status increase as managers require more information from the system. IT literacy is an essential skill for many administrative roles in Modern University and is reflected in salary levels. These new types of staff appear happier sitting at a computer than interacting with the student body and this is a cause for some concern with a number of academic staff. It is also divisive amongst administrative staff whose alternative skills are not recognised to the degree they once were.

Finally, it can be seen that management have used an opportunity based improvisation to replace academic staff roles with those of administrators. Prior to USAS, academics ran the student management systems and had access to all of the data. They also enrolled the students on their degree programmes and managed many of the processes around assessment periods. USAS and its centralising ability has facilitated the removal of the academic from many of these roles. To many academics this has been viewed negatively and some feel they have lost their status in the University. Even feeding back marks to students has been changed without academic staff consultation: students can now access their module

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

marks from USAS (and latterly, post 2016, from the electronic Learning Platform (eLP) and electronic plagiarism and electronic marking assessment system (Turnitin)) almost as fast as the administrators are entering them.

Although it may be considered good practice to allow access to personal data it also involves communicating new processes to staff so that they can be prepared. Students are now more assertive than ever - and this is putting even more stress on university staff. This is not helped by the university documentation that continually refers to students as customers and, as is often the case, with that status comes new expectations.

Integration of USAS Beyond 2007: The New Digital Transformation Programme

USAS at Modern University was procured and implemented between 2005 and 2007 when it went fully live. This heralded a time of significant acceleration in terms of the adoption of new digital technologies, loosely coupled to a deliberate university 10-year corporate strategy and vision. This focused on increasing both efficiency and effectiveness in terms of streamlined administrative bureaucracy, enhancement of teaching and learning delivery and quality, as well as increased levels of research output and impact. External factors driving this strategy included: The Research Excellence Framework (REF) to assess and rank research quality, Border Control Agency (BCA) government immigration policy to monitor overseas student attendance, the National Student Survey (NSS) to rank universities on student experience, and more recently the Teaching Excellence Framework (TEF) to assess and rank teaching quality. USAS could therefore be viewed as being at the core of an ambitious digital transformational programme enabling the proliferation of new key performance indicator (KPIs) targets and measurement tools, computerised monitoring and business intelligence systems – all requiring aggressive organizational change initiatives. A plethora of new digital technologies and information systems were (opportunistic change) able to be spun off from the new ES and potentially integrated (emergent change) or used in a complementary manner (anticipated change) with the core system. Table 2 provides an illustration of these policy initiatives and the corresponding digital technologies/information systems that were adopted at Modern University.

Table 2. Digital Transformation Programme at Modern University

2007	2008	2012	2013	2014	2015	2016	2017
SITS (USAS) Blackboard e-Learning Platform (eLP)	Research Excellence Framework (REF) University League Tables (Times Higher) National Student Survey (NSS)	BCA Electronic Student Attendance Monitoring (SAM-1) barcode and smart card system and reporting pilot eLP now integrated with USAS	Student Attendance Monitoring – full roll out (SAM-2)	Postgraduate Researcher monitoring e-Vision system REF electronic monitoring of research performance outputs, strategy and impact	SAP self-service – MyHR. SAM-3 desktop – integrated with eLP for self-service reporting of student attendance	Self-serve Electronic travel and accommodation booking; Self-serve E-procurement Purchase to Procurement workflow system (P2P) link with SAP finance system Lecture video recording	Electronic Marking and Assessment (EMA) System integrated with eLP and also Turnitin plagiarism system Teaching Excellence Framework (TEF)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

As can be seen in Table. 2, USAS has enabled a new generation of integrated systems to be developed in an opportunistic manner – whereby they have precipitated emergent changes in administrative procedures and work flow systems. This has rapidly changed the role and status of academics (centralised administration controlled procedures and policies resulting in less academic staff autonomy) in terms of programme/module development, teaching and learning management and pedagogic delivery. Key amongst this is the move towards making USAS and its additional HR and Finance modules self-service for both administrators and academics. This shifted the administrative work on to academics whereby an attendant effect was then to disestablish faculty administrative services and recentralise/physically relocate them to fit within a 'One University' strategy. Many long and traditionally established roles then disappeared in what was in effect both a rapid and major business process transformation. This was mirrored by a new wave of performance monitoring and control systems aimed at academic staff. These new digital technologies included mandatory electronic Performance Development and Appraisal (PDA), Performance Review and Innovation Plans (PRIPs), Institutional Research Repository (to monitor staff research publication outputs) and a Research Grant monitoring system (to monitor staff grant proposals and bidding activity). More recent technologies also included electronic marking and assessment (EMA) for streamlining the assessment process and personal monitoring of staff timeliness and consistency in the performance of mark submissions and feedback, as well as video recording of main lectures and electronic student rating of programme modules. Many of these systems have been opportunistically integrated with USAS, a significantly more functional Electronic Learning Portal (eLP), and then accessed through a new Corporate website and intranet system.

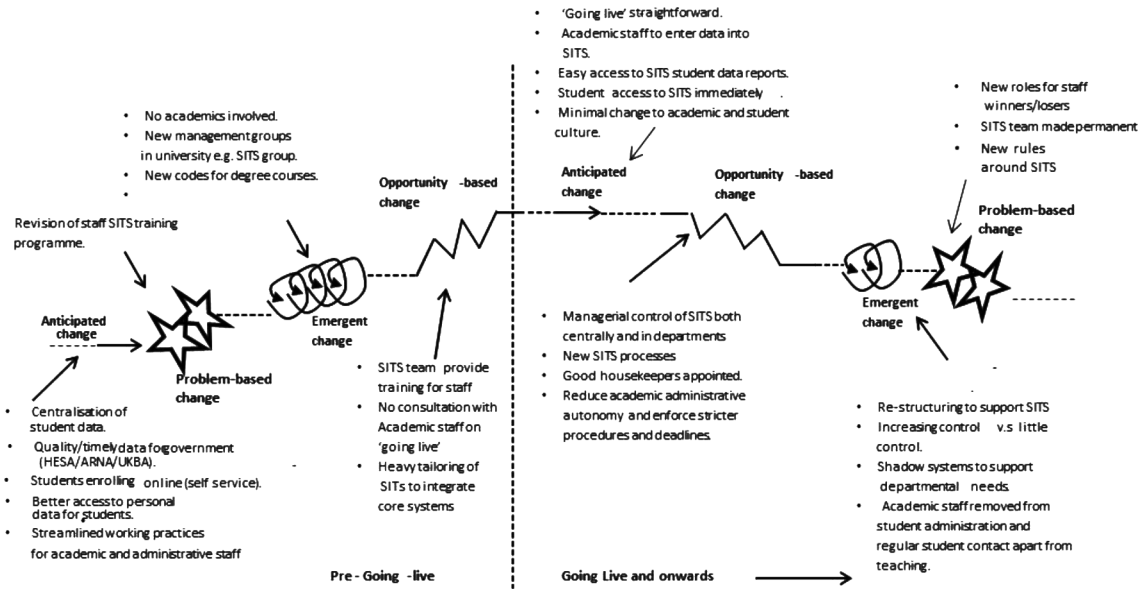
DISCUSSION

In this section we explore how our work provides further insight into improvisation and how it relates to previous theoretical models. Orlikowski's (1996) work on improvisation is very insightful but it does not really address the very nuanced nature of improvisation and the difficult issue of power within it. Even the detailed work on power and institutionalization of IS discussed by Silva (2007) does not focus on the improvised actions which brought about the embedded IS. Thus, it has been our intention to surface these concerns and to explore them through the case study presented here. Figure 3 provides a timeline view of anticipated, emergent, problem and opportunity based change identified over the duration of the USAS (SITS technology) project.

This represents a literal adaptation of Orlikowski's improvisational change model. Although useful in terms of providing an overview of the major events and changes affecting academics and administrators, it still does not provide sufficient means of analysing the deeper power relations and causal effects of agents (human, organizational and technology) that may determine outcomes and result in new embedded and institutionalized routines, practices and structures. The original model did not show problem based change as distinct from emergent or opportunity based changes. Problem based changes can be equally significant triggers for improvisation requiring rapid actions and use of available materials to hand. This is more characteristic of bricolage as opposed to anticipated changes where there is a timeframe for planned actions according to some pre-determined goals and plans. In our analysis we have therefore included a new category for problem based improvisational change as opposed to focusing on anticipated changes. The anticipated changes can be seen in Figure 3 alongside the identified sequence of emergent, opportunistic changes and problem- based changes over both the (pre) and (post) go live

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. A timeline showing improvisational change for the USAS (SITS) system



phases of the project. Added to this we have further deconstructed improvisational types related to emergent, opportunistic and problem based changes and mapped them to the various agencies and standing conditions as described by Clegg's (1989) circuits of power framework.

The Circuits of Power- Improvisation (CPI) Framework

It is evident from our research that improvisations are actions which do not occur without some reference to episodic power as actors adopt a bricolage approach to drawing on material, cognitive, affective and social resources (Cunha et al., 1999). At the start of the project, USAS was viewed as the OPP on to which actors from across the university were enrolled to join the USAS team and USAS liaison team. The Finance Director presented no alternative solution to Modern University's data issues (problematization). The two teams were socialised alongside the vendor team and became very close sharing a specific USAS suite and shared goals (interessement and enrolment). Thus, as the project progressed they became project champions and gained in credibility within the university (mobilisation) (Callon, 1986; Latour, 1987).

The nature of the improvisations during the lead up to 'going-live' and their link to episodic power can now be seen. Most of the improvisations outlined here were undertaken by agencies that drew on the financial support of the USAS project budget as well as the affective and social resources of being part of a team. They did not need at that time to refer to anyone outside the USAS project. Nevertheless, the teams were faced with issues that could not be addressed by financial resources e.g. codes for degree programmes or training of staff and at that point the improvisations called on other resources such as mental models and affective support of the other teams (Cunha et al.,1999). This is where episodic power comes to the fore as action is legitimised through standing conditions, resources and control (Figure 2). The mental models employed by the USAS teams for both the training and degree programme codes

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

were limited as can be seen from the outcomes in our case study - yet they were still able to determine that action.

Training was a major issue in this implementation and even when the USAS team took control it was quickly realised that they had insufficient human resource to undertake the level of training that was required for all the administrators and academics across the university. Thus, new improvised rules emerged which targeted certain staff and not others. Now these rules have become embedded within the organization and have further emerged over time through the social and systemic integration process.

Although there are many examples of how certain actors called on a variety of resources to support them in their actions during the USAS implementation what is not apparent initially is the link between improvisation and social integration. For the circuit of social integration in which rules fix relations of meaning and membership, certain fixtures of meaning are privileged and certain membership categories are aligned with these meanings (Clegg, 1989). Although social integration began prior to going-live it is clear that once the USAS system was in place it became more evident. To illustrate, it is apparent from our study that prior to USAS being introduced into Modern University academic staff led on most student related activities. When the system was introduced into the faculties in August 2006 only administrative staff had had training and hence were the only ones with access to the data and student information. The difficulties at 'going live' led to faculty registrars and Deans exercising their dispositional power in order to 'get things sorted out'. Thus, new relationships emerge between the faculties and the USAS team which are determined by the dispositional power (Clegg, 1989) of the technologists. Yet within the faculties it is the administrators by virtue of their superior USAS knowledge which determines how USAS will be used, by whom and when access to it will be granted. The emergent nature of the Good Housekeepers improvisation has been useful to the faculties as they now have their own resource on which they can call for most USAS related business and therefore do not need to access the USAS team as frequently.

Clegg (1989: 224) views system integration as the circuit of power which is concerned with the empowerment and disempowerment of agencies' capacities, as they become "..more or less strategic as transformations occur which are incumbent upon changes in techniques of production and discipline" Improvisations which have taken place within Modern University have led to the empowerment and disempowerment of a number of staff. The centralised nature of the USAS system has led to a concentration of control at the centre of the university with little localised discretion in the faculties. Rules about all academic matters have ensured that conformity is the norm and intense monitoring is undertaken. Some of these rules are embedded within the USAS data structures and others have emerged through improvisations at key points in the academic year. Within the academic departments it is evident that there has been a power shift and in our interviews academic staff expressed concern about their perceived status and the increasing power of certain administrative staff.

The adoption and implementation of USAS was used to force through major centralised administrative and structural changes that then continued through later years through to 2017. Integration technologies building on enterprise application integration platforms have enabled ambitious automation of existing administrative workflows and business processes. This has been driven by opportunistic change to enable and consolidate the downsizing of core (lower skilled) administrative staff with a deliberate strategy for centralisation of services (with an increasing administrative management cadre) and the adoption of a new public management and performance monitoring (targets and league table driven) culture. Problem based change could also be identified, specifically related to the development of class based and online student attendance monitoring systems to comply with government immigration and BCA policy. Problem based change could also be seen as a driver for the rapid adoption of electronic marking and assessment

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(EMA) integrated with plagiarism detection software (Turnitin) in order to centralise the assessment administrative process and monitor staff performance with respect to achieving mandatory 21 working day feedback turnaround targets (to improve student feedback for NSS scores). Taken as a whole, the 10 year cycle from 2007 to 2017 might be seen as demonstrating emergent change driven by incremental integration of USAS, SAP and the eLP and then punctuated by rapid opportunistic and problem based changes reacting to government policy for immigration control and the competitive marketisation of the UK university sector.

The new digital transformation programme at Modern could also be seen to mirror significant changes in power relations – both between core academic staff and senior executive academic management and also academic staff and the rise of the new managerial administrative and centralised service functions. In terms of episodic power, resources were increasingly siphoned from faculty budgets who had to pay very high financial overhead costs/contributions to support the increasingly centralised university service departments. These new service departments expanded rapidly, especially functions such as Corporate Marketing, based on a deliberate change strategy that focused on raising the university standing in published university sector league tables. This follows a general international trend where administrative staff now outnumber academic staff at over two thirds of UK universities (Jump, 2015) with an increasing number of higher level managers brought in to manage the expanding administrative service departments! (Ginsberg, 2012). In Modern University, the deliberate strategy to expand student numbers and increase teaching and research quality ratings precipitated a culture of performance management, enabling greater hierarchical control paralleled by new academic reward and incentivisation regimes. Alvesson and Spicer (2016) also note the effects of coercive power and the embracement of neo-liberalist agendas. They identify other effects such as manipulation and mainstreaming (game playing to optimise institutions positions on the university ranking league tables with recruitment drives to develop 4* by 4* research factories), domination (reshaping of academic norms and values), and subjectification (incentivising the creation of new academic and managerial identities). Disturbingly, along with Martin (2016) they identify an increasing culture of defeatism (and willingness) amongst academics to go along with the increased managerialism and production factory ethos. Academics are seen to either delude themselves or justify this by an acquiescence to a 'game playing' culture based on self-preservation and personal career advancement (what they term subjectification).

At Modern, this 'academic gamification culture' could be seen to be accelerated due to the overwhelming roll-out of the new digital technologies enabling new levels of performance management and hierarchical control. The circuit of social integration was enabled by changed job descriptions, new centralised policies and procedures and structural organizational change both for academics and also administrative staff. Systems integration was also responsible for moving towards a new 'one university' culture and only made possible due to the enterprise application integration innovations. It was now 'one size fits all' heralding a loss of academic integrity, autonomy and control in traditional decision making involved with faculty strategy, programme development, management and assessment processes.

The CPI Framework and Sociotechnical Theory Development

A number of studies have researched ES from a sociotechnical perspective, specifically to better understand ERP implementation (Lyytinen et al., 2009; Kwahk & Ahn, 2010) as well as investigating the role of improvisation and change in Information Systems development and implementation (Lyytinen & Newman, 2008). Mumford (2003, 2006) stated that sociotechnical systems should emphasise qual-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ity of working life and humanism at work. This approach should facilitate new forms of organizational innovation, often as a result of the adoption of new technologies that remove elitism, promote flatter hierarchies, develop multiskilling and facilitate more democratic processes of decision making. However, existing methods for sociotechnical design, such as ETHICS (Mumford, 2003), PSIC (Lyytinen & Newman, 2008) or SPRINT (Wastell, 2011), treat technology as neutral and do not explicitly deal with complex organizational power relations, neither focus on the challenges of improvised strategies and working practices often enabled by rapid new technology adoption typical of enterprise systems projects. Stahl (2007) recognises and critiques some of these limitations and proposes that sociotechnical approaches can be enhanced through adopting principles and theory associated with critical research in IS and computer and information ethics. The CPI framework proposed in our research and illustrated in this paper is 'critically' informed and can be used to surface issues of power, domination and control whilst taking a pragmatic view of ES implementation and digital transformation projects. This is where planned and deliberate strategies are supplemented by periods of opportunistic, emergent and problem based organizational change. This also responds to recent critiques and identified challenges for sociotechnical theory, methods and approaches relating to its inherent idealism and inability to influence IS innovations during design, use and implementation whilst neglecting power dynamics and the inability to legitimize and sustain spontaneous innovation (Avgerou & McGrath, 2007; McGrath, 2005).

CONCLUSION

IS research in general, and sociotechnical research in particular, must be prepared to build on theoretical models and frameworks that have the potential to provide better insight into the complex area of digital technology adoption and implementation. This must involve consideration of the power and politics which envelop these types of projects and recognition that improvisation is a reality when implementing them. Clegg's (1989) theoretical exploration of power offers great explanatory potential for large scale information systems adoption and implementation. Its later adaptation and use as a model by Silva and Backhouse (2003) demonstrates how it can be used to provide much deeper insight and a rich narrative for the institutionalization of an IS. Similar parallels can be drawn with the case of Modern where there were very obvious exogeneous factors associated with government policy that could be seen as triggers for rapid change and also a source of system integration and facilitative powers. Digital transformation projects are characterised by the importance of improvised change as opposed to a reliance on more rational strategic and anticipated plans for the new developments. In the case of Modern, the administrative staff seized an opportunity to redevelop their skills and knowledge to operate and redefine the new systems whilst simultaneously utilizing dispositionary and facilitative powers for new forms of both social and systemic integration. This is seen to be increasingly the case in organizations characterised by minimal structures and low procedural memories (Tjørnehøj & Mathiassen, 2010) but also perhaps more surprisingly in professional and administrative led organizational cultures where there might be high procedural memory and large bureaucratic structures but also opportunities for radical shifts in roles and responsibilities; hence the growth of managerialism (Deem, 2004), new public management, marketisation and neo-liberalist agendas (Alvesson & Spicer, 2016).

Within the context of ES implementations, and even more recently digital transformation projects, there are relatively few sociotechnical, ethnographic and longitudinal studies that have been undertaken or published. Those that are published tend not to adopt a critically informed stance but focus on impro-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

visation and bricolage as a means of effecting strategic change and innovation as demonstrated by the use of bricolage for IS and business strategy alignment (Ferneley and Bell, 2006), improvisation for health information systems success (Heeks, 2006), rapid adoption of groupware technologies (Orlikowski & Hofman, 1997), and the effective management of outsourcing (Silva, 2002). Our exploration of the use of an adapted CPI framework more closely follows the later work of Silva and Backhouse (2003) but places additional emphasis on the types of improvisation undertaken as the ES project unfolds and how they relate to the different circuits of power identified. Our study is also relevant for professional and administratively intensive organization cultures such as universities but may also be applicable to other types of organization that exhibit similar characteristics. Besides being a tool for academic researchers to analyse and understand ES adoption and implementation post hoc, the CPI framework might also be used by more critically aware or ethical practitioners. This may be used more in real time as events unfold and materials to hand are utilised.

Change can happen extremely rapidly resulting in social, technical and systemic integration. Understanding the consequences of actions earlier in the ES implementation might negate undesirable effects and the over hasty institutionalization of potentially inefficient and damaging work practices and reorganization. The case of ES adoption and implementation is still live and on-going at Modern university. The student administration system has now been effectively institutionalized where academics no longer question its existence, its extension or its role within the academic decision-making processes. It has now become the centre-piece or core of a highly ambitious digital transformation strategy and project. This heralds a new dawn for universities to become mass producers (production machines) of students with increasingly centralised bureaucratic processes and more worryingly, less academic freedom and autonomy. This may lead to professional deskilling resulting in heavily formulaic teaching and learning strategies and standardised content delivered by lower paid associate academic staff. New digital technologies have provided the embedded agency to make this possible and are reinforced by both the social and systemic integration circuits of power.

In the future we anticipate that the CPI framework will be evaluated for its potential to identify improvisation types as they occur and assess the potential changes needed for a more ethical exercise of episodic, social and systems integration circuits of power.

REFERENCES

Alvesson, M., & Spicer, A. (2016). Conditional Surrender? Why do Professionals Comply with Managerialism? *Journal of Organizational Change Management*, *29*(1), 29–45. doi:10.1108/JOCM-11-2015-0221

Avgerou, C., & Mcgrath, K. (2007). Power, Rationality, and the Art of Living through Socio-Technical Change. *Management Information Systems Quarterly*, *31*(2), 295–315. doi:10.2307/25148792

Barley, S. R. (1990). Images of imaging: Notes on Doing Longitudinal Fieldwork. *Organization Science*, *1*(3), 220–247. doi:10.1287/orsc.1.3.220

Bryman, A. (2004). *Social Research Methods*. Oxford, UK: Oxford University Press.

Burgess, R. G. (1984). *In the Field: An introduction to Field Research*. London: George Allen and Unwin. doi:10.4324/9780203418161

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Callon, M. (1986). Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In J. Law (Ed.), *Power, Action and Belief* (pp. 196–233). London: Routledge and Keegan Paul.

Ciborra, C. (1996). Improvisation and Information Technology in Organizations. *Proceedings of the International Conference on Information Systems*, 369-380.

Ciborra, C. (2002). *The Labyrinths of Information: Challenging the Wisdom of Systems*. Oxford, UK: Oxford University Press.

Clarke, J., & Newman, J. (1997). *The managerial State: Power, Politics and Ideology in the Remaking of Social Welfare*. London: Sage.

Clegg, S. (1989). *Frameworks of Power*. London: Sage Publications. doi:10.4135/9781446279267

Coombs, R., Knights, D., & Willmott, H. C. (1992). Culture, Control and Competition; Towards a Conceptual Framework for the study of Information Technology in Organizations. *Organization Studies*, *13*(1), 51–72. doi:10.1177/017084069201300106

Crabtree, B. F., & Miller, W. L. (1999). Doing Qualitative Research. *Sage (Atlanta, Ga.)*, 1999.

Cunha, M. P., Clegg, S. R., & Kamoche, K. (2012). Improvisation as "real time foresight". *Futures*, *44*(3), 265–272. doi:10.1016/j.futures.2011.10.009

Cunha, M. P., Viera Da Cunha, J., & Kamoche, K. (1999). Organizational improvisation: What, when, how and why. *International Journal of Management Reviews*, *1*(3), 299–341. doi:10.1111/1468-2370.00017

Deem, R. (2004). The knowledge worker, the manager- academic and the contemporary UK university:new and old forms of public management. *Financial Accountability & Management*, *20*(2), 107–128. doi:10.1111/j.1468-0408.2004.00189.x

Deem, R., & Brehony, K. J. (2005). Management as ideology: The case of 'new managerialism' in higher eduction. *Oxford Review of Education*, *31*(2), 217–235. doi:10.1080/03054980500117827

Desanctis, G., & And Poole, M. S. (1994). Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science*, *5*(2), 121–147. doi:10.1287/orsc.5.2.121

Dong, L., Neufeld, D., & Higgins, C. (2009). Top management support of enterprise systems implementations. *Journal of Information Technology*, *24*(1), 55–80. doi:10.1057/jit.2008.21

Doolin, B. (1998). Information technology as disciplinary technology: Being critical in interpretive research on Information Systems. *Journal of Information Technology*, *13*(4), 301–311. doi:10.1057/jit.1998.8

Elbanna, A. R. (2006). The validity of the improvisation argument in the implementation of rigid technology. *Journal of Information Technology*, *21*(3), 165–175. doi:10.1057/palgrave.jit.2000069

Elbanna, A. R. (2007). Implementing an integrated system in a socially dis-integrated enterprise: A critical view of ERP enabled integration. *Information Technology & People*, *20*(2), 121–139. doi:10.1108/09593840710758040

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ferneley, E., & And Bell, F. (2006). Using bricolage to integrate business and information technology innovation in SMEs. *Technovation*, *26*(2), 232–241. doi:10.1016/j.technovation.2005.03.005

Foucault, M. (1977). *Discipline and Punishment: The birth of the prison*. London: Penguin.

Fowler, A., & And Gilfillan, M. (2003). A framework for stakeholder integration in higher education information systems projects. *Technology Analysis and Strategic Management*, *15*(4), 467–489. doi:10.1080/0953732030001360 51

Ginsberg, B. (2011). *The Fall of the Faculty: The Rise of the all administrative university and why it matters*. Oxford, UK: Oxford University Press.

Heeks, R. (2006). Health information systems: Failure, success and improvisation. *International Journal of Medical Informatics*, *75*(2), 125–137. doi:10.1016/j.ijmedinf.2005.07.024 PMID:16112893

Hirschheim, R., & And Newman, M. (1991). Symbolism and information systems development: Myth, metaphor and magic. *Information Systems Research*, *2*(1), 29–62. doi:10.1287/isre.2.1.29

Jump, P. (2015). Academics in the Minority at more than two thirds of UK Universities. *Times Higher Education*. Retrieved on July 11, 2017 from https://www.timeshighereducation.com/news/academics-minority-more-two-thirds-uk-universities#survey-answer

Kamoche, K., & And Cunha, M. P. (2001). Minimal Structures: From Jazz Improvisation to Product Innovation. *Organization Studies*, *22*(5), 733–764. doi:10.1177/0170840601225001

King, N. (2004). Using templates in the thematic analysis of text. In C. Cassell & G. Symon (Eds.), *Essential Guide to Qualitative Methods in Organisational Research* (pp. 256–270). London: Sage. doi:10.4135/9781446280119.n21

Kwahk, K. Y., & Ahn, H. (2010). Moderating Effects of Localization Differences on ERP use: A Socio-Technical Systems Perspective. *Computers in Human Behavior*, *26*(2), 186–198. doi:10.1016/j.chb.2009.10.006

Latour, B. (1987). *Science in Action*. Cambridge, MA: Harvard University Press.

Law, J. (1986). *Power, Action and Belief*. London: Routledge and Kegan Paul.

Law, J. (1991). Power, discretion and strategy. In A Sociology of monsters: Essays on power, technology and domination (pp. 165-191). Routledge.

Lockwood, D. (1964). Social and System Integration. In G. K. Zollschan & W. Hirsch (Eds.), *Exploration in Social Change* (pp. 244–257). London: Routledge and Kegan Paul.

Lyytinen, K., & Newman, M. (2008). Explaining Information Systems Change: A Punctuated Socio-technical Change Model. *European Journal of Information Systems*, *17*(6), 589–613. doi:10.1057/ejis.2008.50

Lyytinen, K., Newman, M., & Al-Muharfi, A. R. A. (2009). Institutionalising Enterprise Resource Planning in the Saudi Steel Industry: A Punctuated Socio-Technical Analysis. *Journal of Information Technology*, *24*(4), 286–304. doi:10.1057/jit.2009.14

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mangham, I. L., & Pye, A. (1991). *The Doing of Managing*. Oxford, UK: Basil Blackwell.

Martin, B. R. (2016). What's Happening with our Universities? *Prometheus*, *34*(1), 7–24. doi:10.1080/08109028.2016.1222123

Mcgrath, K. (2005). Doing Critical Research in Information Systems: A Case of Theory and Practice Not Informing Each Other. *Information Systems Journal*, *15*(2), 85–101. doi:10.1111/j.1365-2575.2005.00187.x

Mintzberg, H. (1994). The Fall and Rise of Strategic Planning. *Harvard Business Review*, (Jan-Feb): 107–114.

Moorman, C., & Miner, A. S. (1998). The Convergence of Planning and Execution: Improvisation in New Product Development. *Journal of Marketing*, *62*(July), 1–20. doi:10.2307/1251740

Morch, A. I., & Mehandjiev, N. D. (2000). Tailoring as collaboration: The mediating role of multiple representation and application units. *Computer Supported Cooperative Work*, *9*(1), 75.

Morgan, G. (2006). *Images of Organization* (2nd ed.). Beverly Hills, CA: Sage.

Mumford, E. (2003). *Redesigning Human Systems*. Hershey, PA: Information Science Publishing. doi:10.4018/978-1-59140-118-6

Mumford, E. (2006). The Story of Socio-Technical Design: Reflections on its Successes, Failures and Potential. *Information Systems Journal*, *16*(4), 317–342. doi:10.1111/j.1365-2575.2006.00221.x

Nicolini, D. (2007). Stretching out and expanding medical practices: The Case of Telemedicine. *Human Relations*, *60*(6), 889–920. doi:10.1177/0018726707080080

Oliver, D., & Romm, C. (2009). ERP adoption –What do they say about it? In C. Brooke (Ed.), *Critical Management Perspectives on Information Systems* (pp. 103–131). Oxford, UK: Butterworth-Heinmann.

Orlikowski, W. J. (1996). Improvising Organizational Transformation over Time: A Situated Change Perspective. *Information Systems Research*, *7*(1), 63–92. doi:10.1287/isre.7.1.63

Orlikowski, W. J., & Hofman, J. B. (1997, Winter). An Improvisational Model for Change Management: The Case of Groupware Technology. *Sloan Management Review*, 11–21.

Parker, M. (2000). *Organizational Culture and Identity*. London: Sage.

Pollock, N., & And Cornford, J. (2004). ERP systems and the university as a "unique" organisation. *Information Technology & People*, *17*(1), 31–52. doi:10.1108/09593840410522161

Silva, L. (2002). Outsourcing as an Improvisation: A Case Study in Latin America. *The Information Society*, *18*(2), 129–138. doi:10.1080/01972240290075057

Silva, L. (2007). Epistemological and theoretical challenges for studying power and politics in information systems. *Information Systems Journal*, *17*(2), 165–183. doi:10.1111/j.1365-2575.2007.00232.x

Silva, L., & Backhouse, J. (2003). The circuits of power framework for the study of power in the institutionalisation of information systems. *Journal of the Association for Information Systems*, *4*(6), 294–336. doi:10.17705/1jais.00041

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Stahl, B. C. (2007). Ethics, Morality and Critique: An Essay on Enid Mumford's Socio-Technical Approach. *Journal of the Association for Information Systems*, *8*(9), 479–490. doi:10.17705/1jais.00138

Thayer, L. (1998). Leadership/ communication: a critical review and a modest proposal. In G. M. Goldhaber & G. A. Barnett (Eds.), *Handbook of Organizational Communication* (pp. 231–263). Norwood, NJ: Alex.

Tjørnehøj, G., & And Mathiassen, L. (2010). Improvisation during process-technology adoption: A longitudinal study of a software firm. *Journal of Information Technology*, *25*(1), 20–34. doi:10.1057/jit.2009.20

Van Maanen, J. (1979). The Fact of Fiction in Organizational Ethnography. *Administrative Science Quarterly*, *24*(4), 539–550. doi:10.2307/2392360

Waddington, D. (2004). Participant Observation. In C. Cassells & G. Symon (Eds.), *Essential guide to qualitative methods in organizational research* (pp. 154–164). London: Sage. doi:10.4135/9781446280119.n13

Wagner, E. L., Newell, S., & Piccoli, G. (2010). Understanding Project Survival in an ESS Environment: A Sociomaterial Practice Perspective. *Journal of the Association for Information Systems*, *11*(5), 276–297.

Waring, T., Wainwright, D., & Skoumpopoulou, D. (2016). Enterprise Systems Adoption: A Power and Improvisation Perspective. *International Journal of Systems and Society*, *3*(1), 49–66. doi:10.4018/IJSS.2016010104

Wastell, D. (2011). *Managers as Designers in the Public Services – Beyond Technomagic*. Devon, UK: Triarchy Press.

Watson, T. J. (2011). Ethnography, Reality, and Truth: The Vital Need for Studies of 'How Things Work' in Organization and Management. *Journal of Management Studies*, *48*(1), 202–217. doi:10.1111/j.1467-6486.2010.00979.x

Weick, K. E. (1993). The collapse of sensemaking in organizations: The Man Gulch disaster. *American Quarterly*, *38*, 628–652.

Weick, K. E. (1995). *Sense Making in Organizations*. Sage.

Weick, K. E. (1998). Introductory Essay: Improvisation as a Mindset for Organizational Analysis. *Organization Science*, *9*(5), 543–555. doi:10.1287/orsc.9.5.543

Weick, K. E. (1999). Theory Construction as Disciplined Reflexivity: Trade Offs in the 90s. *Academy of Management Review*, *24*(4), 797–806.

This research was previously published in Systems Research for Real-World Challenges; pages 237-267, copyright year 2018 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 79
Digitally Empowered Workers and Authentic Leaders:
The Capabilities Required for Digital Services

Joseph Crawford
https://orcid.org/0000-0002-2191-6216
University of Tasmania, Australia

Kerryn Butler-Henderson
https://orcid.org/0000-0002-6082-2108
University of Tasmania, Australia

ABSTRACT

The digital era has catalyzed the contemporary workforce and workplace. Employees are now required to develop skills that may be outdated in a matter of years, and be consciously aware that their society is evolving rapidly. This Chapter conceptualizes the characteristics of a digitally empowered worker to encompass awareness, creativity, agility, and a positive learning orientation. In doing so, the authors consider the way in which an authentic leader and authentic follower may influence the development of the digitally empowered. Authors present a model and its impact on digital innovation and digital productivity.

INTRODUCTION

The digital era has catalyzed the contemporary workforce and workplace. Employees are now required to develop skills that may be outdated in a matter of years, and consciously aware that their society is evolving rapidly. Themes of disaggregation, competition, and incentivization are driving new forms of management (Dunleavy et al., 2006). Electronic forms of human resource management have shaped the way in which organizations and their managers can influence employees to achieve their targets (Bondarouk & Ruël, 2009). The rate and scale of change is unprecedented, and employees are expected

DOI: 10.4018/978-1-7998-7297-9.ch079

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to keep pace with the unfolding innovations. In fact, they are often expected to participate in shaping such innovations. Yet, for the most part, employees receive very little training to create the digital fluency skills necessary to achieve desired digital outcomes.

A digitally empowered workforce is prepared for their present needs through hard skills. LinkedIn (2018) identified cloud computing, artificial intelligence, analytical reasoning, people management, and user experience design as the top five most demanded hard skills in their annual survey of 4,000 professionals. Yet, 57 percent of senior leaders recognized that soft skills such as creativity, persuasion, collaboration, adaptability, and time management were more important than hard skills. Senior leaders globally recognize the need for their employees to be ready for the future, not just able to complete their day-to-day responsibilities.

For a workforce to be empowered, it requires three antecedent factors. The first is leaders willing to develop and empower their employees (Cheong et al., 2018). Leaders who are effective at motivating their employees can provide agency to those employees to enact their knowledge, skills, and attributes in the workplace. Leadership has evolved. The focus of behavioral research has been on the development and application of knowledge and theory in traditional contexts. The digital era has forced evolution. For example, leadership is enabled or hindered through videoconferencing (Hambley et al., 2007) and social media (Barbera et al., 2014). Complex technology enhanced environments (e.g. virtual, immersive, and augmented reality) are providing new opportunities for development, productivity, and wellbeing. Leaders are only just beginning to come to terms with what this means for their workplace, and their ability to lead.

The second is employees who are developmentally ready to be empowered. An individual's developmental readiness is based on the belief that individuals can create positive self-fulfilling prophecies about their future (Avolio & Hannah, 2008). That is, individuals who are willing to develop and better understand their own self-concept are better able to respond positively to have agency. The Organization for the Economic Cooperation and Development (OECD, 2001) identified a digital divide between those in lower and higher socioeconomic statuses. In the workplace, those in higher socioeconomic statuses tend to be in management, with a higher remuneration. This would suggest there is an existing digital divide in the workplace between managers and their subordinates (Ayanso et al., 2010). Understanding, therefore, the role of follower behaviors in this context could enable the exploration of bridging the digital fluency gap that may exist.

The third is an organizational culture or climate suitable to enable agency. Important, organizations with poor organizational climate can lead to negative long-term performance outcomes (Crawford et al., 2017). Organizations that embed digital innovation into their culture can change their market landscape (Butler-Henderson, 2014). Organizational culture is defined by many elements such as involvement, consistency, adaptability, and mission (Denison & Mishra, 1995). Earlier research defines organizational culture as the synthesis of assumptions, values, and artefacts (Schein, 1985) with adaptation to also include symbols and processes (Hatch, 1993). We do, however, distinguish organizational culture from this Chapter. While an important part of this discussion, which we encourage others to pursue, there was no scope to discuss with enough depth in this Chapter.

This chapter draws on the three antecedent factors (leaders, employees/followers, and culture) to explore the capabilities that digitally empowered employees require. Scholars are increasingly recognizing the role of behaviors and climate in successful change transitions (Martin et al., 2005), divergence in positive perceptions between leaders and subordinates (Martin et al., 2006), and digital innovation requires

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

a consistent aptitude for change. In this Chapter, we propose a model between authentic leader behavior, authentic follower behavior, digitally empowered workers, digital innovation, and digital productivity.

The structure of this chapter has been set-out to enable the exploration of the relationship that authentic leader behaviors, authentic follower behaviors, and digital fluency have. In the next section, we begin by providing a summary of, and justify the use of, the critical review method in this chapter. In the literature review, we explore the context of digital services, and define the authentic leader and their five behaviors (awareness, sincerity, balanced processing, positive moral perspectives, and informal influence). Next, we define the authentic follower and their behaviors (psychological capacity for authenticity and positive organizational engagement). We also define the characteristics of digital fluency (creativity, social and emotional awareness, agility and adaptability, and a continuous learning orientation). Following, we synthesize the authentic leader, authentic follower, and digital fluency into a model and explain the relationships.

CRITICAL REVIEW METHOD

Critical review methods are commonly used as a 'catch-all' in semi-structured literature reviews. Take for example, a seminal critical review in organizational research (Podsakoff et al., 2003). Aside from the mention of a 'critical review' in the title, the only other place in text that presents the words 'critical review' is a title in the reference list. In the development of a typology of literature reviews, a critical review "aims to demonstrate writer has extensively researched literature and critically evaluated its quality. Goes beyond mere description to include degree of analysis and conceptual innovation" (Grant & Booth, p. 94). This literature review approach differs from systematic reviews and meta-analyzes by their clearly defined rules. Where a critical review seeks to identify the most significant pieces of work in the field, a systematic review would identify clear scoping conditions (e.g. search phrases, temporal periods, and specific journals).

The value in conducting a critical review in this piece of work is that several key areas of the literature are being examined, and codified search terms may limit the knowledge that can be extracted. In this critical review, we examine a series of disperse literatures before synthesizing their parallels and exploring their differences. The aim of which is to enable knowledge sharing across a divide. On the one hand, authentic leadership literature explores the enablers created by developing leaders (some of which are likely enablers of digital services), and on the other is the emerging literature on the digital era and the individuals seeking to operate within an innovative and evolving space. We group our critical review into the next section, with the subsequent section synthesizing the disparate parts.

LITERATURE

Today, terms such as digital disruption and digital transformation are no longer business jargon, but part of the organizational strategy. With consumers expecting to receive information from their lounge suites, any business who does not have a digital presence risks being left behind. It is the scope of that digital presence that will shape the skill requirements of the workforce. A one-person plumbing business servicing a small local area may only have an online listing on a trade website, and therefore their digital capability needs are minimal. But what are the needs of the workforce in business that offer digital

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

services. And what attributes in both the leaders and followers will encourage digital innovation and productivity? This summary of the literature defines digital services explores the future trends that will shape workforce needs. The authentic leader and follower are introduced and the behaviors of each are examined. We conclude by delving into the literature about the digitally empowered worker.

Digital Services

Digital services are defined as "an activity or benefit that one party can give to another, that is, provided through a digital transaction" (Williams, Chatterjee, & Rossi, 2008, p. 507). They are different from normal services in that interactions with clients are, at least in part, through a digital experience. The sense of what is tangible may differ and ownership is more elusive. For example, a digital design company is hired to design a new logo for a company. They may complete all relational elements digitally with the customer. Ownership of the product, a logo, needs to be clearly defined in the service agreement, including the right for the company to modify the logo in the future. Digital services can be personalized, contextualized. and adapted in real-time to meet the client's needs. The power of the client has increased in today's market, with clients expecting services to be available anytime through one click. Client loyalty has also changed in the digital era, with clients seeking services that are client-focused and easy to access (Leimeister, Österle, & Alter, 2014). Organizations with maturing digital services share common features. These features include increased risk taking and experimentation, and investment in talent, across the workforce and leadership behaviors. Digital service employees require the behaviors of a leader to effectively engage with their clients and employees, by influencing and enabling positive outcomes. 90 percent of digitally maturing organizations are integrating their digital strategy into their organizational strategy, yet 44 percent of companies state they are not adequately preparing for digital delivery of services (Kane et al., 2016).

There are six identified megatrends predicted for the future that should shape organizational digital strategy (Hajkowicz et al., 2016). The first is an exponential and rapid technological and data growth reshaping services and the workforce. This includes significant developments in the Internet of Things, growth in interconnectivity technology shaping how we work, increases in big and small data informing business strategy, and rapid advances in artificial intelligence and automation. The second area will be where this growth impacts on changing employment markets and organizational structures. This includes increases in globalization of workforces, a change in work practices, flattened organizational structures, growth in contract or freelance workers, and an increase in co-working environments or remote offices. The third megatrend is the opportunities for entrepreneurship. With the change in organizational structures and increased opportunities for freelance work, the small business environment will see rapid growth. This will create opportunities for enterprise and entrepreneurs to drive innovation and productivity. Digital entrepreneurialism is low cost and lean, with many start-ups today established to quickly turn ideas into innovations.

Fourth, economic and population analysis shows we have an intergenerational workforce. In western cultures the average life expectancy has increased, with improvements in health and lifestyles resulting in people living longer. Whilst people are staying in the workforce for longer, participation rates are declining as people reduce their work hours. This trend will result in a higher proportion of people retired than those in the workforce, leaving many industries with an unsustainable workforce. Digital services, particularly automation of low skilled or operational jobs, will somewhat address this issue. This will result in an increasing need for higher skills-set, which is the fifth megatrend. Education and skills will

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

have increasing importance, particularly postgraduate education. There will be a growth in science, technology, engineering, mathematics, and medicine (STEMM) areas to address industry gaps. In turn, the cost of higher education will continue to increase. Learners will seek different ways to engage in study whilst remaining in the workforce, and as such there will be an increase demand for online education delivered in more accessible formats, such as short courses, micro-credentials and massive open online courses (MOOCs). Lastly, the skills sets required for the workforce will change, due to digital empowerment. The attributes of the digitally empowered worker are addressed later in this chapter.

Education and training will become more important, particularly to upskill the existing workforce through times of automation and innovation. Digital capabilities such as digital literacy and fluency will become assets through a time of changing importance in STEMM (science, technology, engineering, mathematics and medicine). Service industries, particularly education and healthcare, will continue to drive job creation, but these workforces will shift as digital innovations alter roles and processes. In turn, the attitudes and beliefs of the digitally empowered worker will change, as will the very definition of the traditional work day. Flexible work environments will become the norm, and digital service teams will no longer be located geographically in the same location. Digitization and the intergenerational impact on the workforce will result in people staying in the workforce longer, but with decreased participation. Therefore, job transitions will shift and new job forecast models will be required.

Digital transformation of business services requires a digital capable workforce to deliver services. Digitalization has been characterized with six dimensions: interconnectedness, diminishing time lag and abundance of information, increased transparency and complexity, hierarchical removal and dissolvement of personal barriers, decision enabler and integrity enhancing, and humanizing effect (Khan, 2016). While these are not exhaustive, and the methodology is fraught, they do provide a positive initial set of ideas that we will draw on.

Authentic Leaders

Authentic leader theory was created to enable an antidote to prevailing ethical challenges of our society (Luthans & Avolio, 2003). Nested within the field of positive organizational behavior (Luthans, 2002), authentic leaders enable positive development within their followers and those around them (Avolio & Gardner, 2005). Since then, a large series of positive outcomes has been identified for followers of the authentic leader. For example, follower empowerment, performance, satisfaction, commitment, trust, engagement, and happiness (Gardner et al., 2011). Authentic leader behaviors are defined in Table 1 (Crawford et al., 2019).

The authentic leader has an important role in motivating employees, although this relationship has been underexplored in the literature. Empirical relationships exist between authentic leaders and job satisfaction (Wong & Laschinger, 2013) and work engagement (Joo et al., 2016). To some extent, it is possible to theorize that if employees are engaged in their work and they express their satisfaction with their role because of their authentic leader, then it is also likely that such a leader must do so through motivating their employees.

The digital era has caused complexity in the role of the leader, and requires careful consideration to way in which leader behaviors manifest. Motivating an employee, for example, is likely to be more difficult when a leader only sees that employee by way of video-conferencing and the annual staff Christmas party. Drawing on some of the earlier referred to digitalization characteristics (Khan, 2016), we identify the role of the authentic leader as an enabler of transparency in a complex world. Authentic

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Defining authentic leaders and their dimensions

Authentic leader	Influences and motivates followers to achieve goals through their sincerity and positive moral perspective, enabled through heightened awareness and balanced processing.
Awareness	Having insight into the behaviours of one's self, other individuals, and groups.
Sincerity	Presenting one's true self to others, honestly and openly in all relationships and with consideration for the context.
Balanced processing	The tendency to consider all relevant information available, and using this to make decisions that benefit the collective (e.g. followers).
Positive moral perspectives	The commitment to one's intrinsic ethical framework, and a willingness to subdue personal interests and ego to facilitate collective interests.
Informal influence	The ability to inspire and motivate individuals to accomplish goals of their own volition, regardless of rank or position.

Definitions quoted from multiple pages in Crawford et al., (2019b).

leaders engage in sincere interactions with others, and seek to be transparent in their behaviors (Rego et al., 2017). Complexity as an inherent element of the contemporary and dynamic environment that we are situated within, and authentic leader behaviors create the conditions to co-create a vision in times of chaos (Vitello-Cicciu, 2019).

Importantly, within a digital environment, is recognition that hierarchies are harder to sustain. Digital innovation can empower individuals, but also disempower those who leverage information power (Mansell, 2016). The growth in transparency stemming from faster access to information removes significant formal and positional power from managerial staff. In transition, coercive effects can be hindered and informal power enhanced (Powell et al., 2017). The authentic leader relies on their informally developed influence to achieve their shared vision, rather than the power granted by their position. Some leaders reliant on their position are likely to struggle during the digital transformation. Digital transformation requires more than leadership, it requires leaders with behaviors that enable them to consciously understand their changing environment and cope with the ethical and emotional pressures faced.

In discussing a positive leadership theory, it is equally important to consider the low authentic leader. Dark side (Liu et al., 2012), Machiavellian (Rego et al., 2017), corporate psychopaths (Boddy, 2011), and unethical leadership (Brown & Mitchell, 2010) theories are a few examples. Dark sides of leadership are identifiable as those who score low in their authentic leader behaviors. For example, in a typology, the Machiavellian leader is low in authenticity and high in Machiavellianism (Rego et al., 2017). Early psychological evidence focused on prescription for negative psychological conditions over promotion of positive psychological solutions (Seligman & Csikszentmihalyi, 2014). Fredrickson and Joiner (2002) describes this as positive spirals, whereby positive emotions predict the creation of more positive emotions. Likewise, the reverse is true: negative emotions predict more negative emotions (Garland et al., 2010). We recognize, therefore, that the promotion of positive leader behaviors has the capacity to mitigate the negative and dark sides of leadership. For example, bullying behaviors of leaders is possible

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to eliminate by high integrity, sincerity, and awareness. A leader who is aware of the impact of their behaviors on others is likely to have greater empathy and therefore be more considerate of their actions.

Authentic Followers

Followers have been commonly neglected in the leadership literature, with a constant emphasis on the follower as an extension of the leader. There have been some emerging work that has challenged the status quo, but very few significant enough to penetrate the bias towards the leader. In an evolutionary conversation of leadership, authors highlight "it is less obvious what benefits ultimately exist for followers" (Van Vugt, 2006, p. 357). Arguments of 'everyone cannot be a leader, so some have to be followers' are common in the assumptions of the literature, along with recognition that a leader requires a follower to influence. The confusion in the literature exists from an overreliance on the formal positional authority of a manager and the role of the leader. Some studies, albeit limited numbers, attempt to separate formal and perceived authority with leadership style and focus (Eglene et al., 2007). Changes in the contemporary leadership landscape have drawn attention away from positional power and authority towards informal and relational power bases (Ridgeway, 2001). In leadership theories with informal influence bases, there is importance in understanding the nature of the follower. Such an understanding should go beyond questioning how a follower is best influenced to achieve goals, but to consider how followers can be best developed, empowered, and enabled. Followers in one situation may be a leader in another (Gilstrap & Morris, 2015), so developing followers is one mechanism to develop future leaders.

In many theories of followership, engagement is a key component of consideration. In one typology, the follower goes from 'isolates' to 'dieharts' (Kellerman, 2008). The isolates are typically detached and uninterested in engaging in the organization beyond their minimum requirements. The bystander is more engaged, but usually opts to be on the sideline. Participants are engaged and supportive, but may be value-neutral in their followership. Activists are energetic and have high engagement, and diehards are heavily engaged. The challenge with this typology is the lack of recognition that followers can influence through their engagement. This model is insightful but lacks a key component, indeed it explicates the first component of an effective follower but misses the psychological capacity for authenticity.

Another popularized model of followership (Kelley, 2008) identifies two characteristics of followers: the degree to which they are independent thinkers, and the degree to which they are actively engaged in creating positive energy. In this model, there are sheep (passive and non-thinking), yes-people (positive energy, but blindly follow), alienated (think independently and negative energy), pragmatics (fence sitters, but tends to follow the status quo), and star followers (think for themselves and have positive energy). The model articulated by Kelley (2008) is more advanced than the previous, but is still limited. It recognizes the value in thinking critically and challenging the leader when they disagree, but it withholds ethics and indeed a sense of self in the followers. Followers can think critically, reflect and develop a sense of self, and engage with their organization (Crossman & Crossman, 2011). They can also be ethical, and have well defined ethical frameworks (Carsten & Uhl-Bien, 2013).

In studies of authentic followership, authentic followers have a need to be recognized and valued, with a desire to be challenged and excited (Goffee & Jones, 2006). While such notions continue to treat the follower as secondary. Mutual transparency was important however (Avolio & Reichard, 2008). The assumptions in these papers is heavily reliant on the notion that followers are subservient beings rather than demonstrative of their own independence (de Zilwa, 2016). de Zilwa (2014) defines authentic followership through the system in which they would operate. In her work, she considers positive culture

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and political conditions as a key element of the model. The leader-follower relationship is nested within a broader socio-political environment, and such an environment has implications for the leader and the follower alike. A careful explication of what it means to be an authentic follower is lacking however, beyond their psychological capacity for authenticity.

Authentic followers have been far less explored than authentic leaders (Agho, 2009), despite their value in the context of considering what it means to be a digitally empowered employee. Crawford et al. (2018) synthesizes the preexisting research to explain the authentic follower by psychological capacity for authenticity (e.g. de Zilwa, 2014) and positive organizational engagement (like Kelley, 2008). In their work, Crawford and colleagues (2018, p. 274) define the authentic follower by their psychological capacity for authenticity (awareness, sincerity, balanced processing, and a positive moral perspective) and positive organisational engagement:

An authentic follower is an individual who, through their capacity for authenticity and positive organisational engagement, are self-managing and follow leaders with whom they share values.

We draw on this conceptualization to consider how the digitally empowered worker shares characteristics with the authentic follower. Indeed, the literature on authentic leaders and authentic followers provides insights into the enablers of the characteristics of the digitally empowered worker, and we discuss this further in the next section.

Digitally Empowered Workers

The changing landscape in digital services described above will change the worker of the future. The worker will need to maintain engagement in constantly changing environments, largely with and through technology, in data-driven roles. The digitally empowered worker needs to be not only digitally literate (know how to work with technology), but digitally fluent. Digital fluency is described by Briggs and Makice (2012, p. 68) as "the ability to reliably achieve desired outcomes through digital technology". A digitally empowered worker needs to possess a new set of skills, knowledge, and mindset to deliver digital services. But what are the skills, knowledge, and mindset required to be an effective and digitally empowered worker? Among our critical examination of the wealth of published literature on the topic, we identify four dynamic attributes: awareness, creativity, agility, and learning orientation.

Awareness

Awareness, or consciousness, is the ability to perceive, feel, know, and understand people and events. Whilst everyone has level of self-awareness, the digitally empowered worker requires awareness of how others perceive events and the needs of others. Awareness includes a broad range of skills that can be collectively grouped as social and emotional skills. Social and emotional skills include communication and negotiation skills, interpersonal skills and empathy, leadership and managing others, entrepreneurship and initiative-taking, adaptability and continuous learning, and teaching and training others (McKinsey Global Institute, 2018). The McKinsey Global Institute (2018) predicts there will be a 26 percent increase in the number of work hours utilizing social and emotional skills. Furthermore, people management, coordinating with others, and emotional intelligence are amongst the top ten skills required by the future workforce (World Economic Forum, 2016). Interestingly, the World Economic Forum (2016) predicted

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

negotiation skills would drop out of their top ten list as they rationalize that you cannot negotiate with a robot or artificial intelligence (AI).

Emotional intelligence is being aware of and managing your own emotions and the emotions of others, including interpersonal and communication skills (Murawski & Bick, 2017; van Laar et al., 2017). Emotional intelligence comprises emotional recognition and expression, emotions embedded and understood in decision making, awareness of others' emotions, regulation and management of emotions of self and others, and ability to function and flourish in conditions where emotional states are heightened (Gardner & Stough, 2002). Both individual and team emotional intelligence enriches creativity and team cohesion through collaborative communication and negotiation. Similarly, team emotional intelligence is connected to the organizational climate, which can influence individual and team creativity. Moreover, Barczak et al. (2010) conclude the relationship between emotional intelligence, team trust and a collaborative culture are precursors to creativity. In a digital service, emotional intelligence will enable workers to work and communicate with others in a positive and productive way. This is particularly necessary when teams are geographically dispersed and interpersonal and communication skills are through digital technologies instead of in person.

Equally, empathy is an important attribute in the digitally empower worker. Empathy is the cognitive awareness of the perspective of others and how we react to other experiences with an affective response (Colbert et al., 2016). Creativity is enhanced through information and ideas sharing, so being empathetic enables individuals to be focused on the user needs and desires. As such, empathy underpins human-centered design. Within digital services, being empathetic online and building healthy online social networks will become required attributes.

A strong social conscience also featured in the literature (Pricewaterhouse Cooper, 2017; Van Laar et al., 2017). The future digitally empowered workforce will need to have an awareness about the environment, ethics, culture, diversity, and human rights. Economic and social developments will impact innovations, and therefore the workforce must account for these when developing new ideas.

Creativity

Creativity involves forming solutions to bring one's ideas, thoughts and dreams into reality in ways that are novel and useful. It can be looking at the world in a different way to see the potential for a solution. It is creative and sometime complex, problem-solving, where innovation cannot begin without creativity. As such, the ability to be creative features strongly in the literature examining the future workforce needs (Neumeier, 2014; McKinsey Global Institute, 2018; Pricewaterhouse Cooper, 2017; Van Laar, 2017; World Economic Forum, 2016).

Creativity and innovation are often mistakenly used synonymously. Whilst creativity is the process or creation, such as thoughts and ideas, innovation is the use of those ideas to improve the way we do things, whether that be processes, products, services, or procedures. All individuals have some degree of creativity, and creativity is not limited to only innovation (Hoerl & Gardner, 2010). Therefore, creativity is a necessary attribute for the digitally empowered worker. Creativity can be encouraged in individuals by providing them with the space and time to allow people to brainstorm ideas. Continuous learning, rewarding curiosity, encouraging risk taking (within reason), and positive encouragement should be part of the cultural norm. Over time, this will improve the confidence in digitally empowered workers, leading to greater creativity.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Team culture can also facilitate or inhibit creativity, which in turns impacts innovation. Whilst individual characteristics or attributes will influence creativity, the team creativity process will influence the innovation (Somech & Drach-Zahavy, 2011). Functional heterogeneity in teams will result in diverse expertise, skills, and attributes. This richness of diversity will result in either a positive or negative impact on team creativity, depending on the team's cohesion. Furthermore, the external network of the team and individual members will further enrich this diversity as it broadens the information sources, increases members' skills, and reshapes perspectives, lending to new ideas, thoughts and dreams. Somech and Drach-Zahavy (2011) reports there is a positive relationship between personal attributes, functional heterogeneity, and team creativity. Where there is a high level of individual creativity and a high level of heterogeneity in the team, there is high level of team creativity. Individual creativity attributes are a good predictor of the level of team creativity, and therefore team creativity could be enhanced through the selection of creative personalities.

Lastly, the climate can also influence creativity. The climate informs members the expected behaviors and attitudes for the team and organization. Elements within the creative climate include psychological safety, positive team relationships, the degree of individual freedom, encouragement of creativity and setting of the vision and mission, and available resources (Denti, 2011). Denti (2011) proposes the six components of a creative climate include: i) challenging and creative tasks to motivate creativity; ii) intellectual debate to share diverse viewpoints; iii) flexibility and risk taking to push the margins; iv) top management support to challenge the norms; v) positive supervisor relations with the team to encourage creativity; and, vi) positive interpersonal exchange to create joy and togetherness. Most importantly is a climate that empowers individuals to be creative.

Agility

The ability to be flexible and quick will become important skills for the digital workforce (World Economic Forum, 2016). This includes cognitive flexibility and judgement and decision making (World Economic Forum, 2016). Individuals must be agile, demonstrating an ability to think and move quickly (McKinsey Global Institute, 2018; van Laar et al., 2017). Digital services need to be adaptable to continuously meet the demand of clients, and as such the workforce needs to be equally agile. Individuals and teams need to quickly generate new ideas, making team culture even more critical in digital services. The ability to acknowledge and manage change will be an important skill. People with adaptive leadership skills aim to understand a diversity of viewpoints, using empathy and awareness, and enhancing creativity. Those who become part of the change process will benefit the most in the digital world.

Critical thinking (World Economic Forum, 2016; Van Laar et al., 2017) and higher cognitive skills (McKinsey Global Institute, 2018) will enable the digital workforce to interpret information quicker, enabling faster problem-solving. McKinsey Global Institute (2018) forecast between 2016 to 2030 there will be a 25 percent decrease in the number of work hours requiring physical and manual or basic cognitive skills, and an increase in higher cognitive skills (9% increase) and technological skills (60% increase). The ability to think quickly, be cognitively flexible, and be part of the change process will be critical skills in the digitally empowered worker.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Positive Learning Orientation

Lastly, the digitally empowered workforce needs to be able to identify and set their own learning goals, and be open to new ways of working and learning (Pricewaterhouse Cooper, 2017; Van Laar et al., 2017). Learning orientation, or continuous learning, enables individuals and teams to expand their knowledge and skills and remain current across contemporary developments. Being agile allows digitally empowered workers to integrate new skills into their roles and strong interpersonal skills allow the translation of this information to the team. The establishment of a learning organization is critical in enabling employees to have a positive relationship with their learning experience. Indeed, authentic leaders have a significant role to play in enabling the creation of a learning organizational culture (Milić et al., 2017).

Continuous learning can take place through formal learning, social learning, or self-directed learning. As discussed above, self-actualization is an important element in continuous learning. Individuals need to be able to identify areas for growth and improvement within their own skill set and gaps within the team and organization. A culture that supports continuous learning, or a learning culture, will support individuals and teams. Self-direction and lifelong learning are critical elements in creating a workforce that is creative, socially and emotionally aware, agile, and adaptable. Leadership that supports continuous learning through demonstration and empowerment will create an environment where improvement in knowledge and skills is encouraged. The digitally empowered workforce will maintain currency of contemporary practices, enhancing cognitive agility, encouraging creativity, and heightening awareness.

SOLUTIONS AND RECOMMENDATIONS

Through the critical review of digital services, authentic leaders, authentic followers, and the behaviors of digitally empowered employees we have developed the foundation for a synthesis. We identified six megatrends that are likely to have great influence on the organizational ability to engage in digital strategies (Hajkowicz et al., 2016). These include rapid technological/data growth, where such growth will influence employment and organizational structures, new opportunities to be entrepreneurial and innovative, a more diverse employee age profile, a need for higher capabilities, and the rapid evolution of the required skills of the workforce. Each of these offers significant challenges, but underlying an effective response to each is effective leaders and effective follower behaviors.

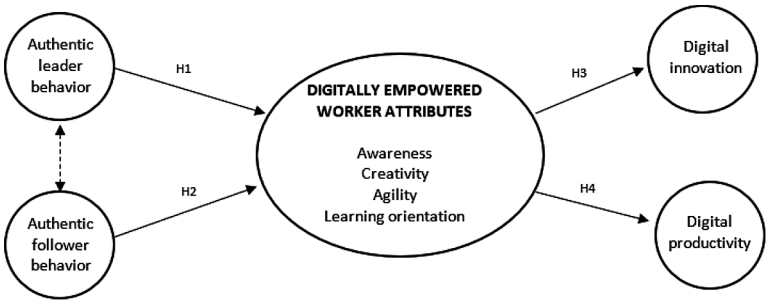
We position authentic leaders and authentic followers as a possible enabler of greater digital empowerment. To this end, we provided a critical review of the two constructs in the context of research that parallels to digital empowerment. We also begin to examine the possible behaviors of a digitally empowered worker. These include creativity, awareness, agility and a learning orientation. At this stage of the Chapter, we believe the reader should have a grasp of the four underlying theoretical lenses we adopt in the establishment of a model of hypotheses (see Figure 1). The subsequent sections begin to explicate the nature of each of these relationships, and we continue further to explore the implications of such a model in practice.

Authentic Leader Behaviors and Digital Empowerment

The authentic leader, through their informal influence and sincere interactions with their followers, creates the conditions by which their followers are developmentally ready to engage with new information

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. The nomological network of the digitally empowered follower



and new knowledge. In the leadership literature, developmental readiness has grown in its usage (Avolio & Hannah, 2008). Through the guise of a positive organizational culture, authentic leaders seek to create the conditions by which followers *want* to engage with self-improvement and assessment of their current conditions. Some negative forms of leadership that leverage information power or fear stifle the follower's desire to improve their work conditions and remain relevant (e.g. Blasé & Blasé, 2002). Power distance has a negative relationship with empowerment (Çakar & Ertürk, 2010), and thereby leaders who are sincere and are willing to engage in positive relationships with employees will create greater employee empowerment.

Authentic leaders can create the foundations for digital empowerment by being supportive and enable knowledge sharing, rather than harboring information. For authentic leaders, a key aim of fostering a psychological capacity for authenticity and positive organizational engagement in followers is paramount (Crawford et al., 2018). This, as discussed in the next hypothesis, is an enabler of digital empowerment. Authentic leaders have a strong influence on enabling both innovation and creativity. In the innovation and entrepreneurship literature, creativity is typically identified as a critical component of early stages of entrepreneurship (Mulgan, 2006). This includes the notion of identifying a problem, generating ideas for solving the problem, and identifying the most suitable idea to pursue. Innovation is required at the latter stages of entrepreneurship, from developing prototypes through to entering the chosen market for the first time (Anderson et al., 2014). For authentic leaders, there are established relationships with outcomes of higher individual creativity (Ribeiro et al., 2019) and individual and team performance (Luu, 2019; Shirey et al., 2019).

In digital innovation, a parallel can be drawn. The authentic leader, by facilitating an environment where individuals feel safe to take risks and explore alternate ways of operating, empowers their followers to be creative and innovative (Černe et al., 2013). When considering dark sides of leadership, evidence indicates abusive behaviors towards employees results in declines in creativity (Liu et al., 2012). To this end, a leader who engages in positive and supportive behaviors is likely to also enable creativity and innovation in their followers. For authentic leaders, the ability for employees to engage in social innovation is also important. Social innovation is creating new ideas for wider benefit and is often linked to social entrepreneurship models (Crawford et al., 2020). The ability for employees to engage in digital innovation in for-profit and for-purpose organizations is strengthened by an authentic leader creating an employee willingness and ability to learn and take calculated risks. We posit, therefore, that:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hypothesis 1: That authentic leaders will have a direct influence on the degree to which employees are digitally empowered.

Authentic Followers as the Foundation of Digitally Empowered Workers

The authentic follower, who has a psychological capacity for authenticity and positive organizational engagement, to be aware of themselves and their environment (de Zilwa et al., 2014). By being aware of their environments, they can regularly conduct environmental scans (which includes technology changes and usage). An authentic follower uses their balanced processing to critically review options and needs to make informed decisions. This process, along with recognition of individual strengths and weaknesses creates conditions where followers are better able to engage in the use of innovative digital technologies.

In contemporary society, there is a constant bombardment of digital technologies. Some of these are exceptionally relevant, and some are not. Authentic leaders are cognizant of the strengths and weaknesses of their followers (Avolio et al., 2004). This leads to an understanding of the characteristics that might hold back a follower from being digitally empowered. For example, an older follower may have significant resistance to new piece of technology, particularly when younger employees are able to intuitively understand the new technology. The divide between digitally native employees born from the late 90s will have difficulty in empathizing with older employees who can recall times before computers, phones, and similar. These challenges, an authentic follower can overcome with sincere engagement and careful assessment of the situation. This is just one way in which an authentic follower can create the conditions for digital empowerment in their organization. We posit, therefore, that:

Hypothesis 2: That authentic follower behaviors will have a predictive effect on employee digitally empowerment.

Digitally Empowered Workers and Digital Innovation

For digital workers, their creative self-efficacy has an impact on their perceptions of personal idea generation and objective ratings of creative output. In the same study, when psychological entitlement was high, this was no longer true (Černe et al., 2019). These employees, with the kind of self-regulation and self-efficacy that an authentic follower is likely to engage in, creates the conditions for greater digital innovation. Where digitally empowered employees are empowered to be creative, innovative, moderate their sense of entitlement, and learn, we posit that they will engage in higher levels of digital innovation.

In a study of 743 employees over 93 small/medium enterprises, collective attitudes and uncertainty avoidance had an association with empowerment and innovation (Çakar & Ertürk, 2010). Therefore, employees who have awareness of their environment, are more open in conversations and interactions with others, and seek to process information in a balanced manner are likely to better engage with innovation generally. The capabilities of the digitally empowered are likely to further strengthen the application of innovation in digital settings. We propose therefore that:

Hypothesis 3: That digitally empowered workers will have higher rates of digital innovation than employees who are not digitally empowered.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Digitally Empowered Workers and Digital Productivity

Having a high level of awareness, creativity, agility, and learning orientation will better position workers in digital services compared to those who have minimal awareness beyond their immediate self, lack creativity, are rigid, and do not take part in continuous learning. To return to the digital services example earlier. A designer who creates logos is likely to work with clients across the globe. These clients will have needs that vary, and cultural norms that are diverse. Such a designer will need to demonstrate high degrees of other and situational awareness to navigate such complexities, beyond a designer that only worked with domestic clients. They would also need higher agility to manage deadlines across multiple time zones, and a positive learning orientation to acknowledge that their competitors are not two nearby design firms, but rather any design firm with a well-developed digital presence. These attributes will enable the worker in a digital environment to be more productive as they are able to develop new ideas and adapt to rapid change. Dynamic management can encourage creativity and innovation in workers to the benefit of organizations (Helfat & Martin 2015).

Hypothesis 4: That digitally empowered workers will have higher rates of digital productivity than employees who are not digitally empowered.

FUTURE RESEARCH DIRECTIONS

The implications of this chapter are extensive, but still infant in their development. Our Chapter highlights a set of implications for emerging research with significant opportunities for empirical testing. The model we propose (Figure 1) highlights the potential for a series of relationships between the authentic leader and authentic follower to digitally empowered workers, and subsequent increases in digital innovation and productivity. If this holds true, managers should seek authentic leader behavior training and development, and seek to cultivate authentic follower behaviors in their subordinates. Doing so has wide implications already discussed in the literature (see Gardner et al., 2011 for an extensive list of outcomes), and we propose that digital empowerment is produced as an outcome of authentic leaders and followers. We also believe that there may be direct effects of authentic leaders and followers on digital innovation and digital productivity, but further research is required for such a proposition.

This research, while encompassing a wide suite of literature, has its limitations and opportunities for future research. The first limitation is that our work is theoretical. While it is critical that theoretical developments inform empirical research (Crawford & Kelder, 2019), at present our hypotheses are untested outside of their logical consistency and potential for significance. We encourage scholars to continue this exploration of the role of authentic leaders and authentic followers in enabling digital outcomes (e.g. empowerment, innovation, and productivity). The second limitation is that we only reviewed one type of leader behaviors. Most evidence indicates a significant list of leadership styles, and to provide the strength of argument, and to explore in depth, we selected one that had logical consistency based on past work. This assumption, while we believe is true, could also be true of other theories of leadership such as transformational leadership (e.g. Özaralli, 2003), top management teams' theory (Ugboro & Obeng, 2000), and empowering leadership (Srivastava et al., 2006). Each of these theories have relationships to empowered employees, among others, and could also contribute to digitally empowered leadership.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Future research could examine such relationships and continue to theoretically and empirically explore the comparative effects of leadership styles on digital outcomes.

CONCLUSION

This Chapter evaluated the role of the authentic leader and authentic follower on digital empowerment and began to theorize what a digitally empowered worker might look like. Through a critical review of four underlying constructs (authentic leaders, authentic followers, digital services, and digital empowerment) we sought to develop a better understanding of each of their roles in enabling digital outcomes. In our discussion, we explicated a model of digital empowerment that views authentic leaders and authentic followers as antecedents, and digital innovation and digital productivity as outcomes. In a world that is characterized by significant growth in the use of technology, being able to understand and shape its usage for positive outcomes is critical in enabling human flourishing. We believe that authentic leaders and followers have a role in enabling the conditions of digital empowerment, and such empowerment creates the conditions that can shape and continue to innovate digitally.

REFERENCES

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and creativity in organizations: A state-of-the-science review, prospective commentary, and guiding framework. *Journal of Management*, *40*(5), 1297–1333. doi:10.1177/0149206314527128

Avolio, B., & Gardner, W. (2005). Authentic leadership development: Getting to the root of positive forms of leadership. *The Leadership Quarterly*, *16*(3), 315–338. doi:10.1016/j.leaqua.2005.03.001

Avolio, B., Gardner, W., Walumbwa, F., Luthans, F., & May, D. (2004). Unlocking the mask: A look at the process by which authentic leaders impact follower attitudes and behaviors. *The Leadership Quarterly*, *15*(6), 801–823. doi:10.1016/j.leaqua.2004.09.003

Avolio, B., & Hannah, S. (2008). Developmental readiness: Accelerating leader development. *Consulting Psychology Journal: Practice and Research*, *60*(4), 331–347. doi:10.1037/1065-9293.60.4.331

Avolio, B., & Reichard, R. (2008). The rise of authentic followership. In R. Riggio, I. Chaleff, & J. Lipman-Blument (Eds.), *The Art of Followership: How Great Followers Create Great Leaders and Organizations* (pp. 325–337). San Francisco, CA: Jossey-Bass.

Ayanso, A., Cho, D., & Lertwachara, K. (2010). The digital divide: Global and regional ICT leaders and followers. *Information Technology for Development*, *16*(4), 304–319. doi:10.1080/02681102.2010.504698

Barbera, P., Bonneau, R., Egan, P. Jost, J., Nagler, J., Tucker, J. (2014). *Leaders or followers?* Measuring political responsiveness in the U.S. Congress using social media data. *110th American Political Science Association Annual Meeting*.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Barczak, G., Lassk, F., & Mulki, J. (2010). Antecedents of team creativity: An examination of team emotional intelligence, team trust and collaborative culture. *Creativity and Innovation Management*, *19*(4), 332–345. doi:10.1111/j.1467-8691.2010.00574.x

Blasé, J., & Blasé, J. (2002). The dark side of leadership: Teacher perspectives of principal mistreatment. *Educational Administration Quarterly*, *38*(5), 671–727. doi:10.1177/0013161X02239643

Boddy, C. (2011). The corporate psychopaths theory of the global financial crisis. *Journal of Business Ethics*, *102*(2), 255–259. doi:10.100710551-011-0810-4

Bondarouk, T., & Ruel, H. (2009). Electronic human resource management: Challenges in the digital era. *International Journal of Human Resource Management*, *20*(3), 505–514. doi:10.1080/09585190802707235

Briggs, C., & Makice, K. (2012). *Digital fluency: building success in the digital age*. Bloomington: SociaLens.

Brown, M., & Mitchell, M. (2010). Ethical and unethical leadership: Exploring new avenues for future research. *Business Ethics Quarterly*, *20*(4), 583–616. doi:10.5840/beq201020439

Butler-Henderson, K. (2017). *Health Information Management 2025: What is required to create a sustainable profession in the face of digital transformation?* Launceston, Australia: University of Tasmania.

Çakar, N., & Ertürk, A. (2010). Comparing innovation capability of small and medium-sized enterprises: Examining the effects of organizational culture and empowerment. *Journal of Small Business Management*, *48*(3), 325–359. doi:10.1111/j.1540-627X.2010.00297.x

Carsten, M., & Uhl-Bien, M. (2013). Ethical followership: An examination of followership beliefs and crimes of obedience. *Journal of Leadership & Organizational Studies*, *20*(1), 49–61. doi:10.1177/1548051812465890

Cerne, M., Bunjak, A., Wong, S., & Moh'd, S. (2019). Creative and deserving: Digital workers' transformation of subjective into objective creativity. Academy of Management Proceedings, 2019(1), 10070.

Černe, M., Jaklič, M., & Škerlavaj, M. (2013). Authentic leadership, creativity, and innovation: A multilevel perspective. *Leadership*, *9*(1), 63–85. doi:10.1177/1742715012455130

Cheong, M., Yammarino, F., Dionne, S., Spain, S., & Tsai, C. (2018). A review of the effectiveness of empowering leadership. *The Leadership Quarterly*, *30*(1), 34–58. doi:10.1016/j.leaqua.2018.08.005

Colbert, A., Yee, N., & George, G. (2016). The digital workforce and the workplace of the future. *Academy of Management Journal*, *59*(3), 731–739. doi:10.5465/amj.2016.4003

Crawford, J., Dawkins, S., Martin, A., & Lewis, G. (2017). Understanding the organizational climate of unethical leadership in the Australian Football League. *The Journal of Leadership Studies*, *11*(2), 52–54. doi:10.1002/jls.21525

Crawford, J., Dawkins, S., Martin, A., & Lewis, G. (2018). Conceptualising authentic followers and developing a future research agenda. In D. Cotter-Lockard (Ed.), *Authentic Leadership and Followership: International Perspectives* (pp. 271–293). Cham, Switzerland: Palgrave Macmillan. doi:10.1007/978-3-319-65307-5_11

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Crawford, J., Dawkins, S., Martin, A., & Lewis, G. (2019). Putting the leader back into authentic leadership: Reconceptualising and rethinking leaders. *Australian Journal of Management*; Advanced Online Publication. doi:10.1177/0312896219836460

Crawford, J., & Kelder, J.-A. (2019). Do we measure leadership effectively? Articulating and evaluating scale development psychometrics for best practice. *The Leadership Quarterly*, *30*(1), 133–144. doi:10.1016/j.leaqua.2018.07.001

Crawford, J., Kelder, J.-A., & Knox, M. (2020). What does it take to be a social entrepreneur? Authentic leaders and their effect on innovation. In Ç. Dogru (Ed.), *Leadership styles, innovation, and social entrepreneurship in the era of digitalization* (pp. 282–310). Hershey, PA: IGI Global.

Crossman, B., & Crossman, J. (2011). Conceptualising followership–a review of the literature. *Leadership*, *7*(4), 481–497. doi:10.1177/1742715011416891

de Zilwa, D. (2016). The strengths and capacities of authentic followership. *Leadership and Organization Development Journal*, *37*(3), 310–324. doi:10.1108/LODJ-01-2014-0010

de Zilwa, D., Lapierre, L., & Carsten, M. (2014). A new conceptual framework for authentic followership. In L. Lapierre, & M. Carsten (Eds.), *Followership: What is it, and why do people follow* (pp. 47–72). Bingley, UK: Emerald Group.

Denison, D., & Mishra, A. (1995). Toward a theory of organizational culture and effectiveness. *Organization Science*, *6*(2), 204–223. doi:10.1287/orsc.6.2.204

Denti, L. (2011). *Leadership and innovation: How and when do leaders influence innovation in R&D teams?* Sweden: University of Gothenburg.

Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New public management is dead—Long live digital-era governance. *Journal of Public Administration: Research and Theory*, *16*(3), 467–494. doi:10.1093/jopart/mui057

Eglene, O., Dawes, S., & Schneider, C. (2007). Authority and leadership patterns in public sector knowledge networks. *American Review of Public Administration*, *37*(1), 91–113. doi:10.1177/0275074006290799

Fredrickson, B., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychological Science*, *13*(2), 172–175. doi:10.1111/1467-9280.00431 PMID:11934003

Gardner, L., & Stough, C. (2002). Examining the relationship between leadership and emotional intelligence in senior level managers. *Leadership and Organization Development Journal*, *23*(2), 68–78. doi:10.1108/01437730210419198

Gardner, W., Cogliser, C., Davis, K., & Dickens, M. (2011). Authentic leadership: A review of the literature and research agenda. *The Leadership Quarterly*, *22*(6), 1120–1145. doi:10.1016/j.leaqua.2011.09.007

Garland, E., Fredrickson, B., Kring, A., Johnson, D., Meyer, P., & Penn, D. (2010). Upward spirals of positive emotions counter downward spirals of negativity: Insights from the broaden-and-build theory and affective neuroscience on the treatment of emotion dysfunctions and deficits in psychopathology. *Clinical Psychology Review*, *30*(7), 849–864. doi:10.1016/j.cpr.2010.03.002 PMID:20363063

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gilstrap, C., & Morris, A. (2015). Role fluidity and emergent followership: How nonprofit leaders communicate their relationship as/to followers. *Journal of Nonprofit Education and Leadership*, *5*(3), 153–173.

Goffee, R., & Jones, G. (2006). *Why should anyone be led by you: What it takes to be an authentic leader*. Boston, MA: Harvard Business School Press.

Grant, M., & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal*, *26*(2), 91–108. doi:10.1111/j.1471-1842.2009.00848.x PMID:19490148

Hambley, L., O'Neill, T., & Kline, T. (2007). Virtual team leadership: The effects of leadership style and communication medium on team interaction styles and outcomes. *Organizational Behavior and Human Decision Processes*, *103*(1), 1–20. doi:10.1016/j.obhdp.2006.09.004

Hatch, M. (1993). The dynamics of organizational culture. *Academy of Management Review*, *18*(4), 657–693. doi:10.5465/amr.1993.9402210154

Helfat, C., & Martin, J. (2015). Dynamic managerial capabilities: a perspective on the relationship between managers, creativity, and innovation in organizations. In J. Zhou (Ed.), *The Oxford handbook of creativity, innovation, and entrepreneurship*. Oxford, UK: Oxford University Press.

Hoerl, R., & Gardner, M. (2010). Lean Six Sigma, creativity, and innovation. *International Journal of Lean Six Sigma*, *1*(1), 30–38. doi:10.1108/20401461011033149

Joo, B., Lim, D., & Kim, S. (2016). Enhancing work engagement: The roles of psychological capital, authentic leadership, and work empowerment. *Leadership and Organization Development Journal*, *37*(8), 1117–1134. doi:10.1108/LODJ-01-2015-0005

Kane, G., Palmer, D., Phillips, A., Kiron, D., & Buckley, N. (2016). Aligning the organization for Its digital future. *MIT Sloan Management Review, 58*(1), n.p.

Kellerman, B. (2008). *Followership: How followers are creating change and changing leaders*. Boston, MA: Harvard Business School Press.

Kelley, R. (2008). Rethinking followership. In R. Riggio, I. Chaleff, & J. Lipman-Blumen (Eds.), *The art of followership: How great followers create great leaders and organizations* (pp. 5–16). San Francisco, CA: Jossey-Bass.

Khan, S. (2016). Leadership in the digital age: A study on the effects of digitalization on top management leadership. *Masters Dissertation, Stockholm Business School.*

Leimeister, J., Österle, H., & Alter, S. (2014). Digital services for consumers. *Electronic Markets*, *24*(4), 255–258. doi:10.100712525-014-0174-6

LinkedIn. (2018). *2018 workplace learning report: The rise and responsibility of talent development in the new labor market*. Carpinteria, CA: LinkedIn Learning.

Liu, D., Liao, H., & Loi, R. (2012). The dark side of leadership: A three-level investigation of the cascading effect of abusive supervision on employee creativity. *Academy of Management Journal*, *55*(5), 1187–1212. doi:10.5465/amj.2010.0400

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Luthans, F. (2002). The need for and meaning of positive organizational behavior. *Journal of Organizational Behavior*, *23*(6), 695–706. doi:10.1002/job.165

Luthans, F., & Avolio, B. (2003). Authentic leadership development. In K. Cameron, J. Dutton, & R. Quinn (Eds.), *Positive organisational scholarship: Foundations of a new discipline* (pp. 241–258). San Francisco, CA: Berrett Koehler Publishers.

Luu, T. (2019). *Linking authentic leadership to salespeople's service performance: The roles of job crafting and human resource flexibility. Industrial Marketing Management*. Advanced Online Publication.

Martin, A., Jones, E., & Callan, V. (2005). The role of psychological climate in facilitating employee adjustment during organizational change. *European Journal of Work and Organizational Psychology*, *14*(3), 263–289. doi:10.1080/13594320500141228

Martin, A., Jones, E., & Callan, V. (2006). Status differences in employee adjustment during organizational change. *Journal of Managerial Psychology*, *21*(2), 145–162. doi:10.1108/02683940610650758

McKinsey Global Institute. (2018). *Skill shift. Automation and the future of the workforce*, (accessed 12 June 2019) https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce

Milić, B., Grubić-Nešić, L., Kuzmanović, B., & Delić, M. (2017). The influence of authentic leadership on the learning organization at the organizational level: The mediating role of employees' affective commitment. *Journal for East European Management Studies*, *22*(1), 9–38. doi:10.5771/0949-6181-2017-1-9

Mulgan, G. (2006). The process of social innovation. *Innovations: Technology, Governance, Globalization*, *1*(2), 145–162. doi:10.1162/itgg.2006.1.2.145

Murawski, M., & Bick, M. (2017). Digital competences of the workforce – a research topic? *Business Process Management Journal*, *23*(3), 721–734. doi:10.1108/BPMJ-06-2016-0126

Neumeier, M. (2014). *The 46 rules of genius: an innovator's guide to creativity*. San Francisco, CA: New Riders.

Organisation for Economic Co-operation and Development. (2001). Understanding the digital divide. Paris: Directorate for Science, Technology and Industry, OECD.

Özaralli, N. (2003). Effects of transformational leadership on empowerment and team effectiveness. *Leadership and Organization Development Journal*, *24*(6), 335–344. doi:10.1108/01437730310494301

Podsakoff, P., MacKenzie, S., Lee, J., & Podsakoff, N. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *The Journal of Applied Psychology*, *88*(5), 879–903. doi:10.1037/0021-9010.88.5.879 PMID:14516251

Powell, W., Oberg, A., Korff, V., Oelberger, C., & Kloos, K. (2017). Institutional analysis in a digital era: Mechanisms and methods to understand emerging fields. In G. Krucken, C. Mazza, R. Meyer, & P. Walgenbach (Eds.), *New themes in institutional analysis: Topics and issues from European research*. Cheltenham, UK: Edward Elgar. doi:10.4337/9781784716875.00016

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pricewaterhouse Cooper. (2017). *Workforce of the future. The competing forces shaping 2030.* (accessed 12 June 2019) https://www.pwc.com/gx/en/services/people-organisation/workforce-of-the-future/workforce-of-the-future-the-competing-forces-shaping-2030-pwc.pdf

Rego, P., Lopes, M., & Simpson, A. (2017). The authentic-Machiavellian leadership grid: A typology of leadership styles. *The Journal of Leadership Studies*, *11*(2), 48–51. doi:10.1002/jls.21524

Ribeiro, N., Duarte, A., Filipe, R., & Torres de Oliveira, R. (2019). How authentic leadership promotes individual creativity: The mediating role of affective commitment. *Journal of Leadership & Organizational Studies*; Advanced Online Publication. doi:10.1177/1548051819842796

Ridgeway, C. (2001). Gender, status, and leadership. *The Journal of Social Issues*, *57*(4), 637–655. doi:10.1111/0022-4537.00233

Schein, E. (1985). *Organizational culture and leadership*. San Francisco, CA: Jossey-Bass.

Seligman, M., & Csikszentmihalyi, M. (2014). Positive psychology: An introduction. In M. Csikszentmihalyi (Ed.), *Flow and the foundations of positive psychology* (pp. 279–298). Dordrecht, The Netherlands: Springer.

Shepherd, J. (2004). What is the digital era? In G. Doukidis, N. Mylonopoulos, & N. Pouloudi (Eds.), *Social and economic transformation in the digital era* (pp. 1–18). IGI Global. doi:10.4018/978-1-59140-158-2.ch001

Shirey, M., White-Williams, C., & Hites, L. (2019). Integration of Authentic Leadership Lens for Building High Performing Interprofessional Collaborative Practice Teams. *Nursing Administration Quarterly*, *43*(2), 101–112. doi:10.1097/NAQ.0000000000000339 PMID:30839447

Somech, A., & Drach-Zahavy, A. (2013). Translating team creativity to innovation implementation: The role of team composition and climate for innovation. *Journal of Management*, *39*(3), 684–708. doi:10.1177/0149206310394187

Srivastava, A., Bartol, K., & Locke, E. (2006). Empowering leadership in management teams: Effects on knowledge sharing, efficacy, and performance. *Academy of Management Journal*, *49*(6), 1239–1251. doi:10.5465/amj.2006.23478718

Ugboro, I., & Obeng, K. (2000). Top management leadership, employee empowerment, job satisfaction, and customer satisfaction in TQM organizations: An empirical study. *Journal of Quality Management*, *5*(2), 247–272. doi:10.1016/S1084-8568(01)00023-2

van Laar, E., van Deursen, A., van Dijk, J., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, *72*, 577–588. doi:10.1016/j.chb.2017.03.010

Van Vugt, M. (2006). Evolutionary origins of leadership and followership. *Personality and Social Psychology Review*, *10*(4), 354–371. doi:10.120715327957pspr1004_5 PMID:17201593

Vitello-Cicciu, J. (2019). Am I an Authentic Nursing Leader for Healthy Workplace Environments? *Nurse Leader*, *17*(3), 201–206. doi:10.1016/j.mnl.2019.03.011

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Williams, K., Chatterjee, S., & Rossi, M. (2008). Design of emerging digital services: A taxonomy. *European Journal of Information Systems*, *17*(5), 505–517. doi:10.1057/ejis.2008.38

Wong, C., & Laschinger, H. (2013). Authentic leadership, performance, and job satisfaction: The mediating role of empowerment. *Journal of Advanced Nursing*, *69*(4), 947–959. doi:10.1111/j.1365-2648.2012.06089.x PMID:22764828

World Economic Forum. (2016). *The future of jobs. Employment, skills, and workforce strategy for the fourth industrial revolution*, (accessed 12 June 2019) https://www.weforum.org/reports/the-future-of-jobs

ADDITIONAL READING

Butler-Henderson, K. (2017). *Health Information Management 2025: What is required to create a sustainable profession in the face of digital transformation?* Launceston, Australia: University of Tasmania.

Crawford, J., Dawkins, S., Martin, A., & Lewis, G. (2018). Conceptualising authentic followers and developing a future research agenda. In D. Cotter-Lockard (Ed.), *Authentic Leadership and Followership: International Perspectives* (pp. 271–293). Cham, Switzerland: Palgrave Macmillan. doi:10.1007/978-3-319-65307-5_11

Crawford, J., Dawkins, S., Martin, A., & Lewis, G. (2019). Putting the leader back into authentic leadership: Reconceptualising and rethinking leaders. *Australian Journal of Management*; Advanced Online Publication. doi:10.1177/0312896219836460

Liu, D., Liao, H., & Loi, R. (2012). The dark side of leadership: A three-level investigation of the cascading effect of abusive supervision on employee creativity. *Academy of Management Journal*, *55*(5), 1187–1212. doi:10.5465/amj.2010.0400

Pricewaterhouse Cooper. (2017) *Workforce of the future. The competing forces shaping 2030.* (accessed 12 June 2019) https://www.pwc.com/gx/en/services/people-organisation/workforce-of-the-future/workforce-of-the-future-the-competing-forces-shaping-2030-pwc.pdf

World Economic Forum. (2016) *The future of jobs. Employment, skills and workforce strategy for the fourth industrial revolution*, (accessed 12 June 2019) https://www.weforum.org/reports/the-future-of-jobs

KEY TERMS AND DEFINITIONS

Authentic Follower: An individual who, through their capacity for authenticity and positive organisational engagement, are self-managing and follow leaders with whom they share values (Crawford et al., 2018, p. 274).

Authentic Leader: A leader who "influences and motivates followers to achieve goals through their sincerity and positive moral perspective, enabled through heightened awareness and balanced processing" (Crawford et al., 2019, n.p.).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Digital Era: "Characterized by technology which increases the speed and breadth of knowledge turnover within the economy and society" (Shepherd, 2004, p. 1).

Digital Innovation: The creation or application of technology to enhance existing practices and solve emergent problems.

Digitally Empowered Worker: A digital worker who is aware, creative, agile, and willing to learn.

Digital Productivity: The digital output value of workers.

Digital Services: An activity or benefit that one party can give to another, that is, provided through a digital transaction" (Williams, Chatterjee, & Rossi, 2008, p. 507).

MOOC: Massive open online courses.

STEMM: Science, technology, engineering, mathematics, and medicine.

This research was previously published in Leadership, Management, and Adoption Techniques for Digital Service Innovation; pages 103-124, copyright year 2020 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 80
Understanding the Effect of Digital Literacy on Employees' Digital Workplace Continuance Intentions and Individual Performance

Elizabeth Marsh
Coventry University, Warwickshire, UK

ABSTRACT

While a growing body of literature suggests that employees' digital skills are important to enable both individuals and organisations to make the most of the digital workplace, empirical understanding of their effect on technology adoption and performance is currently limited. Drawing on prior models of technology acceptance and continuance, the present study investigated the effect of digital literacy on behavioural intention to continue using the digital workplace and, ultimately, on individual performance. Linear regression was used to analyse the conceptual model using survey data from 142 employees of a major UK charitable organisation. Results partially supported the model, demonstrating that employees' digital skills effect continuance intentions and individual performance via their perceptions of ease of use. The findings suggest an important role for digital literacy, both as an antecedent to the more general determinants of technology adoption, and in organisational interventions designed to encourage digital workplace adoption.

INTRODUCTION

Digital technologies (such as productivity suites, mobile devices, and collaboration platforms) are now an integral part of most workplaces (Cascio & Montealegre, 2016). Implementing such technologies, however, does not guarantee their success (Schallenmueller, 2016), it is essential that individuals adopt and use them as intended for benefits to be realised (Venkatesh et al., 2003). The digital literacy of the

DOI: 10.4018/978-1-7998-7297-9.ch080

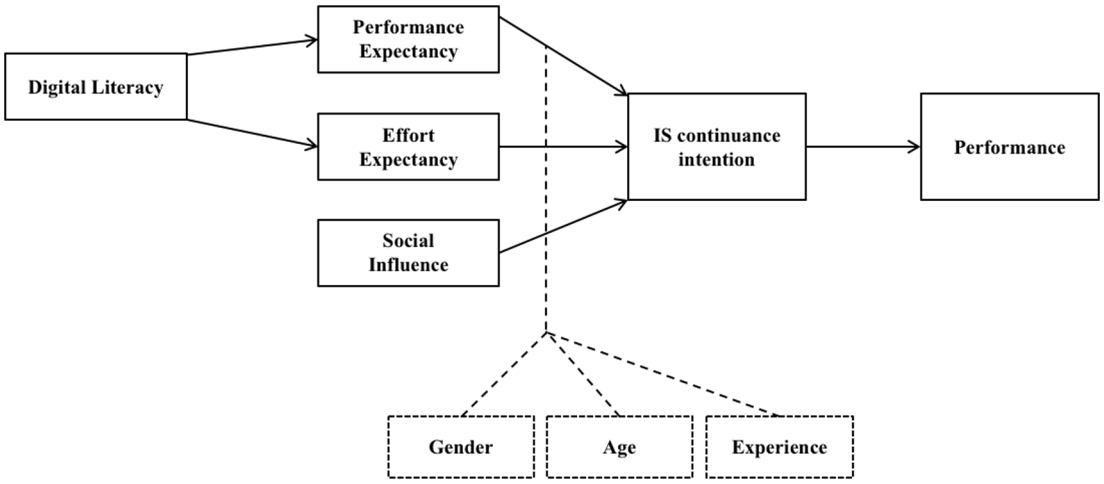
Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

workforce can contribute to this outcome (Mohammadyari and Singh, 2015). While a growing body of literature suggests that employees' digital skills are important to enable both individuals and organisations to make the most of the digital workplace, empirical understanding of their effect on technology adoption and performance is currently limited.

The present study investigates the effect of digital literacy on behavioural intention to continue using the digital workplace and, ultimately, on individual performance. Data was gathered from the workforce of a major UK charitable organisation. A new conceptual model was developed (see Figure 1) and the pathways within it assessed. It takes as its base model the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al., 2003), adapting it using measures of information systems (IS) continuance intention and individual performance (Bhattacherjee, 2001), as well as including digital literacy (Van Deursen, Helsper and Eynon, 2016) as a new antecedent.

Figure 1. Conceptual Model



Findings have the potential to advance current understanding of technology acceptance in the workplace. Greater understanding of the relationship between digital literacy and digital workplace acceptance may also have important implications for organisations and the design of interventions to help employees make optimal use of digital tools at work.

BACKGROUND

Prior Research on the Digital Workplace

The workplace, and the way that we work within it, has been fundamentally reshaped by technology in the last 30 years, a process that is continuing and gathering pace (Cascio, 2014; Cascio and Montealegre, 2016). The growing consumerisation of technology has seen the migration of new capabilities, such as social platforms and mobile devices, from the consumer market into the workplace (Harris, Ives and Junglas, 2012; Loose, Weeger and Gewald, 2013). In his seminal 2006 paper, McAfee coined the term

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

'Enterprise 2.0' to describe the new wave of social and collaborative technology inside of organisations, pointing out their potential to better facilitate knowledge work where legacy knowledge management systems had largely failed. Writing a decade on from McAfee's paper, Schallenmueller (2016) notes the deep impact that such technologies, as part of an extended range of information technology capabilities in enterprises, have had on the workplace. Mobile, big data, cloud computing and search-based applications have been, and continue to be, particularly significant in this respect (White, 2012).

While the term 'digital workplace' has been in use since around the turn of the century (e.g. Beir, 2000; Benson, Johnson and Kuchinke, 2002) it has become increasingly popular in a business context in the 2010s as a way of describing the broad set of connected technologies that employees use on a daily basis to do their jobs. This is evidenced, for example, by Gartner's publication of an inaugural 'Hype Cycle for Digital Workplace' (Cain, Austin and Gotta, 2014), as well as the launch of specific digital workplace offerings by major consultancies (e.g. Avanade, 2014; Deloitte, 2014,).

The digital workplace is an integrative concept that reaches across enterprise tools and, in one definition, has been described as: "The aggregated set of technology services that enable us to do our work, including: intranets, unified communication, microblogging, HR systems, email, mobile applications, collaborative spaces, supply chain and customer relationship management systems." (Miller and Marsh 2014 as quoted in Wiggins, 2015, p. 607). Among these technologies, the intranet is sometimes viewed as a "precursor to" (White, 2012, p. 208), "front door to" (McConnell 2011), or "core component of" (Miller and Marsh, 2014, p. 78) the digital workplace, descriptions which highlight its potential to act as an integration point for all of the digital tools that employees' need.

Dery, Sebastian and Van der Meulen (2017) take a different approach to describing the digital workplace, highlighting its relation to the digital, physical and cultural aspects of designing work in complex, dynamic organisations that help to streamline the way in which work happens. This speaks to the need to focus not only on the technologies of the emerging digital workplace, but also to fundamentally redesign work for the digital age (Colbert, Yee and George, 2016), enable advances in the people, collaborative and contextual aspects of knowledge management (Hobert, 2015), develop a culture that is conducive to digital work (Oxford Economics, 2017), and help employees develop the new behaviours and competencies that working in such a way demands of them (Kiron et al., 2016).

Organisations are making large investments in digital workplace technologies, as indicated by the anticipated market size of digital workplace transformation which, in one estimate, is expected to grow to USD 18.06 billion by 2021 (Markets and Markets, 2017). Expected benefits resulting from such investments include: employee productivity and satisfaction, talent attraction, accelerated innovation and increased revenue (Avanade, 2014; Deloitte, 2014). However, simply installing the technology is not enough to guarantee that such technologies will be successful (Schallenmueller, 2016), as the mixed results of technology implementations in the field of knowledge management have demonstrated (e.g. Schmidl et al., 2011, Coakes, Amar and Granados, 2013). Organisations need to invest not only in the technologies, but also in the people and skills that enable the workforce to use them optimally (Oxford Economics 2017), thereby enabling 'digital dexterity', or the ability for the organisation as a whole to move swiftly to exploit new digital opportunities (Soule et al., 2016).

In a literature review of digital workplace research, Köffer (2015) notes that there is, as yet, no particular academic research stream for the digital workplace as an integrated concept, although the associated technologies have received extensive attention individually. The recent publication of an edited book 'The New Digital Workplace: How New Technologies Revolutionise Work' (Marks et al. 2017) may signal that academic interest in this field is growing and that such a dedicated research stream is indeed

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

now emerging. In addition, Cascio and Montealgre (2016) underline the importance, for occupational psychologists in particular, of investigating and understanding how technology is impacting on work and organisations.

Prior Research on Technology Acceptance and Continuance

Information systems research reaches back to the 1950s and covers a range of issues such as decision support, human-computer interaction and the value of information (Banker and Kauffman, 2004). Relatively early on in its development, user acceptance of technology was identified as one of its most challenging issues (Swanson, 1988, cited in Davis, Bagozzi and Warshaw, 1989, p. 982) and is today considered one of its most mature research streams (Venkatesh, Davis and Morris, 2007). It focuses on users' willingness, or lack thereof, to use information technology in the way it is intended in order to enable tasks (Dillon and Morris, 1996). Insights from this research stream are important for organisations as expected benefits from technology investments may not be realised if such systems are not adopted by users (Sharma and Mishra, 2014).

As early as the 1970s, researchers seeking to understand acceptance behaviour among technology users recognised the need to go beyond the technology itself to gain an understanding of user attitudes and perceptions towards it (Banker and Kauffman, 2004). Drawing on psychological theories such as the Theory of Reasoned Action (Ajzen and Fishbein, 1975), Self-Efficacy Theory (Bandura, 1982), the Theory of Interpersonal Behaviour (Triandis, 1977), and the Theory of Planned Behaviour (Ajzen, 1985), a range of models have been developed to understand user acceptance. These approaches seek to predict technology usage by focusing on the human decision-making processes that cause a user to either accept or resist a new technology (Dillon and Morris, 1996).

The proliferation of technology acceptance models led Venkatesh and colleagues (2003) to propose a new, unified view of user acceptance using Ajzen's (1985) Theory of Planned Behaviour as their conceptual framework. They integrated elements from eight prominent models, the most robust and widely used of these being the Technology Adoption Model (TAM; Davis, 1989) which predicts behavioural intention based on the constructs of perceived usefulness and perceived ease of use (Sharma and Mishra, 2014).

The resulting Unified Theory of Acceptance and Use of Technology (UTAUT), for which the authors found strong empirical support, incorporates three direct determinants of intention to use technology (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behaviour (intention and facilitating conditions). Effort expectancy and performance expectancy have been defined respectively as the extent to which an individual believes that system use will be easy and lead to job performance gains (Venkatesh et al., 2003, pp. 447-450). Both constructs build on those used in the original TAM. The other determinant of intention to use technology, social influence, draws on a later extension of the TAM (Venkatesh and Davis, 2000) and relates to an individual's perception of whether important others believe he or she should engage with and use the system.

The researchers also identified that experience, voluntariness of use, gender and age were significant moderating factors, although as they themselves acknowledged, gender and age may have less impact as a younger cohort of employees progressively enters the workplace. Venkatesh, Thong and Xu (2016) express disappointment that so few UTAUT studies have included these moderating factors as this weakens the ability to understand the generalizability of the model.

The extensive UTAUT literature that has developed in the last 15 years has not only replicated the model but also sought to extend it, both through using it in conjunction with other theories and models,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and also by exploring the potential antecedents of its general determinants (Venkatesh, Thong and Xu, 2016). Chan et al. (2011) suggest that such extensions offer a valuable way of applying the model in different contexts as well as helping to identify interventions that will increase acceptance within them.

One of the reasons that the UTAUT has been used in conjunction with other theories is to understand technology use beyond initial acceptance (Venkatesh, Thong and Xu, 2016). A number of studies (e.g. Miltgen, Popovi and Oliveira, 2013; Sun et al., 2014) have taken this approach using, for example, Rogers' (1962) Diffusion of Innovations theory to understand how technology spreads throughout the user population, and Bhattacherjee's (2001) IS Continuance Model to understand users' intentions to continue using technology over time.

A review by Venkatesh, Thong and Xu (2016) highlights the range of technologies and contexts in which the UTAUT has been used, including: citizens' use of e-government services (Chan et al., 2014), physicians' use of digital systems in a hospital (Chang et al., 2007), customers' use of mobile banking (Oliveira et al. 2014), and employees' use of an e-learning system in the workplace (Sarabadani, Jafarzadeh and ShamiZanjani, 2017). It is interesting to note that although none of the studies they highlight specifically explore the digital workplace as an integrative concept, the UTAUT has been used to investigate some of its component technologies. These include: workplace e-learning (Yoo, Han and Huang, 2012), Enterprise 2.0 applications (Wang et al. 2014), desktop applications (Al-Gahtani, Hubona and Wang, 2007), a knowledge management system (Bourdon and Ollet-Haudebert, 2009), and BYOD ('Bring Your Own Device'; Loose, Weeger and Gewald, 2013).

UTAUT studies have also investigated a range of antecedents to the general determinants of behavioural intention to use technology (Venkatesh, Thong and Xu, 2016). These include: computer self-efficacy (Chiu and Wang, 2008), organisational culture (Ciganek, Mao and Srite, 2010), perceived threats (Loose, Weeger and Gewald, 2013), intrinsic motivation (Yoo, Han and Huang, 2012), and perceived innovativeness with IT (Wang et al., 2014). The inclusion of digital literacy as an antecedent to the general determinants represents a novel extension of the UTAUT (Mohammadyari and Singh, 2015).

In their UTAUT study of e-learning technology, Mohammadyari and Singh (2015) use the model in conjunction with the IS Continuance Model (Bhattacherjee, 2001) as well as extending it by including a measure of digital literacy (Hargittai, 2005). The authors found that digital literacy had a direct positive impact on both effort expectancy and performance expectancy, and the latter significantly impacted on continuance intentions and individual performance. Based on their findings, the authors argue that digital literacy facilitates e-learning use and its ultimate impact on individual performance, validating the significant investments that many organisations are making in this technology.

Prior Research on Digital Literacy

The term 'digital literacy' was first used in the 1990s (e.g. Gilster, 1997; Lanham, 1995), although work to extend the notion of 'literacy' for an increasingly technological age stretches back to the 1960s (Belshaw, 2011). In the intervening years, visual literacy, computer literacy, and information literacy attracted a great deal of research interest and a substantial body of literature had developed by the time the concept of digital literacy was introduced (Chinien and Boutien, 2011; Martin and Grudziecki, 2006). In the present, research on digital literacy sits alongside and sometimes overlaps with that on new media literacy, e-literacy, e-skills, digital skills, ICT literacy, digital competence, technological literacy and information literacy (Chinien and Boutien, 2011; Covello, 2010; Van Laar et al., 2017) meaning that this is far from being a simple or unitary field (Belshaw, 2011).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

An early conceptualisation of digital literacy by Gilster (1997, p. 17) as "being about ideas, not keystrokes" remains popular and relevant to the present, perhaps because it implies a much broader set of skills than just being able to operate a computer (Eshet, 2012). Underlining the breadth of the concept, Gilster (1997, p. 33) further elaborated his definition of digital literacy as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers.". Reflecting on this early definition nearly a decade later, Bawden (2008) points out that digital literacy continues to be an integrative concept that relates to an extended range of skills and abilities.

Indeed, some researchers argue that it is more appropriate to talk about 'digital literacies' in the plural in order to encompass the wide range of skills, competencies and practices involved (e.g. Jones and Hafner, 2012; Lankshear and Knobel, 2008). For others, digital literacy is, itself, just one dimension of the wider concept of new or twenty-first century literacies or multiliteracies that aim to cover an all-encompassing set of practices related to living in a global, technological society (e.g. Leu et al., 2009). The digital literacy concept is likely to remain fluid as technologies continue to change (Chinien and Boutien, 2011), indeed Covello (2010) remarks on how much it has already changed with the emergence of Web 2.0 (i.e. the social, collaborative web).

Given the multiplicity of definitions of digital literacy, accounts and models also abound (Belshaw, 2011). These tend to range in breadth from a relatively narrow focus on technical skills and competencies ("mastering keystrokes" in Gilster's phrase) through to a broad focus on ideas, social practices and mind-sets (Gilster's "mastering ideas"). Martin and Grudziecki (2006, p. 255), defining digital literacy as part of the DigEULit project, encapsulate the latter view:

Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process.

The definition is underpinned by a layered model which depicts technology users as advancing through three stages: digital competence (in which a range of skills are gained), digital usage (in which these skills are used in an applied setting), and finally digital transformation (in which the application of skills leads to innovation and creativity).

Later work emanating from the European Commission, known as DIGCOMP, further elucidates the components of digital competence and shows how it applies in different contexts such as leisure, education, society and work (Kluzer and Pujol Priego, 2018), thus demonstrating the important point that digital literacies can only really be understood when contextually situated (Lankshear and Knobel, 2008). DIGCOMP takes a broad view, going beyond device or software use to encompass the use of digital technology in a critical, collaborative and creative way. As such it identifies twenty-one competences (e.g. managing digital identity, protecting health and well-being, identifying digital competence gaps) that are organised into five areas (information and data literacy, communication and collaboration, digital content creation, safety, and problem solving) and assessed across eight levels of proficiency.

Eshet (2004, 2012), also taking a broad view of digital literacy, provides a skills-based theoretical framework to understand the wide and complex range of abilities that it involves. In a 2012 revision to his original model, Eshet sets out six skills that he argues constitute digital literacy: photo-visual, reproduction, branching, information, socio-emotional and real-time digital skills. This is a view that acknowledges that digital literacy involves a complex range of cognitive, technical and social-emotional

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

skills, a view set out in detail by Ng (2012a), who emphasizes critical literacy (i.e. evaluating motivations behind content) as being at the centre of all these skills.

Although theoretical research into digital literacy is abundant, many of the available assessments are inadequate, focusing too narrowly on technical skills (Calvani et al., 2008). Covello (2010), in a review of digital literacy assessment instruments, points out that the fragmented nature of digital literacy research as well as its overlap with other related domains make it difficult to select a suitable instrument. He argues that an understanding of the underlying definition and concept, as well as how it is evolving based on new technologies, is essential to making such a selection. This is particularly important as instruments may be labelled with a number of related terms such as ICT literacy (Martin and Grudziecki, 2006), digital competence (Calvani, Fini and Ranieri, 2009), and internet skills (Van Deursen, Helsper and Eynon, 2016).

In developing a new measurement tool for digital literacy, Van Deursen, Helsper and Eynon (2016) acknowledge a number of shortcomings of previous measures (e.g. Hargittai, 2005; Van Deursen, Van Dijk and Peters, 2012) such as only focusing on technical skills and not reflecting recent changes to technology (e.g. social and mobile developments). The authors propose a new measure, the Internet Skills Scale (ISS), which is based on a broad conceptualization of digital literacy that goes beyond just technical competencies to encompass social, critical and creative skills.

Their framework consists of five types of internet skills: operational, information navigation, social, creative and mobile. It is specifically designed, according to the authors, to retain relevancy as new and novel platforms and applications appear, although they acknowledge that the scale will need further development in areas such as information seeking and mobile skills as technologies continue to evolve. Van Deursen, Helsper and Eynon (2016) argue that the skills covered in their measure are a prerequisite for engagement with digital technologies and Van Laar et al. (2017), building on their work, argue that they are essential for people to be successful in the workplace.

Digital skills have been highlighted among the elements required for employees to operate effectively in the digital workplace (Briggs and Makice, 2012; Kiron et al., 2016; Soule et al., 2016), with employees potentially losing nearly 8 percent of productive time due to poor IT resources or inadequate digital skills (Van Deursen and Van Dijk, 2012). A high level of digital literacy, on the other hand, can help to reduce cognitive load for individuals when using technology, thereby freeing them to focus on the task at hand (Ng, 2012b). It can also enable them to quickly and conveniently access information, collaborate with others, and share knowledge (Kasemsap, 2018).

In addition, digital skills can aid inclusion and well-being in the workplace (Collard et al., 2017) as well as the management of social relationships and identities in a virtual workplace (Jones and Hafner 2012). In fact, digital literacy is seen as essential for the modern workforce (Briggs and Makice, 2012) and is thought to be one of the top ten workplace skills for future organisations (Senter and McClelland 2015).

A lack of such skills among the workforce can reduce the organisation's ability to benefit from digital workplace technologies and participate fully in the knowledge economy (Jones and Hafner, 2012; Kiron et al., 2016; Mitrovic, 2010). The House of Commons (2016) reports that almost 50 percent of UK employers have a digital skills gap in their business and that this gap is costing the UK economy an estimated GBP 63 billion a year in lost additional GDP.

Despite evidence of the importance of digital skills at both an organisational and individual level for positive digital workplace outcomes, there is a lack of empirical studies investigating the digital skills needed by the workforce as a whole (rather than just ICT specialists) potentially compromising organisations' adaptive capacity in the face of fast evolving technologies (Chinien and Boutien, 2011).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In addition, there is limited research examining the impact of digital skills on technology acceptance and continuance (Mohammadyari and Singh, 2015).

MAIN FOCUS OF THE ARTICLE

A substantial body of literature has demonstrated that users' attitudes and perceptions towards a technology significantly impact on their behavioural intentions to use it (e.g. Venkatesh, Thong and Xu, 2016). This literature has explored a range of antecedents to the general determinants in the UTAUT model, however research on the impact of digital literacy on technology acceptance and continuance is as yet immature. The literature has also explored acceptance for a range of different technologies, however this does not yet encompass the digital workplace as an integrative concept. In addition, the digital workplace research stream itself is emergent, with only a small body of dedicated literature to date.

A new conceptual model was developed (see Figure 1) and the pathways within it assessed. Given that prior research has indicated the potential importance of digital literacy for effective adoption and use of technology, it is expected that similar associations will be found in the current sample. It is anticipated that digital literacy will be positively associated with higher performance expectancy and effort expectancy, and that these measures will in turn be positively associated with users' continuance intentions and individual performance. Social influence is also expected to be positively linked to continuance intentions as per prior studies. Prior research on technology acceptance has also suggested that the control variables of age, gender and experience may mediate these associations, and it is therefore expected that such effects may be identified in the present study. In summary, the research hypotheses are:

- Digital literacy will be positively associated with both higher performance expectancy and higher effort expectancy.
- Performance expectancy, effort expectancy and social influence will be positively associated with users' digital workplace continuance intentions.
- Users' digital workplace continuance intentions will be positively associated with individual performance.
- The control variables of age, gender and experience will mediate the hypothesised associations.

METHOD

Participants and Procedure

Participants for this study (N = 142) were recruited using opportunity sampling from among the employees of a major UK charitable organisation headquartered in London. 119 females (83.8 per cent) and 23 males (16.2 per cent) participated in the study. Their ages ranged from 22 to 68 years (M=38.36, SD=11.15) and their length of tenure ranged from 1 to 32 years (M=5.33, SD=6.57).

The study was reviewed by the School of Psychological, Social and Behavioural Sciences, and approved by the University Research Ethics Committee at Coventry University. A gatekeeper email was sent, and approval given, in order to gain access to participants in the organisation. Employees at the organisation were invited to complete an online survey (run using Bristol Online Surveys) available via

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

its intranet. Participation was on a voluntary basis and the survey took around 10 minutes to complete. Participants were provided with a Participant Information Sheet prior to completing a Survey Consent Statement and commencing the survey, as well as a Debrief page immediately following completion. A paper version of the survey was also prepared but not used as sufficient responses were forthcoming via the online method.

Measures

Participants completed a questionnaire with items relating to digital literacy, the determinants of behavioural intention to use technology, continuance intention, and individual performance. The technology under investigation was the intranet as the "front door" (McConnell, 2011) to the organisation's evolving digital workplace. In addition, participants responded to questions about their age (in years), gender, and length of tenure (in years). Voluntariness of use was not measured as use of the technology in question was mandated for all employees. Descriptive statistics for all core measures in this study are presented in Table 1 in the Results section.

Digital Literacy

Participants' digital literacy was measured using the Internet Skills Scale (ISS; Van Deursen, Helsper and Eynon, 2016). The scale comprises 23 items assessing five types of internet skills: operational (e.g. 'I know how to open downloaded files'), information navigation (e.g. 'I find it hard to find a website I visited before'), social (e.g. 'I know which information I should and shouldn't share online'), creative (e.g. 'I know how to create something new from existing online images, music or video'), and mobile (e.g. 'I know how to install apps on a mobile device'). A Likert scale was used for the response format, with respondents requested to rate their skills for each item on a scale of 1 (not at all true of me) to 5 (very true of me). 5 items required reverse scoring. While both short and long versions of the ISS are available, the short version was deemed suitable for the present study as no analysis of the individual types of internet skills was involved. Van Deursen, Helsper and Eynon's (2016) study suggests that the ISS framework is a reliable measure (CR > .70) with a robust theoretical foundation. In the present study, the Cronbach's alpha was .86.

Determinants of Behavioural Intention to Use Technology

Determinants of participants' behavioural intention were measured using a number of constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al., 2003). 12 scale items from the UTAUT were included in the questionnaire to assess the three direct determinants of behavioural intention: performance expectancy (e.g. 'I find the intranet useful in doing my job'), effort expectancy (e.g. 'I find the intranet easy to use'), and social influence (e.g. 'People who influence my behavior think that I should use the intranet'). A Likert scale was used for the response format, with respondents requested to rate each item on a scale of 1 (strongly disagree) to 5 (strongly agree). Minor wording changes were made in order to (a) replace the generic word 'system' with 'intranet', and (b) modify the tense of the statements to reflect that the system being studied is already in use (e.g. 'I find the intranet easy to use' instead of 'I would find the intranet easy to use'). Venkatesh et al. (2003) found

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

that reliability across all elements in the UTAUT was acceptable (CR > .70). In the present study, the Cronbach's alpha for the determinants used was .88.

IS Continuance Intention and Individual Performance

Participants' intentions to continue using the intranet and anticipated individual performance as a result of doing so were measured using constructs from Bhattacherjee's (2001) Information Systems Continuance model (ISCM). 7 scale items from the ISCM were included in the questionnaire to assess IS continuance intention (e.g. 'If I could, I would like to discontinue my use of the intranet') and Perceived Usefulness (e.g. 'Using the intranet improves my performance in doing my job'). A Likert scale was used for the response format, with respondents requested to rate each item on a scale of 1 (strongly disagree) to 5 (strongly agree). Minor wording changes were made to replace the generic word 'system' with 'intranet'. One item required reverse scoring. Bhattacherjee (2001) found that reliability across all elements of the ISCM was acceptable (CR > .80). In the present study, the Cronbach's alpha for the constructs used was .90.

RESULTS

The model was analysed in IBM SPSS Statistics (Version 24) using linear regression.

Descriptive Statistics

Table 1 shows means and standard deviations for all variables. It also shows skewness and kurtosis z-scores for the constructs. Mild violations of normality were found in some of them. As there were no compelling reasons not to transform the data (Tabachnick and Fidell, 2014) transformations were attempted and were found to be successful in the case of Digital Literacy and IS Continuance Intention. Following these transformations, all measures had skew and kurtosis z-scores within ± 1.96 (Field, 2009) and standardised z-scores within ± 3.29 (Tabachnick and Fidell, 2014). These indicators, along with visual exploration of the graphs (Field, 2009), suggested that the data were broadly normal and acceptable for parametric analyses.

Bivariate Correlation Analyses

The relationships between the variables were investigated using Pearson product-moment correlation coefficient following preliminary analyses to ensure no violation of the assumptions of normality, linearity and homoscedasticity. Bivariate correlations between all variables are presented in Table 2.

The relationships between Digital Literacy (as measured by the ISS) and both Performance Expectancy and Effort Expectancy (as measured by the UTAUT) were investigated. There was a moderate, positive correlation between Digital Literacy and Effort Expectancy ($r = .32$, $n = 142$, $p < .001$) with high levels of digital literacy associated with high effort expectancy (i.e. a high degree of ease is associated with use of the intranet). There was no correlation found between Digital Literacy and Performance Expectancy ($r = -.01$, $n = 142$, $p = .90$).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Summary statistics for modelled variables

	Mean	SD	Skewness (z-score)	Kurtosis (z-score)
Age	38.36	11.15	-	-
Gender	1.84	0.37	-	-
Tenure	5.33	6.57	-	-
Digital Literacy	93.80	11.80	-2.99	.39
Performance Expectancy	12.46	3.23	-.99	.39
Effort Expectancy	14.85	3.20	-1.91	1.05
Social Influence	11.72	2.89	-1.46	1.20
IS Continuance Intention	11.23	2.03	-3.84	4.55
Perceived Usefulness	12.82	3.81	-1.26	-1.12

Notes. Age and Tenure were measured in years. Digital Literacy was scored from 1 to 115; Performance Expectancy, Effort Expectancy, Social Influence and Perceived Usefulness were scored from 1 to 20; IS Continuance Intention was scored from 1 to 15; higher scores correspond to higher levels of the construct in all cases. Z-scores (prior to noted transformations) are presented for skewness and kurtosis.

Table 2. Bivariate correlations between modelled variables

	1	2	3	4	5	6	7	8
1. Age								
2. Gender	-.09							
3. Tenure	.45**	-.04						
4. DL	-.13	-.13	-.18*					
5. PE	-.06	.11	.11	-.01				
6. EE	-.19*	-.06	-.05	.32**	.48**			
7. SI	-.12	-.03	.01	-.05	.55**	.33**		
8. CI	-.18*	.09	.02	.03	.60**	.45**	.41**	
9. PU	-.02	.06	.04	-.04	.84**	.49**	.57**	.63**

Notes. DL Digital Literacy, *PE* Performance Expectancy, *EE* Effort Expectancy, *SI* Social Influence, *CI* IS Continuance Intention, *PU* Perceived Usefulness. * $p < .05$, ** $p < .001$.

The relationships between the determinants of behavioural intentions (Performance Expectancy, Effort Expectancy, and Social Influence; as measured by the UTAUT) and IS Continuance Intention (as measured by the ISCM) were investigated. There was a strong, positive correlation between Performance Expectancy and IS Continuance intention ($r = .60$, $n = 142$, $p < .001$). These results indicate that high levels of Performance Expectancy (i.e. using the intranet is expected to help improve job performance) are associated with high intentions to continue using the intranet. There was a moderate, positive correlation between Effort Expectancy and IS Continuance Intention ($r = .45$, $n = 142$, $p < .001$) and between Social Influence and Continuance Intention ($r = .41$, $n = 142$, $p < .001$).

The relationship between Continuance Intention and Perceived Usefulness (both as measured by the ISCM) was investigated. There was a strong, positive correlation between IS Continuance Intention and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Perceived Usefulness ($r = .63$, $n = 142$, $p < .001$) with high intentions to continue using the intranet associated with higher expected performance.

Although there were weak, negative correlations between age and effort expectancy ($r = -.19$, $n = 142$, $p < .05$), as well as tenure and digital literacy ($r = -.18$, $n = 142$, $p < .05$), no other significant correlations were found between the control variables and constructs.

Given that correlations between the control variables (age, gender and experience) and the constructs were either non-significant or very small, they were excluded from the conceptual model with results from the linear regression analyses that is depicted in Figure 2.

Regression Analyses

Linear regression was used to explore the paths in the model. Results are presented in Figure 2. Preliminary analyses were conducted to ensure no violations of the assumptions of normality, linearity and homoscedasticity (as well as multicollinearity, in the case of the multiple regression analysis).

Simple linear regression analyses were used to assess the ability of Digital Literacy to predict users' levels of Performance Expectancy and Effort Expectancy when using the intranet. It was found that Digital Literacy made a statistically significant contribution to Effort Expectancy (beta = .32, $t(140) = 3.96$, $p < .001$) explaining 10%, $F(1, 140) = 15.65$, $p < .001$), of the variance in the dependent variable. However, Digital Literacy did not make a statistically significant contribution to Performance Expectancy (beta = -.01, $t(140) = .13$, $p = .90$).

Multiple regression was used to assess the ability of the three determinants of behavioural intention (Performance Expectancy, Effort Expectancy, and Social Influence) to predict users' intentions to continue using the intranet as measured by IS Continuance Intention. The total variance in IS Continuance Intention explained by the model as a whole was 39.9%, $F(3, 138) = 30.56$, $p < .001$. Performance Expectancy (beta = .46, $t(138) = 5.35$, $p < .001$) and Effort Expectancy (beta = .20, $t(138) = 2.62$, $p < .05$) made statistically significant unique contributions to explaining IS Continuance Intention. Social Influence did not make a statistically significant contribution (beta = .09, $t(138) = 1.14$, $p = .26$).

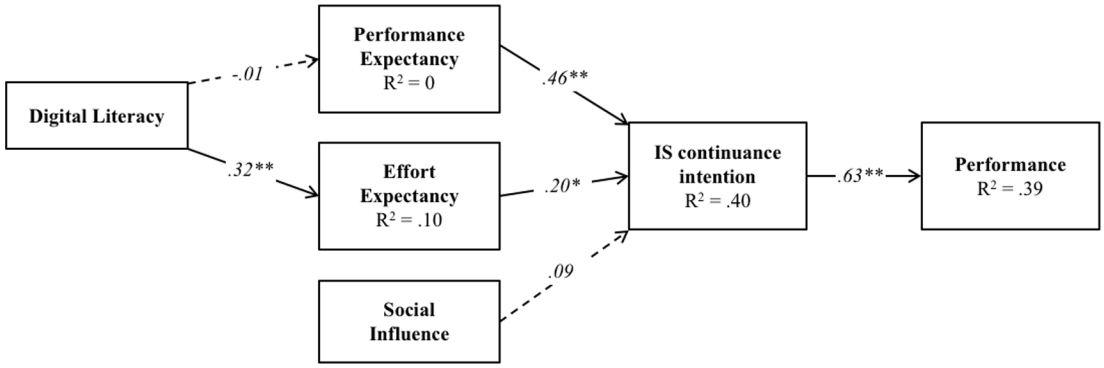
Simple linear regression was used to assess the ability of Continuance Intention to predict users' expected performance (as measured by Perceived Usefulness) when using the Intranet. The total variance explained by the model was 39.1%, ($F(1, 140) = 89.91$, $p < .001$). Users' intention to continue using the intranet made a statistically significant contribution to Perceived Usefulness (beta = .63, $t(140) = 9.48$, $p < .001$).

DISCUSSION

Drawing on prior research on the digital workplace, technology acceptance, and digital literacy, the present study set out to investigate the relationships between digital literacy, digital workplace continuance intentions and individual performance. A conceptual model was developed, and pathways therein were tested using a series of linear regression analyses. The conceptual model, which was adapted from the UTAUT (Venkatesh et al., 2003), was partially supported. Findings revealed that digital literacy is positively associated with higher effort expectancy. However, no relationship was found between digital literacy and performance expectancy. Both performance expectancy and effort expectancy positively predicted behavioural intention to continue using the digital workplace. Social influence, however, was

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

*Figure 2. Linear regression results for the conceptual model. Notes. Non-significant paths are represented by dashed lines. * p < .05, ** p < .001*



not found to be predictive of continuance intention. As expected, continuance intention positively predicted performance. Key findings are discussed below.

Employees' digital literacy was significantly positively associated with effort expectancy. In other words, higher levels of digital literacy mean that employees are more likely to perceive the intranet as easy to use. This supports the conceptual positioning of digital literacy as an element that can help employees to operate effectively in the digital workplace (e.g. Kiron et al., 2016). It is likely that this occurred because digitally literate employees are better able to focus on tasks due to reduced cognitive load when using technology (Ng, 2012b), as well as easily and speedily carrying out common digital workplace tasks, such as accessing and sharing information (Kasemsap, 2018).

Despite indications in the literature (e.g. Kiron et al., 2016; Van Deursen and Van Dijk, 2012), no association between digital literacy and performance expectancy was found in the present study. In other words, employees' digital literacy did not impact on their perceptions of how useful the intranet would be to do their job, accomplish tasks, be productive, or get a raise. Mohammadyari and Singh (2015) found a significant positive association between digital literacy and performance expectancy, although it was considerably weaker than the association with effort expectancy. They highlight the relevance of Brown, Dennis and Venkatesh's (2010) study on collaboration technology use, in which the authors found that computer self-efficacy (i.e. individuals' beliefs about their ability to use technology effectively) was positively associated with effort but not performance expectancy. Insights from their study indicate a possible explanation for the lack of association between digital literacy and performance expectancy in the present one: as with the collaboration technologies they investigate, intranets are familiar, frequently-used tools inside most organisations and therefore additional digital skills may not significantly add to their usefulness for employees accessing them regularly to perform repeated tasks.

Together, the amount of variance in behavioural intention predicted by the determinants (performance expectancy, effort expectancy and social influence) in the present study (40%) is very similar to that found by Dwivedi et al. (2011) in their meta-analysis of 43 UTAUT studies (39%). Both performance expectancy and effort expectancy were found to predict continuance intentions, a finding that is consistent with other comparable adaptions of the UTAUT (e.g. Sun et al., 2014). In light of the literature, it is unsurprising that employees who perceive the intranet as useful and easy to use are likely to want to continue using it. Performance expectancy had a stronger effect than effort expectancy on continuance intentions. Again, this is in line with prior studies in which performance expectancy was consistently

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

found to be the strongest predictor of technology acceptance (e.g. Davis, Bagozzi and Warshaw, 1989). The weaker effect of effort expectancy on continuance intentions may also be explained by it being thought to be more salient in the initial stages of adoption (e.g. Venkatesh et al., 2003) when users may face a steep learning curve before they become comfortable with the system.

In a finding that was contrary to expectations, social influence was not found to make a significant unique contribution to continuance intention. This is inconsistent with the technology acceptance literature, particularly in a mandatory use setting (e.g. Venkatesh et al., 2003). This may have occurred because social influence is less salient in a continuance as opposed to initial adoption context. For instance, Venkatesh and Morris (2000) found that after three months using a new system, social influence no longer significantly affected participants' behavioural intentions to use the technology. It is possible that digital workplace continuance is more strongly related to the individual's usage experience (i.e. effort required and performance gains) than normative beliefs (Chan et al., 2010).

In line with Bhattacherjee's (2001) IS Continuance Theory, continuance intention was strongly predictive of individual performance. This finding indicates that employees who intend to continue using the intranet believe that it will improve their performance, increase their productivity and enhance their effectiveness in their job. As per Mohammadyari and Singh (2015) this finding legitimates the large investments that organisations are making in the digital workplace technologies.

Although previous studies (e.g. Venkatesh et al., 2003; Venkatesh and Morris, 2000) have found that age, gender and experience significantly affected behavioural intentions to use technology, this was not supported by the present study. A possible explanation is that, as a younger cohort of employees have entered the workplace, these demographic factors have become less salient, as anticipated by Venkatesh et al. (2003). It may also be due to the wide adoption of intranets in large organisations (Oliveira et al., 2014).

Overall, the present study validated some aspects of the UTAUT model as well as demonstrating the value of including digital literacy in studies of digital workplace adoption. It also contributed new data to the emerging digital workplace research stream and associated need to investigate digital tools in the workplace as an integrative concept.

Practical Implications

Köffer (2015) suggests that practitioners may be able to gain valuable insights from the emerging academic literature on the digital workplace. The present study contributes to these insights by empirically testing the determinants of individuals' behavioural intentions towards using the digital workplace. It also investigated the role of digital literacy as an antecedent to these general determinants. The findings suggest that there is scope for organisations to consider employees' digital literacy as part of wider efforts to encourage effective use of digital tools at work. Supporting employees in improving their digital skills may help to reduce their cognitive load and enable them to more easily perform tasks when using the digital workplace (Kasemsap, 2018; Ng, 2012b). Soule et al. (2016) emphasize that such interventions are critical to support overall organisational digital dexterity across customer experience, operational efficiency, and workforce enablement. In addition, Kiron et al. (2016) suggest that a large proportion of employees expect their organization to help them gain digital skills for work.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Limitations and Future Directions

There are several limitations in the present study that need to be considered when interpreting the results and generalising them to different organisations. First, this study investigated the intranet as the "front door" to an evolving digital workplace, rather than a mature, fully integrated digital workplace (e.g. McConnell, 2011; Miller and Marsh, 2014). This may have implications for the generalisability of the findings to organisations with a higher level of digital dexterity (Soule et al., 2016). Second, the sample was relatively homogenous in terms of gender. This may limit the generalisability of the findings as males and females can exhibit different technology acceptance profiles (e.g. Venkatesh et al., 2003). Third, this study examined digital literacy using a measure of internet skills. Although this measure provided a broad view of the components of digital literacy, it may not cover all of the specific digital skills required in the workplace (e.g. Chinien and Boutien, 2011). Fourth, digital workplace continuance intentions and perceived performance were measured at a single point in time for this study. These measures provide indicators of future behaviour and outcomes but are not the same as measuring actual behaviour and performance in a longitudinal design (e.g. Bhattacherjee, 2001; Venkatesh et al., 2003). Fifth, although the model was able to explain a proportion of the variance in the core criterion variables of continuance intention (40%) and performance (39%), this does suggest that other important factors are involved that were not considered by the present study. Finally, the present analysis, although appropriate in assessing the pathways within the model, was not able to assess model fit.

Several directions for future research are suggested by the findings, implications and limitations of the present study. Future research that investigates digital workplace adoption could be enriched by considering organisations with different levels of digital dexterity (e.g. Soule et al., 2016), actual adoption and performance data, as well as multiple time points in the technology acceptance journey (e.g. Bhattacherjee, 2001; Venkatesh et al., 2003). The conceptual model was based on the UTAUT and some of its pathways were supported by the findings. There may be other adoption models such as Venkatesh, Thong and Xu's (2016) multi-level framework of technology acceptance and use, that could furnish future digital workplace adoption studies with potentially valuable constructs and pathways for further exploration. Such studies could benefit from a digital literacy measure that is specifically designed for the workplace, something on which Chinien and Boutien (2011) and Van Laar et al. (2016) provide useful background insight.

CONCLUSION

The aim of this study was to investigate the relationships between digital literacy, digital workplace continuance and individual performance using data gathered from the workforce of a major UK charitable organisation. It took as its base model the UTAUT and adapted it using measures of digital literacy and continuance intention. Findings partially supported the conceptual model. The results demonstrated the influence of digital literacy on employees' effort expectancy, which in turn influenced their digital workplace continuance intentions and ultimately individual performance. Several findings differed from prior research. In particular, digital literacy was not associated with performance expectancy. The most important implication of this study is to suggest an important role for digital literacy both as an antecedent to the more general determinants of technology adoption, and in organisational interventions designed to encourage digital workplace adoption. For organisations investing in digital workplace technologies,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

consideration should be given to how such interventions can support employees in gaining and applying digital skills to their day-to-day tasks. Findings from the present study suggest avenues for future research into the nature of digital literacy at work and its association with digital workplace adoption and use.

ACKNOWLEDGMENT

The author would like to thank the staff of Coventry University for their support and feedback on this article. The author would also like to acknowledge and thank the participating employees from the UK charitable organisation that got involved in the research. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In J. Kuhl & J. Beckman (Eds.), *Action Control* (pp. 11–39). Berlin, Germany: Springer. doi:10.1007/978-3-642-69746-3_2

Ajzen, I., & Fishbein, M. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. London, UK: Addison-Wesley.

Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information Technology (IT) in Saudi Arabia: Culture and the Acceptance and use of IT. *Information & Management*, *44*(8), 681–691. doi:10.1016/j.im.2007.09.002

Avanade. (2014). *Tailor. Engage. Empower. Work Faster in the Digital Workplace*. Retrieved from https://www.avanade.com/~/media/asset/ebook/avanade-digital-workplace-approach-ebook.pdf

Bandura, A. (1982). Self-Efficacy Mechanism in Human Agency. *The American Psychologist*, *37*(2), 122–147. doi:10.1037/0003-066X.37.2.122

Banker, R. D., & Kauffman, R. J. (2004). 50th Anniversary Article: The Evolution of Research on Information Systems: A Fiftieth-Year Survey of the Literature in Management Science. *Management Science*, *50*(3), 281–298. doi:10.1287/mnsc.1040.0206

Bawden, D. (2008). Origins and Concepts of Digital Literacy. In C. Lankshear & M. Knobel (Eds.), *Digital Literacies: Concepts, Policies, and Practices* (pp. 17–32). New York: Peter Lang.

Beir, J. (2000). The Digital Workplace. *VARbusiness*, *16*(16), 40–40.

Belshaw, D. (2012). *What is 'Digital Literacy'? A Pragmatic Investigation.* Unpublished doctoral dissertation, Durham University, Durham.

Benson, A. D., Johnson, S. D., & Kuchinke, K. P. (2002). The use of Technology in the Digital Workplace: A Framework for Human Resource Development. *Advances in Developing Human Resources*, *4*(4), 392–404. doi:10.1177/152342202237518

Bhattacherjee, A. (2001). Understanding Information Systems Continuance: An Expectation-Confirmation Model. *Management Information Systems Quarterly*, *25*(3), 351–370. doi:10.2307/3250921

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bourdon, I., & Ollet-Haudebert, S. (2009). Towards an Understanding of Knowledge Management Systems - UTAUT Revisited. In K.E. Kendall, & U. Varshney (Eds.), *15th Americas Conference on Information Systems*, San Francisco, CA, August 6-9. Atlanta, GA: Association for Information Systems.

Briggs, C., & Makice, K. (2012). *Digital Fluency: Building Success in the Digital Age*. Bloomington, IN: SociaLens.

Brown, S. A., Dennis, A. R., & Venkatesh, V. (2010). Predicting Collaboration Technology use: Integrating Technology Adoption and Collaboration Research. *Journal of Management Information Systems*, *27*(2), 9–54. doi:10.2753/MIS0742-1222270201

Cain, M. W., Austin, T., & Gotta, M. (2014). *Hype Cycle for Digital Workplace*. Stamford, Connecticut: Gartner, Inc.

Calvani, A., Cartelli, A., Fini, A., & Ranieri, M. (2008). Models and Instruments for Assessing Digital Competence at School. *Journal of E-Learning and Knowledge Society*, *4*(3), 183–193.

Calvani, A., Fini, A., & Ranieri, M. (2009). Assessing Digital Competence in Secondary Education. Issues, Models and Instruments. In M. Leaning (Ed.), *Issues in Information and Media Literacy* (Vol. 2, pp. 153–172). Santa Rosa, CA: Informing Science Press.

Cascio, W. F. (2014). Looking Back, Looking Forward: Technology in the Workplace. In M. D. Coovert & L. Foster Thompson (Eds.), *The Psychology of Workplace Technology* (pp. 307–313). New York: Routledge.

Cascio, W. F., & Montealegre, R. (2016). How technology is changing work and organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, *3*(1), 349–375. doi:10.1146/annurev-orgpsych-041015-062352

Chan, F. K., Thong, J. Y., Venkatesh, V., Brown, S. A., Hu, P. J., & Tam, K. Y. (2010). Modeling Citizen Satisfaction with Mandatory Adoption of an e-Government Technology. *Journal of the Association for Information Systems*, *11*(10), 519–549. doi:10.17705/1jais.00239

Chang, I., Hwang, H., Hung, W., & Li, Y. (2007). Physicians' Acceptance of Pharmacokinetics-Based Clinical Decision Support Systems. *Expert Systems with Applications*, *33*(2), 296–303. doi:10.1016/j.eswa.2006.05.001

Chinien, C., & Boutin, F. (2011). *Defining Essential Digital Skills in the Canadian Workplace: Final Report for Human Resources and Skills Development Canada*. Retrieved from http://en.copian.ca/library/research/digi_es_can_workplace/digi_es_can_workplace.pdf

Chiu, C., & Wang, E. T. (2008). Understanding Web-Based Learning Continuance Intention: The Role of Subjective Task Value. *Information & Management*, *45*(3), 194–201. doi:10.1016/j.im.2008.02.003

Ciganek, A. P., Mao, E., & Srite, M. (2010). Organizational Culture for Knowledge Management Systems: A Study of Corporate Users. *Ubiquitous Developments in Knowledge Management: Integrations and Trends*, *4*(1), 52–67. doi:10.4018/978-1-60566-954-0.ch004

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Coakes, E., Amar, A. D., & Granados, M. L. (2013). Success or Failure in Knowledge Management Systems: A Universal Issue. In *International Working Conference on Transfer and Diffusion of IT* (pp. 39-56). Springer. 10.1007/978-3-642-38862-0_3

Colbert, A., Yee, N., & George, G. (2016). The Digital Workforce and the Workplace of the Future. *Academy of Management Journal*, *59*(3), 731–739. doi:10.5465/amj.2016.4003

Collard, A., De Smedt, T., Dufrasne, M., Fastrez, P., Ligurgo, V., Patriarche, G., & Philippette, T. (2017). Digital Media Literacy in the Workplace: A Model Combining Compliance and Inventivity. *Italian Journal of Sociology of Education*, *9*(1), 122–154.

Coolican, H. (2014). *Research Methods and Statistics in Psychology* (6th ed.). Hove, East Sussex: Psychology Press.

Covello, S. (2010). *A Review of Digital Literacy Assessment Instruments. Unpublished front-end analysis research*. Syracuse: Syracuse University.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of use, and User Acceptance of Information Technology. *Management Information Systems Quarterly*, *13*(3), 319–340. doi:10.2307/249008

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982–1003. doi:10.1287/mnsc.35.8.982

Deloitte. (2014). *The Digital Workplace: Think, Share, Do*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/us/Documents/human-capital/us-cons-digital-workplace-and-culture.pdf

Dery, K., Sebastian, I., & Van der Meulen, N. (2017). The Digital Workplace is Key to Digital Innovation. *MIS Quarterly Executive*, *16*(2), 135–152.

Dillon, A., & Morris, M. G. (1996). User Acceptance of New Information Technology: Theories and Models. In M. Williams (Ed.), *Annual Review of Information Science and Technology* (Vol. 31, pp. 3–32). Medford, NJersey: Information Today.

Dwivedi, Y., Rana, N., Chen, H., & Williams, M. (2011). A Meta-Analysis of the Unified Theory of Acceptance and use of Technology (UTAUT). In M. Nüttgens, A. Gadatsch, K. Kautz et al. (Eds.) *IFIP International Working Conference on Governance and Sustainability in Information Systems - Managing the Transfer and Diffusion of IT*, Hamburg, Germany, September 22-24. Springer. 10.1007/978-3-642-24148-2_10

Eshet, Y. (2012). Thinking in the digital era: a revised model for digital literacy. *Issues in Informing Science & Information Technology*, *9*(2), 267–276. doi:10.28945/1621

Eshet-Alkalai, Y. (2004). Digital literacy: a conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia*, *13*(1), 93–106.

Field, A. P. (2009). *Discovering Statistics using SPSS: (and Sex and Drugs and Rock 'n' Roll)* (3rd ed.). Los Angeles: SAGE.

Gilster, P. (1997). *Digital Literacy*. New York: Wiley Computer Publishing.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hargittai, E. (2005). Survey measures of web-oriented digital literacy. *Social Science Computer Review*, *23*(3), 371–379. doi:10.1177/0894439305275911

Harris, J., Ives, B., & Junglas, I. (2012). IT Consumerization: when gadgets turn into enterprise IT tools. *MIS Quarterly Executive*, *11*(3), 99–112.

Hobert, K. (2015). *Revive Knowledge Management with the Digital Workplace*. Stamford, Connecticut: Gartner, Inc.

House of Commons. (2016). House of Commons Science and Technology Committee. Digital Skills Crisis Second Report of the House of Commons Science and Technology Committee (HC 936; Session 2016-17). London: UK Parliament.

Jones, R. H., & Hafner, C. A. (2012). *Understanding Digital Literacies: A Practical Introduction*. Abingdon, Oxfordshire: Routledge.

Kasemsap, K. (2018). Encouraging Digital Literacy and ICT Competency in the Information Age. In M. Khosrow-Pour (Ed.), *Encyclopedia of Information Science and Technology* (4th ed., pp. 2253–2263). Hershey, Pennsylvania: IGI Global. doi:10.4018/978-1-5225-2255-3.ch196

Kiron, D., Kane, G. C., Palmer, D., Phillips, A. N., & Buckley, N. (2016). *Aligning the Organization for its Digital Future* Retrieved from http://pedrotrillo.com/wp-content/uploads/2016/01/58180-MITSMR-Deloitte-Digital-Business-2016.pdf

Kluzer, S., & Pujol Priego, L. (2018). DigComp into Action - Get Inspired, Make it Happen. In Carretero, Y., Punie, R., Vuorikari, M. Cabrera, and O'Keefe, W. (Eds.), JRC Science for Policy Report, EUR 29115 EN, Publications Office of the European Union, Luxembourg.

Köffer, S. (2015). Designing the Digital Workplace of the future–what Scholars Recommend to Practitioners. In *The 36th International Conference on Information Systems (ICIS)*, Fort Worth, Texas, December 13-16.

Lanham, R. A. (1995). Digital Literacy. *Scientific American*, *273*(3), 198–199.

Lankshear, C., & Knobel, M. (2008). Introduction. In C. Lankshear & M. Knobel (Eds.), *Digital Literacies: Concepts, Policies, and Practices* (pp. 17–32). New York: Peter Lang.

Lankshear, C. & Knobel, M. (2015). Digital Literacy and Digital Literacies: Policy, Pedagogy and Research Considerations for Education. *Nordic Journal of Digital Literacy 10*(Jubileumsnummer), 8-20.

Leu, D. J., McVerry, J. G., O'Byrne, W. I., Zawilinski, L., Castek, J., & Hartman, D. K. (2009). The New Literacies of Online Reading Comprehension and the Irony of no Child Left Behind. In L. Mandel Morrow, R. Rueda, & D. Lapp (Eds.), *Handbook of Research on Literacy and Diversity* (pp. 173–194). New York: Guilford Press.

Loose, M., Weeger, A., & Gewald, H. (2013). BYOD – the Next Big Thing in Recruiting? Examining the Determinants of BYOD Service Adoption Behavior from the Perspective of Future Employees. In J. P., Shim, Hwang, Y., and Petter, S. (Eds.) *19th Americas Conference on Information Systems.* held 15-17 2013 at Chicago, Illinois. Atlanta, Georgia: Association for Information Systems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Markets & Markets. (2017). *Workplace Transformation Market Worth 18.06 Billion USD by 2021*. Retrieved from http://www.marketsandmarkets.com/PressReleases/digital-workplace-transformation-service.asp

Marks, A., Briken, K., Chillas, S., & Krzywdzinski, M. (2017). *The New Digital Workplace: How New Technologies Revolutionise Work*. London: Palgrave.

Martin, A., & Grudziecki, J. (2006). DigEuLit: Concepts and Tools for Digital Literacy Development. *Innovation in Teaching and Learning in Information and Computer Sciences*, *5*(4), 1–19.

McAfee, A. P. (2006). Enterprise 2.0: The Dawn of Emergent Collaboration. *MIT Sloan Management Review*, *47*(3), 21–28.

McConnell, J. (2011). *The Digital Workplace, a 10-Year Old Term with New Life*. Retrieved from http://www.netjmc.com/digital-workplace/intranet-digital-workplace-or-workplace-web-or-intranet

Miller, M. P., & Marsh, M. E. (2014). *The Digital Renaissance of Work: Delivering Digital Workplaces Fit for the Future*. London: Gower Publishing.

Miltgen, C. L., Popovič, A., & Oliveira, T. (2013). Determinants of End-User Acceptance of Biometrics: Integrating the "Big 3" of Technology Acceptance with Privacy Context. *Decision Support Systems*, *56*, 103–114. doi:10.1016/j.dss.2013.05.010

Mitrovic, Z. (2010). Positioning e-Skills within an Organisation: An Information Systems Management Viewpoint. *South African Journal of Information Management*, *12*(1), 1–7. doi:10.4102ajim.v12i1.427

Mohammadyari, S., & Singh, H. (2015). Understanding the Effect of e-Learning on Individual Performance: The Role of Digital Literacy. *Computers & Education*, *82*, 11–25. doi:10.1016/j.compedu.2014.10.025

Ng, W. (2012a). *Education in a Competitive and Globalizing World: Empowering Scientific Literacy through Digital Literacy and Multiliteracies*. Hauppauge: Nova Science Publishers.

Ng, W. (2012b). Can we Teach Digital Natives Digital Literacy? *Computers & Education*, *59*(3), 1065–1078. doi:10.1016/j.compedu.2012.04.016

Oliveira, T., Faria, M., Thomas, M. A., & Popovič, A. (2014). Extending the Understanding of Mobile Banking Adoption: When UTAUT Meets TTF and ITM. *International Journal of Information Management*, *34*(5), 689–703. doi:10.1016/j.ijinfomgt.2014.06.004

Osterman, M. D. (2012). Digital literacy: Definition, theoretical framework, and competencies. in Plakhotnik, M. S., Nielsen, S. M., and Pane, D. M. (eds.), *Proceedings of the 11th Annual College of Education & GSN Research Conference*. held 28 April 2012 at Florida International University. Miami: Florida International University, 135-141.

Oxford Economics. (2017). *Building the Digital Workplace: What Comes Next in the Mobile Revolution*. Retrieved from http://www.oxfordeconomics.com/my-oxford/projects/365465

Rogers, E. (1962). Diffusion and Innovation. *The Journal of Consumer Research*, *2*, 290–301. doi:10.1086/208642

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sarabadani, J., Jafarzadeh, H., & ShamiZanjani, M. (2017). Towards understanding the determinants of employees' e-learning adoption in workplace: a unified theory of acceptance and use of technology (UTAUT) view. *International Journal of Enterprise Information Systems*, *13*(1), 38–49. doi:10.4018/IJEIS.2017010103

Schallenmueller, S. (2015). Smart Workplace Technology Buzz. In J. E. Lee (Ed.), *The Impact of ICT on Work* (pp. 127–150). Switzerland: Springer.

Schmidl, J., Slavtchev, V., Wittges, H., & Krcmar, H. (2011). *Knowledge Management Success or Failure - What Determines the Performance of a KM-Initiative?* (pp. 161–169). Wissensmanagement.

Senter, K. Y., & McClelland, A. (2015). Top ten workplace skills for future organizations. *International Journal of Business Research and Management*, *6*(2), 20–32.

Sharma, R., & Mishra, R. (2014). A review of evolution of theories and models of technology adoption. *Indore Management Journal*, *6*(2), 17–29.

Soule, D. L., Puram, A. D., Westerman, G. F., & Bonnet, D. (2016). *Becoming a Digital Organization: The Journey to Digital Dexterity*. Retrieved from https://ssrn.com/abstract=2697688

Sun, Y., Liu, L., Peng, X., Dong, Y., & Barnes, S. J. (2014). Understanding Chinese users' continuance intention toward online social networks: an integrative theoretical model. *Electronic Markets*, *24*(1), 57–66. doi:10.100712525-013-0131-9

Tabachnick, B. G., & Fidell, L. S. (2014). *Using Multivariate Statistics* (6th ed.). Harlow, Essex: Pearson.

Triandis, H. (1977). *Interpersonal Behaviour*. Monterey, California: Brooks/Cole.

Van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2014). *Measuring Digital Skills. from Digital Skills to Tangible Outcomes Project Report*. Retrieved from http://eprints.lse.ac.uk/61807/1/__lse.ac.uk_storage_LIBRARY_Secondary_libfile_shared_repository_Content_Helsper,%20E_Helsper_Tangible%20outcomes_2015.pdf

Van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2016). Development and validation of the internet skills scale (ISS). *Information Communication and Society*, *19*(6), 804–823. doi:10.1080/1369118X.2015.1078834

Van Deursen, A. J. A. M., & Van Dijk, J. A. G. M. (2012). *Ctrl Alt Delete: Lost Productivity due to IT Problems and Inadequate Computer Skills in the Workplace*. Retrieved from http://www.alexandervandeursen.nl/Joomla/Articles/Reports/2012%20-%20CTRL_ALT_DEL_ENG.pdf

Van Deursen, A. J. A. M., Van Dijk, J. A. G. M., & Peters, O. (2012). Proposing a Survey Instrument for Measuring Operational, Formal, Information, and Strategic Internet Skills. *International Journal of Human-Computer Interaction*, *28*(12), 827–837. doi:10.1080/10447318.2012.670086

Van Laar, E., Van Deursen, A. J. A. M., Van Dijk, J. A., & De Haan, J. (2017). The Relation between 21st-Century Skills and Digital Skills: A Systematic Literature Review. *Computers in Human Behavior*, *72*, 577–588. doi:10.1016/j.chb.2017.03.010

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, *46*(2), 186–204. doi:10.1287/mnsc.46.2.186.11926

Venkatesh, V., Davis, F. D., & Morris, M. G. (2007). Dead or alive? the development, trajectory and future of technology adoption research. *Journal of the Association for Information Systems*, *8*(4), 267–286. doi:10.17705/1jais.00120

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *Management Information Systems Quarterly*, *24*(1), 115–139. doi:10.2307/3250981

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: toward a unified view. *Management Information Systems Quarterly*, *27*(3), 425–478. doi:10.2307/30036540

Venkatesh, V., Thong, J. Y., & Xu, X. (2016). Unified theory of acceptance and use of technology: a synthesis and the road ahead. *Journal of the Association for Information Systems*, *17*(5), 328–376. doi:10.17705/1jais.00428

Wang, T., Jung, C., Kang, M., & Chung, Y. (2014). Exploring determinants of adoption intentions towards enterprise 2.0 applications: an empirical study. *Behaviour & Information Technology*, *33*(10), 1048–1064. doi:10.1080/0144929X.2013.781221

White, M. (2012). Digital workplaces: vision and reality. *Business Information Review*, *29*(4), 205–214. doi:10.1177/0266382112470412

Wiggins, B. (2015). The digital renaissance of work. p. miller, e. marsh. Gower Publishing, Farnham. 216p., Price £20.00. *International Journal of Information Management*, *35*(5), 606–608. doi:10.1016/j.ijinfomgt.2015.06.002

Wood, C. P., Giles, D., & Percy, C. (2009). *Your Psychology Project Handbook: Becoming a Researcher* (2nd ed.). Harlow, Essex: Pearson.

Yoo, S. J., Han, S., & Huang, W. (2012). The roles of intrinsic motivators and extrinsic motivators in promoting e-learning in the workplace: a case from South Korea. *Computers in Human Behavior*, *28*(3), 942–950. doi:10.1016/j.chb.2011.12.015

This research was previously published in the International Journal of Digital Literacy and Digital Competence (IJDLDC), 9(2); pages 15-33, copyright year 2018 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 81
Impact of Online Teamwork Self-Efficacy on Attitudes Toward Teamwork

Abdullah Konak
https://orcid.org/0000-0001-6250-7825
Penn State Berks, Reading, USA

Sadan Kulturel-Konak
Penn State Berks, Reading, USA

ABSTRACT

The lack of professional skills in project teams is one of the most important factors contributing to the high failure rate of Information Technology (IT) projects. Therefore, preparing students for increasingly complex IT projects has been an important learning objective in information sciences and technology programs. This article investigates the relationships between face-to-face students' self-efficacy of managing project tasks through online processes and their attitudes toward teamwork. The relationships among student engagement in learning experiences related to teamwork, self-efficacy of technology-mediated teamwork, and attitudes towards teamwork are investigated using confirmatory factor analysis on a data set with 344 participants. The analysis shows that self-efficacy of technology-mediated teamwork mediates the effect of learning engagement on attitudes toward teamwork. Therefore, the article postulates that mastering technology-mediated teamwork skills helps face-to-face students develop positive attitudes toward teamwork, which can be transferred to the workplace.

INTRODUCTION

IT projects are complex undertakings that are known to have high failure rates due to many reasons. In the literature, this high failure rate of information technology (IT) projects has been mainly attributed to the lack of professional skills in IT project teams rather than the deficiencies in the technical skills of the project teams (Keil et al., 1998; Whittaker, 1999). IT projects involve high levels of uncertainty due

DOI: 10.4018/978-1-7998-7297-9.ch081

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to complex interfaces between technology and people. Technology and user requirements can change during the course of the project. IT project teams usually involve members with diverse background from various departments of the organization and are usually geographically distributed. IT projects typically have a high degree of virtual components. Therefore, team members of an IT project should have the flexibility to adapt dynamic project requirements and technology. In addition to the technical knowledge, career resiliency in the 21st century demands excellence in teamwork, effective communication, adaptability to change, positive and flexible attitudes, continuous learning, self-confidence (Collard et al., 1996). To improve the readiness of their students for the ever-increasing complex IT challenges of the 21st century, information sciences and technology programs have integrated teamwork knowledge, skills, and abilities (KSAs) into their curricula through new course offerings, embedding them into existing courses, or extra circular activities such as workshops and seminars. Furthermore, the use of virtual teams in IT projects has become so pervasive that not only distance learning classes but also face-to-face classes incorporated virtual team projects to introduce IT students virtual teamwork skills (Chen et al., 2008; Kulturel-Konak, Maurer, & Lohin, 2010; Falls et al., 2014; Brewer et al., 2015).

In this paper, we study the effect of students' self-efficacy of applying teamwork KSAs using online mediums on their attitudes toward teamwork. We define self-efficacy of teamwork KSAs using online mediums as students' beliefs in their abilities to perform teamwork KSAs such as resolving team conflict, solving problems collaboratively, communicating effectively, establishing team goals, scheduling and coordinating project tasks using online communication and collaborative technologies. We will refer to this definition as self-efficacy of technology-mediated teamwork for avoiding confusion with virtual teamwork self-efficacy. The target population of the study is information sciences and technology students who attend traditional face-to-face classes. The motivation of this research focus stems from the fact that even in face-to-face team projects, project tasks increasingly take place in online settings. In particular, commuter and non-traditional students have limited time on campus for face-to-face team meetings. Such student groups usually rely on online technologies to perform many components of face-to-face team projects. Therefore, it is important that students are well versed in managing team projects using online mediums for effective teamwork in face-to-face classes as well. Based on this premise, the main research question of the paper is to investigate whether face-to-face students exhibit more positive attitudes toward teamwork if they have self-efficacy of technology-mediated teamwork. In the literature, technology-mediated teamwork KSAs expected from information technology teams are mainly discussed in the context of virtual and distributed teams (Nunamaker, Reinig, & Briggs, 2009; Kulturel-Konak, Maurer, & Lohin, 2010; Schulze & Krumm, 2017). On the other hand, we emphasize the importance of technology-mediated teamwork KSAs for face-to-face student teams. This point is a unique contribution of the paper.

Attitudes toward teamwork can be defined as to the extent that a person is agreeable to work in a team. It is important that students develop a positive attitude toward teamwork because people's attitudes influence their future behavior (Ajzen & Fishbein, 1977). If students develop negative attitudes toward teamwork during their education, they may carry these negative experiences to the workplace. For example, Riebe et al. (2010) note that negative teamwork experiences can discourage new graduates to participate in real-life workplace teams. Cannon-Bowers, Salas, & Milham (2003) state that having positive attitudes toward teamwork is among the factors that determine the success of transferring teamwork skills learned in a training into practice. Furthermore, effective teamwork requires that team members perceive teamwork as an attractive work arrangement. Chapman and Van Auken (2001) investigate the factors affecting students' attitudes toward teamwork and report that students' understanding of the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

benefits of teamwork is one of the important factors for developing positive attitudes toward teamwork. This observation is the first hypothesis of the research model used in the paper.

Hypothesis One: Students' perceived value of teamwork has a positive effect on their attitudes toward teamwork.

The engagement of students in learning activities related to teamwork may help them avoid the pitfalls of teamwork, reduce the negative aspects of teamwork, and develop an appreciation of teamwork. As results of a meta-analysis, McEwan et al. (2017) report that teamwork training interventions have a positive effect on teamwork and team performance. Naveh et al. (2015) report that active learning in a team environment improves individual's work performance in medical fields through teamwork related KSAs such as feedback seeking and discussions. Konak et al. (2015) also report a positive correlation between engineering students' teamwork training and their attitudes toward teamwork. Therefore, engagement of students in teamwork related learning activities may help them develop positive attitudes toward teamwork. This observation is the second hypothesis of the research model.

Hypothesis Two: Students' engagement in learning teamwork KSAs has a positive impact on their attitudes toward teamwork.

The main research question in this paper is to study the relationship between self-efficacy of technology-mediated teamwork and students' attitudes toward teamwork. This relationship has not previously been investigated in the literature for face-to-face teams as self-efficacy of technology-mediated teamwork has been mainly defined and studied in the context of distributed teams (Hertel, Konradt, & Voss, 2006; Hardin, Fuller, & Valacich, 2006; Fuller, Hardin, & Davison, 2006; Krumm et al., 2016). As IT projects are increasingly conducted in virtual environments, students' ability and knowledge of using online technologies to conduct team tasks are becoming increasingly important. Research also points out that collective efficacy of team members is closely associated with team resilience (Rodríguez-Sánchez & Vera Perea, 2015), which is important for the success of an IT project that includes a high degree of uncertainty and risks. Team members should know how to cope with failures, be flexible in changing directions, and maintain a positive attitude. Gray (2012) reports that building self-efficacy of teamwork KSAs through informal and formal learning can enhance team member resilience. Gray (2012) also notes that self-efficacy influences the individual performance of team members by improving individuals' satisfaction with the team environment, in particular in the case of low performing teams. Eby and Dobbins (1997) note that higher self-efficacy of teamwork skills is related to an individual's effective orientation toward working with others in a team setting. The findings by Falls et al. (2014) support that learning essential teamwork skills may make a positive change in students' perceptions of teamwork. Based on these earlier researches, we postulate the following hypotheses.

Hypothesis Three: Students' engagement in learning teamwork KSAs enhances their self-efficacy of technology-mediated teamwork KSAs.

Hypothesis Four: Self-efficacy of technology-mediated teamwork KSAs improves students' attitudes toward teamwork.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Combining Hypothesis Three and Hypothesis Four, the main claim in this paper is that students' learning engagements related to teamwork KSAs will increase their self-efficacy of technology-mediated teamwork KSAs and in turn improve their attitudes toward teamwork. In other words, self-efficacy of technology-mediated teamwork facilitates the relationships between students' engagement in learning teamwork KSAs and their attitudes toward teamwork.

BACKGROUND

An extensive number of papers in the literature discuss expected teamwork KSAs from students in face-to-face and virtual teams. Stevens and Campion (1994) define five major areas of teamwork KSAs: (*i*) Conflict Resolution; (*ii*) Collaborative Problem Solving; (*iii*) Communications, (*iv*) Goal Setting, and (*v*) Performance Management and Planning/Task Coordination. Within each area, several specific KSAs are defined. Schulze and Krumm (2017) organize virtual team KSAs into six major categories: (*i*) Knowledge about functionalities of a medium, (*ii*) Communications, (*iii*) Developing and maintaining interpersonal trust, (*iv*) Intercultural awareness, (*v*) Self-management, and (*vi*) Conflict management. Schulze and Krumm's (2017) categorization emphasizes KSAs to cope with the challenges of virtual teams. In this section, we only highlight teamwork KSAs that are particularly important to be effective in face-to-face team projects with a high degree of online components. Further, we provide the conceptual definitions of the variables used in the research model of the paper.

Among planning/task coordination KSAs, self-management skills become particularly important in online settings because guidance and control by other team members are reduced in online team tasks. Hertel et al. (2006) argue that individuals need to develop an aptitude for planning and organizing their activities independently without motivation and support from others in virtual teams. Kankanhalli et al. (2006) also suggest that having the aptitude of independence is important for team members if the majority of project tasks are completed in virtual environments. It should be noted that self-efficacy is a precursor of developing an aptitude for independence in virtual teams (Hertel et al., 2005). Hertel, Konradt, and Orlikowski (2004) note that the quality of goal setting processes is an important factor determining the effectiveness of virtual teams. Although face-to-face teams have opportunities to coordinate team tasks in team meetings, IT students frequently rely on web-based tools (e.g., GitLab, Lucidchart, and Slack.com) to manage team projects (Boyd et al., 2017).

As face-to-face team processes are increasingly replaced with virtual ones, team goal setting and performance management increasingly rely on self-regulation, which is individuals' ability to set standards for their own performances, seek and evaluate feedback, and take remedial measures to correct discrepancies in their performance (Driskell et al., 2003). In team projects with a high degree of online components, students need to learn how to give and receive feedback actively on team performance. This feedback allows team members to refocus on project tasks in the case of distractions. In addition, Kankanhalli et al. (2006) note that persistence, which includes aspects of self-motivation, the endurance of goal striving and continuing activities after interruptions, is a critical attribute of team members in virtual teams because they are subject to external distractions more frequently compared to face-to-face teams. Persistence and independence are important attributes of resilience in online teamwork.

Effectively using electronic communication media is a fundamental skill for teamwork. Synchronous (text, video, voice) and asynchronous (email, discussion forums, document management systems) electronic media are frequently used to facilitate communication and coordination among team members in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

not only virtual but also face-to-face teams. Students should be clear and disciplined about electronic communication to avoid pitfalls such as lack of non-verbal cues, slow development of relationships, delay in information exchanges, lack of social presence (Warkentin et al., 1997). Students should also know various types of online collaboration technologies so that they select the most appropriate one for the project tasks (Havard et al., 2008) and have the competency of using them. Furthermore, students should have self-efficacy for experimenting with online collaboration technologies that tend to change rapidly.

Conflict resolution is one of the challenging KSAs for students to master. Rather than seeking win-win solutions, students tend to avoid conflict in virtual teams (Kankanhalli et al., 2006). Delay in asynchronous communication can cause problems in the development of a mutual team understanding and knowledge (Cramton, 2001). Electronic communications can also exacerbate misunderstandings due to cultural differences among team members (Dubé & Paré, 2001). Therefore, resolving conflict through online communication is more challenging compared to face-to-face communication.

Problems related to the asynchronous electronic communication may result in subpar team problem-solving processes. A slow development of mutual team knowledge through online communication affects teams' ability to formulate the problem precisely and clearly as well as reach consensus. For example, Jacob and Sam (2008) report that discussion forums fail to generate productive arguments in problem-solving without interventions from the instructor. Even high-quality video conferencing technologies may not lead to productive problem-solving sessions compared to face-to-face meetings in the case of complex projects with a high level of task interdependency such as software development (Andres, 2002). Therefore, soliciting input from and giving constructive feedback to team members through electronic communication in an unbiased and clear manner is a critical teamwork skill that students should learn to be an effective problem solver in online environments.

Attitude is an internal state that influences a student's decision on whether to participate in group work or not (Gardner &, 1998). Attitudes toward teamwork can be broadly defined as how apt a student is to work in a team with others (Ulloa & Adams, 2004). If a student has a positive attitude toward teamwork, then the student is expected to participate in a team more willingly. Students' negative attitudes toward teamwork is a frequently discussed topic in the literature. Particularly, many articles aim to discover the underlying reasons for negative attitudes toward teamwork so that appropriate interventions can be applied. Among the factors affecting students' attitude toward teamwork include rewards (Bacon et al., 1999; Pfaff & Huddleston, 2003), team size, workload, cooperation versus competitiveness, peer evaluations (Pfaff & Huddleston, 2003), level of participation (Bacon et al., 1999; Pfaff & Huddleston, 2003) myths about teamwork (Pauli et al., 2008), online settings (Vance et al., 2015), and the level of instructor's involvement (Chapman & Van Auken, 2001). Pfaff and Huddleston (2003) note that expected grade, perceived workload, class time, and absence of free rider play important roles in shaping students attitudes toward teamwork. Beigi and Shirmohammadi (2012) also report a moderate relationship between team evaluation concerns and attitudes toward teamwork in a study involving students from Iran. Konak et al. (2015) report that engineering students' attitudes toward teamwork are negatively correlated with their GPA, which also suggests that students are concerned with their grades being affected by underperforming team members. Ulloa and Adams (2004) report positive relationships between the characteristics of effective teams and students' attitudes toward teamwork. These characteristics included conflict resolution, communication, goal setting, purpose, psychological safety, role clarity, and accountability. Chapman and Van Auken (2001) state that positive attitudes could be nurtured by instructors who are actively involved in teamwork by providing students with timely feedback on their team progress, introducing team management techniques, and monitoring team performance by

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

peer evaluations. Bacon et al. (1999) also identify instructor guidance on team processes as an important factor affecting students' teamwork experiences. According to Rawlings (2014), students' attitudes and perceptions toward online teamwork began in college after their first online team experience. Therefore, it is suggested that for effective online teamwork, instructors should include methods to ensure both team and individual accountability, promote team cohesiveness, and foster frequent communication among team members. Huitt et al. (2015) observe that including team-based learning in anatomy laboratories improve students' overall attitudes toward teamwork.

Bandura's self-efficacy theory (Bandura, 1982, 1991) states that self-confidence determines how successful one will be. Parallel to this definition, collective-efficacy refers to the shared beliefs of the team members in their team's capabilities to achieve the expected outcomes of the team's tasks (Gibson et al., 2000). In order to assess team forming and responsibility through the self-efficacy theory, the Personal Efficacy Beliefs Scale (PEBS) can be used. The PEBS assesses each team member's comfort and motivation to achieve the team's expected tasks (McClough & Rogelberg, 2003; Riggs et al., 1994). Huh et al. (2014) report three approaches to measuring collective efficacy. One approach is to collect self-evaluations regarding a particular set of group tasks, which enables an effective method for both individual and teamwork self-efficacy. Another approach is to evaluate individual perceptions of the whole group's capabilities. The third approach involves reaching a consensus through a comprehensive discussion among group members communicating about the overall team efficacy. The Collective Efficacy Beliefs Scale uses a seven-point Likert scale (Huh et al., 2014) through various questions and statements regarding the group's ability to work together (Riggs et al., 1994). Overall, the recent research supports that collective-efficacy has a positive impact on team performance (Gibson et al., 2000; Huh et al., 2014; Katz-Navon & Erez, 2005; Tasa et al., 2007).

In this paper, the focus is on self-efficacy of technology-mediated teamwork KSAs which can be defined as a team member's confidence in performing the tasks related to team processes (McClough & Rogelberg, 2003). In this respect, teamwork self-efficacy is independent of the efficacy related to the tasks that the team undertakes. To study the role of self-efficacy in team processes, Tasa et al. (2007) use a research model in which self-efficacy of teamwork KSAs mediates collective-efficacy, which in turn determines the team performance. A longitudinal study based on this multi-level model supports that self-efficacy of teamwork KSAs plays a significant role in the formation of collective-efficacy, and both self-efficacy and collective-efficacy are instrumental for effective team performance. Gully et al. (2002) also report that team-efficacy and potency are positively related to team performance. Lent et al. (2006) surveyed two groups of engineering college students during a team project and asked them to evaluate the overall group's confidence in performing tasks. The results of their survey indicated that self-efficacy and team cohesion were strong predictors of collective-efficacy. Eby and Dobbins (1997) provide an eight-item scale to measure teamwork self-efficacy and report that teamwork self-efficacy leads higher collectivism orientation in individuals. In the literature, self-efficacy of technology-mediated teamwork KSAs has mainly been discussed in the context of virtual teams (Hertel et al., 2005). Staples et al. (1998) report that self-efficacy of remote work skills is correlated with overall productivity and satisfaction of team members in virtual teams. In Staples et al.'s (1998) study, participants with high self-efficacy tend to have training in remote work and good information. Fuller, Hardin, and Davison (2006) define virtual team efficacy as a virtual team's belief in its ability to work together successfully in a non-collocated, technology-mediated environment. The authors measure virtual team efficacy in two dimensions: Computer Collective Efficacy and Group Potency. The empirical findings of Fuller, Hardin, and Davison (2006) support that virtual team efficacy is predictive of team outcomes in distributed teams.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wang and Haggerty (2011) define virtual self-efficacy as one's belief in his/her competence to work in virtual settings and measure virtual self-efficacy in two dimensions: computer self-efficacy and remote work self-efficacy. Their findings show that an individual's remote work self-efficacy is correlated with his/her virtual competence and affects work outcomes positively in virtual settings.

Although developing positive attitudes toward teamwork is an important objective of teamwork work training programs, the relationship between teamwork self-efficacy and attitudes toward teamwork has not been studied in the literature. Chen, Donahue, and Klimoski (2004) study the effect of teamwork training on teamwork KSA, teamwork self-efficacy, and attitudes toward teamwork. They report a low but positive correlation between teamwork self-efficacy and attitudes toward teamwork. However, they do not directly investigate the relationship between these two variables. Interestingly, Chen, Donahue, and Klimoski (2004) report that while teamwork training was able to improve students' teamwork knowledge and skills in their study, they observed little improvement in attitudes toward teamwork after the training.

While the benefits of teamwork have been widely discussed in the literature, only a limited number of papers investigate how students perceive the value of teamwork. First of all, teamwork allows students to experience complex and large-scale projects which cannot be completed individually. Students may consider the value of teamwork in four main dimensions (Walker, 2001): (*i*) learning how real-life teams' function, (*ii*) learning how to run teams effectively, (*iii*) developing and practicing interpersonal skills, and (*iv*) creating collaborative learning opportunities. Chapman and Van Auken (2001) study the effect of students' perceived benefits of teamwork on their attitudes toward teamwork. In their study, Chapman and Van Auken (2001) measure the perceived benefits of teamwork using several items indicating how teamwork prepares students for real-life projects. Bailey et al. (2015) investigate the factors promoting the benefits of teamwork to students and report instructor contribution as a significant factor. Shankar and Seow (2010) note that students' perceived usefulness of teamwork depends on their personality. Students with lone-wolf tendencies generally perceive fewer benefits from teamwork. Nonetheless, the literature agrees that the perceived value of teamwork is an important factor influencing students' future engagement with teamwork.

METHOD

Participants

Participants in this study were undergraduate students from Information Sciences and Technology programs at several campuses of a public university in the northeast United States. Although the participants were geographically distributed, they were all enrolled in face-to-face programs that follow the same curriculum. In addition, the program courses require a significant amount of teamwork at all academic levels. After data cleaning, $n = 344$ responses were used in this study. The distributions of the responses across various demographic metrics are as follows: Female ($n = 86$), Male ($n = 257$), First Year ($n = 80$), Second Year ($n = 65$), Third Year ($n = 85$), and Fourth Year ($n = 114$).

Procedures

Participants were recruited via email. An anonymous URL link to the online survey was emailed to the target population. The participation in the survey was voluntary, and no incentives were provided for

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

participation. We collected limited background information about participants per the IRB requirements. The survey intended to measure students' overall attitudes toward teamwork during their education, without being specific to a course or a single project.

Measures

The measures of the study included four latent variables: overall attitudes toward teamwork (Attitude), self-efficacy of technology-mediated teamwork (TMT Self-Efficacy), Perceived Value of Teamwork (Perceived Value), and Learning Engagement related to Teamwork KSAs (Learning Engagement). In the following discussion, these latent variables are referred to as Attitude, TMT Self-Efficacy, Perceived Value, and Learning Engagement for the presentation brevity. The survey items associated with each latent variable are given in Appendix. The average scores of the items related to each latent variable were used to measure the variable.

The TMT Self-Efficacy latent variable intends to measure how confident a student is in his/her capabilities to accomplish team forming, team management, and team coordination tasks via online communications and technologies. We developed items for TMT Self-Efficacy based on the learning outcomes areas defined in (Alexander, 2006; London, 2013; Lurey & Raisinghani, 2001). The items related to this latent variable were operationalized with a four-point Likert scale as (1)-Very Unconfident, (2)- Unconfident, (3)-Confident, and (4)-Very Confident.

The Learning Engagement latent variable measures how frequently students engage in learning activities related to teamwork KSAs. The survey items related to this latent variable were operationalized using four-level rating scales as (1)-None, (1)-Once, (3)-A few times (2-3), and (4)-Several times or more (>4). As given in Appendix, the items to measure Learning Engagement are action-oriented such as reading a book about teamwork or attending a speaker event. Students who perform such activities frequently are expected to have a higher level of teamwork KSAs.

As previously discussed, Attitude toward teamwork is defined as how agreeable a student is to work in a team. Based on this conceptual definition, the Attitude latent variable measures students' preference of working in team settings using three items operationalized by four-point Likert scales as (1)-Strongly Disagree, (2)-Disagree, (3)-Agree, and (4)-Strongly Agree.

Perceived Value is defined as the degree to which a student believes that teamwork usually enhances the outcomes of a project and helps them grow professionally. The Perceived Value latent variable was also measured by five items operationalized by four-point Likert scales as (1)-Strongly Disagree, (2)-Disagree, (3)-Agree, and (4)-Strongly Agree. We adapted teamwork attitude questions from (Beigi & Shirmohammadi, 2012; Pauli et al., 2008; Payne & Monk-Turner, 2006; Pfaff & Huddleston, 2003).

Validation of the Measurement Model

Before testing the path models to study the formulated hypotheses, we used a confirmatory factor analysis to evaluate internal consistency, convergence validity, and discriminant validity of the latent variables of the measurement model. The measurement model had CMIN/DF = 1.87 (< 2.5), CFI = 0.954 (> 0.90), TLI = 0.95 (> 0.95), and RMSEA = 0.05 (< 0.05), supporting a good model fit to the data for the measurement model. Table 1 summarizes Cronbach's Alpha (α), Composite Reliability (*CR*), and Average Variance Extracted (*AVE*) of the latent variables. In the measurement model, all standardized factor loadings of the survey items exceeded 0.50 and were significant ($p < 0.001$). The individual fac-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tor loadings and *p* values are not provided in the paper for the brevity of the presentation. In addition, all CR and α values were greater than 0.70, indicating an acceptable level of internal reliability of the latent variables. The Cronbach's Alpha value of the Attitude latent variable is slightly higher than the commonly accepted threshold of 0.70 (Nunnally, 1978) while it has a high CR value. The main reason for the discrepancy is that the Cronbach's Alpha measure assumes that standardized regression coefficients (factor loadings) are identical for all items. In the case of the Attitude latent variable, the factor loading of one of the three items was lower than the other two items as given in Appendix. Therefore, the Cronbach's Alpha value of this variable was lower. In such cases, CR provides a better a measure of internal reliability (Peterson & Kim, 2013). The AVE values of the latent variables were very close to or larger than 0.50, indicating their convergent validity. However, the AVE value of Learning Engagement was lower than 0.50. Because of the fact that the AVE of Engagement was close to 0.50, the low correlations between Learning Engagement and other variables and a strong CR value, the convergent validity of Learning Engagement was considered as acceptable.

Table 1. Summary of the metrics for the internal reliability and convergent validity of the measurement model

Latent Variable	α	AVE	CR
Attitude	0.73	0.52	0.95
Learning Engagement	0.83	0.46	0.84
TMT Self-Efficacy	0.88	0.60	0.88
Value	0.91	0.60	0.88

We used heterotrait-monotrait ratio (HTMT) of the correlations to provide evidence of discriminant validity for the latent variables. The HTMT ratio is the average of the heterotrait-heteromethod correlations (i.e., the correlations of indicators across constructs measuring different phenomena), relative to the average of the monotrait-heteromethod correlations (i.e., the correlations of indicators within the same construct). Henseler et al. (2015) suggest that discriminant validity is supported between the two latent variables if the HTMT ratio between them is less than 0.85. Based on this criterion, discriminant validity was established for all latent variables of the measurement model as shown in Table 2.

Table 2. The heterotrait-monotrait ratio of correlations (HTMT) to assess discriminant validity (baseline value: HTMT < 0.85)

	Learning Engagement	TMT Self-Efficacy	Perceived Value
Attitude	0.33	0.22	0.83
Engagement		0.13	0.31
TMT Self-Efficacy			0.14

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Validation of the Path Models

After establishing the psychometric validity of the latent variables based on the measurement model, we evaluated the validity of the structural pattern models underlying the research hypotheses. The first hypothesized structured equation model (SEM) states that Learning Engagement and Perceived Value has a direct causal effect on Teamwork Attitude (i.e., Hypothesis One and Hypothesis Two). This model is referred to as the Direct SEM. The second hypothesized SEM states that the effect of Learning Engagement on Attitude is mediated through TMT Self-Efficacy. As stated before, our main hypotheses are that the more students are engaged in learning activities related to teamwork skills, the higher self-efficacy of technology-mediated teamwork they will have (Hypothesis Three), and self-efficacy of technology-mediated teamwork leads to positive attitudes toward teamwork (Hypothesis Four). This model is referred to as the Mediated SEM. As seen in Table 3, the goodness of fit for both direct SEM and mediated SEM was found to be acceptable.

Table 3. Goodness-of-fit statistics of the research models

	CMIN/DF	CFI	TLI	RMSEA
Measurement Model	1.87	0.95	0.95	0.050
Direct SEM	1.68	0.97	0.96	0.045
Mediated SEM	1.87	0.95	0.94	0.051
Baseline Values	< 2.5	> 0.9	> 0 .95	< 0.05

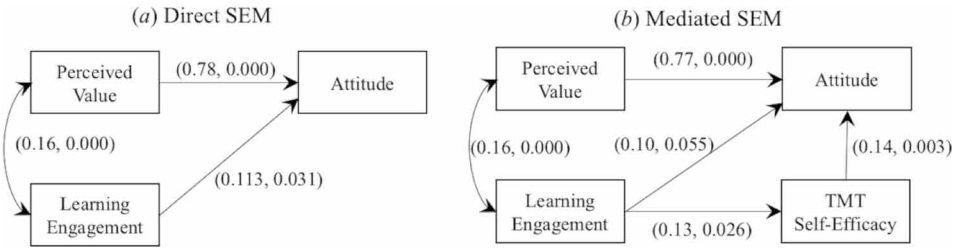
DISCUSSIONS

Figure 1 illustrates the standardized regression coefficients and *p* values of the direct SEM and mediated SEM, respectively. Hypothesis One was strongly supported by both models, i.e., students' perceived value of teamwork had a significant positive effect on their attitudes toward teamwork. Even after including TMT Self-Efficacy in the direct SEM, the strength of the path from Perceived Value to Attitude remained virtually unchanged in the mediated SEM. This result indicates that students should appreciate the value of teamwork in order to develop positive attitudes toward the teamwork. Although this result is expected at some level, it has several practical implications. Firstly, teamwork should be used for tasks that are worthy of a team effort. Managing a team is itself a time-consuming process. Students need to schedule meeting times, meet as a team, collaborate on ideas, share the work, and coordinate tasks. Teamwork can unnecessarily complicate the tasks that are simple enough that can be performed by individuals. As students are regularly involved in teamwork in multiple classes, they may feel overwhelmed by the demand of managing teamwork and develop a negative attitude toward teamwork (James et al., 2002). Therefore, instructors should be aware of the negative effects of overusing teamwork. As indicated by Bailey et al. (2015), active involvement of instructors in team processes can also help students better understand the value of teamwork.

It is seen that Hypothesis Two was supported by the direct SEM ($p < 0.05$) but not by the mediated SEM ($p > 0.05$). Both Hypothesis Three and Hypothesis Four were supported by the mediated SEM. The indirect path (Engagement →TMT Self-Efficacy→Attitude) had significant positive relationships.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. The standardized regression coefficients and p values of (a) direct SEM and (b) mediated SEM (standardized regression coefficient, p-value)



In addition, the direct path (Learning Engagement →Attitude) became insignificant when TMT Self-Efficacy was added to the model. These findings supported that the main research hypothesis of the paper, i.e., the TMT Self-Efficacy mediates the relationships between Learning Engagement and Attitude. This particular research finding has implications for the design of the programs to increase students' teamwork KSAs through formal and informal learning. First of all, formal learning in teamwork KSAs should emphasize building self-efficacy. The findings suggest that the impact of learning activities to develop and improve teamwork KSAs is realized more effectively if the activities lead students to build their self-efficacy. According to Bandura (2000), training employees in how to manage failure through informative processes is important for building self-efficacy. Bandura (2000) argues that if people are faced with only easy challenges, they tend to expect quick results and are easily discouraged by failures. In teamwork training programs, participants should experience overcoming challenges through perseverant effort in order to build resilient self-efficacy. The recommendations by Bandura (2000) certainly are applicable to educate students in teamwork KSAs as well. In addition, our findings support the role of informal learning in developing students' self-efficacy of technology-mediated teamwork KSAs. Our results suggest that students who engage in informal learning activities often are likely to have higher self-efficacy of technology-mediated teamwork KSAs.

The results showed that there was a positive relationship between students' self-efficacy of technology-mediated teamwork KSAs and their attitudes toward teamwork. This result suggests that technology-mediated teamwork KSAs should be incorporated into existing face-to-face curriculum to instill positive attitudes toward teamwork in students. IT students are likely to work in virtual teams when they join the workforce. Incorporating virtual teamwork in existing face-to-face classes can prepare students for the demands of jobs in our global economy (Falls et al., 2014; Brewer et al., 2015). Based on our findings, we suggest that face-to-face students can observe the benefits of developing self-efficacy of technology-mediated teamwork KSAs not only in their future careers but also in their current team projects. Foremost, our results show that there is a relationship between self-efficacy of technology-mediated teamwork and attitudes toward teamwork. Having positive attitudes toward teamwork can improve team processes and outcomes, increasing students overall learning experience in team projects. When students have positive experiences in team projects, they tend to transfer their learning into practice more effectively. Furthermore, positive team experiences can lead to more collaborative learning opportunities for students. Instructors can help students to nurture positive attitudes toward teamwork through appropriate teamwork training and practice (Hamer & O'Keefe, 2013; Rawlings, 2014). In particular, the involvement of instructors in early steps of establishing team leadership and roles as well as reducing free riders is important for developing positive attitudes toward teamwork (Rudawska, 2017). Our results also

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

suggest that teamwork training for face-to-face students should also incorporate virtual team KSAs. In particular, knowledge about functionalities of web collaboration technologies, such as when to use a specific collaboration technology and their pros/cons (Schulze & Krumm, 2017), is quite important for face-to-face students as well.

CONCLUSION AND LIMITATIONS

It is evident from the mediated SEM that self-efficacy of technology-mediated teamwork KSAs is a factor in developing positive attitudes toward teamwork. While the importance of teamwork KSAs such as goal setting, team forming, performance evaluation, team coordination, communications, conflict resolution, and problem-solving have been widely discussed in the literature, the research in this paper draws attention to the self-efficacy of performing these KSAs in online settings for face-to-face students. As the project management processes increasingly take place in online environments for even traditional face-to-face teams, the strong relationship observed between TMT Self-Efficacy and Attitude reaffirms the need for increasing students' online teamwork KSAs.

In this research, we focused on the self-efficacy of technology-mediated teamwork KSAs. This is one of the limitations of the research. To expand the findings of the paper, a broader set of teamwork KSAs can be considered as further research. Studying other teamwork KSAs will also substantiate the main finding of the paper. In addition, the target population includes only information sciences and technology students. The validity of the research model should be tested in other fields in order to generalize the findings.

REFERENCES

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, *84*(5), 888–918. doi:10.1037/0033-2909.84.5.888

Alexander, P. M. (2006). Virtual teamwork in very large undergraduate classes. *Computers & Education*, *47*(2), 127–147. doi:10.1016/j.compedu.2004.09.004

Andres, H. P. (2002). A comparison of face-to-face and virtual software development teams. *Team Performance Management: An International Journal*, *8*(1/2), 39–48. doi:10.1108/13527590210425077

Bacon, D. R., Stewart, K. A., & Silver, W. S. (1999). Lessons from the best and worst student team experiences: How a teacher can make the difference. *Journal of Management Education*, *23*(5), 467–488. doi:10.1177/105256299902300503

Bailey, S., Barber, L. K., & Ferguson, A. J. (2015). Promoting perceived benefits of group projects: The role of instructor contributions and intragroup processes. *Teaching of Psychology*, *42*(2), 179–183. doi:10.1177/0098628315573147

Bandura, A. (1982). Self-efficacy mechanism in human agency. *The American Psychologist*, *37*(2), 122–147. doi:10.1037/0003-066X.37.2.122

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, *50*(2), 248–287. doi:10.1016/0749-5978(91)90022-L

Bandura, A. (2000). Cultivate self-efficacy for personal and organizational effectiveness. Handbook of principles of organization behavior, 2, 11-21.

Beigi, M., & Shirmohammadi, M. (2012). Attitudes toward teamwork: Are Iranian university students ready for the workplace? *Team Performance Management*, *18*(5/6), 295–311. doi:10.1108/13527591211251087

Boyd, B., Townsley, A., Walter, C., Johnson, C., & Gamble, R. (2017, January). Examining Collaboration among Student Teams relying on Web Applications to Coordinate Software Development. In *Proceedings of the 50th Hawaii International Conference on System Sciences* (pp. 697-705). 10.24251/HICSS.2017.084

Brewer, P. E., Mitchell, A., Sanders, R., Wallace, P., & Wood, D. D. (2015). Teaching and learning in cross-disciplinary virtual teams. *IEEE Transactions on Professional Communication*, *58*(2), 208–229. doi:10.1109/TPC.2015.2429973

Cannon-Bowers, J. A., Salas, E., & Milham, L. M. (2003). The transfer of team training. In E. F. Holton & T. T. Baldwin (Eds.), *Improving learning transfer in organizations* (pp. 195–226). San Francisco, CA: John Wiley & Sons.

Chapman, K. J., & Van Auken, S. (2001). Creating positive group project experiences: An examination of the role of the instructor on students' perceptions of group projects. *Journal of Marketing Education*, *23*(2), 117–127. doi:10.1177/0273475301232005

Chen, F., Sager, J., Corbitt, G., & Gardiner, S. C. (2008). Incorporating virtual teamwork training into MIS curricula. *Journal of Information Systems Education*, *19*(1), 29–41.

Chen, G., Donahue, L. M., & Klimoski, R. J. (2004). Training undergraduates to work in organizational teams. *Academy of Management Learning & Education*, *3*(1), 27–40. doi:10.5465/amle.2004.12436817

Collard, B. A., Epperheimer, J. W., & Saign, D. (1996). Career resilience in a changing workplace. Columbus: ERIC Clearinghouse.

Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science*, *12*(3), 346–371. doi:10.1287/orsc.12.3.346.10098

Driskell, J. E., Radtke, P. H., & Salas, E. (2003). Virtual teams: Effects of technological mediation on team performance. *Group Dynamics*, *7*(4), 297–323. doi:10.1037/1089-2699.7.4.297

Dubé, L., & Paré, G. (2001). Global Virtual Team. *Communications of the ACM*, *44*(12), 71–73. doi:10.1145/501317.501349

Eby, L. T., & Dobbins, G. H. (1997). Collectivistic orientation in teams: an individual and group-level analysis. *Journal of Organizational Behavior*, *18*(3), 275–295. doi:10.1002/(SICI)1099-1379(199705)18:3<275::AID-JOB796>3.0.CO;2-C

Falls, I., Bahhouth, V., Chuang, C. M., & Bahhouth, J. (2014). Factors influencing students' perceptions of online teamwork. *SAGE Open*, *4*(1), 1–9. doi:10.1177/2158244014525415

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Fuller, M. A., Hardin, A. M., & Davison, R. M. (2006). Efficacy in technology-mediated distributed teams. *Journal of Management Information Systems*, *23*(3), 209–235. doi:10.2753/MIS0742-1222230308

Gardner, B., & Korth, S. (1998). A framework for learning to work in teams. *Journal of Education for Business*, *74*(1), 28–33. doi:10.1080/08832329809601657

Gibson, C. B., Randel, A. E., & Earley, P. C. (2000). Understanding group efficacy: An empirical test of multiple assessment methods. *Group & Organization Management*, *25*(1), 67–97. doi:10.1177/1059601100251005

Gray, D. (2012). The influence of complexity and uncertainty on self–directed team learning. *International Journal of Learning and Change*, *6*(1-2), 79–96. doi:10.1504/IJLC.2012.045858

Gully, S. M., Incalcaterra, K. A., Joshi, A., & Beaubien, J. M. (2002). A meta-analysis of team-efficacy, potency, and performance: Interdependence and level of analysis as moderators of observed relationships. *The Journal of Applied Psychology*, *87*(5), 819–832. doi:10.1037/0021-9010.87.5.819 PMID:12395807

Hamer, L. O., & O'Keefe, R. D. (2013). Achieving Change in Students' Attitudes Toward Group Projects by Teaching Group Skills. *Journal of Higher Education Theory and Practice*, *13*(2), 25–33.

Hardin, A. M., Fuller, M. A., & Valacich, J. S. (2006). Measuring group efficacy in virtual teams: New questions in an old debate. *Small Group Research*, *37*(1), 65–85. doi:10.1177/1046496405284219

Havard, B., Du, J., & Xu, J. (2008). Online collaborative learning and communication media. *Journal of Interactive Learning Research*, *19*(1), 37–50.

Hertel, G., Geister, S., & Konradt, U. (2005). Managing virtual teams: A review of current empirical research. *Human Resource Management Review*, *15*(1), 69–95. doi:10.1016/j.hrmr.2005.01.002

Hertel, G., Konradt, U., & Orlikowski, B. (2004). Managing distance by interdependence: Goal setting, task interdependence, and team-based rewards in virtual teams. *European Journal of Work and Organizational Psychology*, *13*(1), 1–28. doi:10.1080/13594320344000228

Hertel, G., Konradt, U., & Voss, K. (2006). Competencies for virtual teamwork: Development and validation of a web-based selection tool for members of distributed teams. *European Journal of Work and Organizational Psychology*, *15*(4), 477–504. doi:10.1080/13594320600908187

Huh, Y., Reigeluth, C. M., & Lee, D. (2014). Collective Efficacy and its Relationship with Leadership in a Computer-mediated Project-based Group Work. *Contemporary Educational Technology*, *5*(1), 1–21.

Huitt, T. W., Killins, A., & Brooks, W. S. (2015). Team-based learning in the gross anatomy laboratory improves academic performance and students' attitudes toward teamwork. *Anatomical Sciences Education*, *8*(2), 95–103. doi:10.1002/ase.1460 PMID:24799448

Jacob, S., & Sam, H. (2008). Measuring critical thinking in problem solving through online discussion forums in First Year University Mathematics. *Paper presented at the Proceedings of the International Multi-Conference of Engineers and Computer Scientists (IMECS)*, Hong Kong.

James, R., McInnis, C., & Devlin, M. (2002). *Assessing Learning in Australian Universities: Ideas, strategies and resources for quality in student assessment: Australian*. Universities Teaching Committee.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kankanhalli, A., Tan, B. C., & Wei, K.-K. (2006). Conflict and performance in global virtual teams. *Journal of Management Information Systems*, *23*(3), 237–274. doi:10.2753/MIS0742-1222230309

Katz-Navon, T. Y., & Erez, M. (2005). When collective-and self-efficacy affect team performance: The role of task interdependence. *Small Group Research*, *36*(4), 437–465. doi:10.1177/1046496405275233

Keil, M., Cule, P. E., Lyytinen, K., & Schmidt, R. C. (1998). A framework for identifying software project risks. *Communications of the ACM*, *41*(11), 76–83. doi:10.1145/287831.287843

Konak, A., Kulturel-Konak, S., Kremer, G. E. O., & Esparragoza, I. E. (2015, October 21-24). Teamwork attitude, interest, and self-efficacy: Their implications for teaching teamwork skills to engineering students. *Paper presented at the 2015 IEEE Frontiers in Education Conference (FIE)*, El Paso, TX. 10.1109/FIE.2015.7344118

Krumm, S., Kanthak, J., Hartmann, K., & Hertel, G. (2016). What does it take to be a virtual team player? The knowledge, skills, abilities, and other characteristics required in virtual teams. *Human Performance*, *29*(2), 123–142. doi:10.1080/08959285.2016.1154061

Kulturel-Konak, S., Maurer, C. R., & Lohin, D. L. (2010). Teaching Students How to Effectively Work in Virtual Teams. *International Journal of Information Technology Project Management*, *1*(2), 61–78. doi:10.4018/jitpm.2010040104

Lent, R. W., Schmidt, J., & Schmidt, L. (2006). Collective efficacy beliefs in student work teams: Relation to self-efficacy, cohesion, and performance. *Journal of Vocational Behavior*, *68*(1), 73–84. doi:10.1016/j.jvb.2005.04.001

London, M. (2013). Generative team learning in Web 2.0 environments. *Journal of Management Development*, *32*(1), 73–95. doi:10.1108/02621711311287035

Lurey, J. S., & Raisinghani, M. S. (2001). An empirical study of best practices in virtual teams. *Information & Management*, *38*(8), 523–544. doi:10.1016/S0378-7206(01)00074-X

McClough, A. C., & Rogelberg, S. G. (2003). Selection in teams: An exploration of the teamwork knowledge, skills, and ability test. *International Journal of Selection and Assessment*, *11*(1), 56–66. doi:10.1111/1468-2389.00226

McEwan, D., Ruissen, G. R., Eys, M. A., Zumbo, B. D., & Beauchamp, M. R. (2017). The effectiveness of teamwork training on teamwork behaviors and team performance: a systematic review and meta-analysis of controlled interventions. *PLoS One*, *12*(1), e0169604. doi:10.1371/journal.pone.0169604 PMID:28085922

Naveh, E., Katz-Navon, T., & Stern, Z. (2015). Active learning climate and employee errors: The moderating effects of personality traits. *Journal of Organizational Behavior*, *36*(3), 441–459. doi:10.1002/job.2000

Nunamaker, J. F. Jr, Reinig, B. A., & Briggs, R. O. (2009). Principles for effective virtual teamwork. *Communications of the ACM*, *52*(4), 113–117. doi:10.1145/1498765.1498797

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pauli, R., Mohiyeddini, C., Bray, D., Michie, F., & Street, B. (2008). Individual differences in negative group work experiences in collaborative student learning. *Educational Psychology*, *28*(1), 47–58. doi:10.1080/01443410701413746

Payne, B. K., & Monk-Turner, E. (2006). Students' Perceptions of Group Projects: The Role of Race, Age, and Slacking. *College Student Journal*, *40*(1), 132–139.

Peterson, R. A., & Kim, Y. (2013). On the relationship between coefficient alpha and composite reliability. *The Journal of Applied Psychology*, *98*(1), 194–198. doi:10.1037/a0030767 PMID:23127213

Pfaff, E., & Huddleston, P. (2003). Does it matter if I hate teamwork? What impacts student attitudes toward teamwork. *Journal of Marketing Education*, *25*(1), 37–45. doi:10.1177/0273475302250571

Rawlings, M. (2014). Are You an Online Team Player? A Pilot Study. *International Journal of Virtual and Personal Learning Environments*, *5*(1), 20–33. doi:10.4018/ijvple.2014010102

Riebe, L., Roepen, D., Santarelli, B., & Marchioro, G. (2010). Teamwork: Effectively teaching an employability skill. *Education + Training*, *52*(6/7), 528–539. doi:10.1108/00400911011068478

Riggs, M. L., Warka, J., Babasa, B., Betancourt, R., & Hooker, S. (1994). Development and validation of self-efficacy and outcome expectancy scales for job-related applications. *Educational and Psychological Measurement*, *54*(3), 793–802. doi:10.1177/0013164494054003026

Rodríguez-Sánchez, A. M., & Vera Perea, M. V. (2015). The secret of organisation success: A revision on organisational and team resilience. *International Journal of Emergency Services*, *4*(1), 27–36. doi:10.1108/IJES-09-2014-0018

Rudawska, A. (2017). Students' team project experiences and their attitudes towards teamwork. *Journal of Management and Business Administration*, *25*(1), 78–97.

Schulze, J., & Krumm, S. (2017). The "virtual team player" A review and initial model of knowledge, skills, abilities, and other characteristics for virtual collaboration. *Organizational Psychology Review*, *7*(1), 66–95. doi:10.1177/2041386616675522

Shankar, P. G., & Seow, J. L. (2010). The association between accounting students' lone wolf tendencies and their perceptions, preferences and performance outcomes in team projects. *Journal of Accounting Education*, *28*(2), 75–84. doi:10.1016/j.jaccedu.2011.03.004

Staples, D. S., Hulland, J. S., & Higgins, C. A. (1998). A self-efficacy theory explanation for the management of remote workers in virtual organizations. *Journal of Computer-Mediated Communication, 3*(4).

Stevens, M. J., & Campion, M. A. (1994). The knowledge, skill, and ability requirements for teamwork: Implications for human resource management. *Journal of Management*, *20*(2), 503–530. doi:10.1177/014920639402000210

Tasa, K., Taggar, S., & Seijts, G. H. (2007). The development of collective efficacy in teams: A multilevel and longitudinal perspective. *The Journal of Applied Psychology*, *92*(1), 17–27. doi:10.1037/0021-9010.92.1.17 PMID:17227148

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ulloa, B. C. R., & Adams, S. G. (2004). Attitude toward teamwork and effective teaming. *Team Performance Management*, *10*(7/8), 145–151. doi:10.1108/13527590410569869

Vance, K., Kulturel-Konak, S., & Konak, A. (2015, March 7). Teamwork efficacy and attitude differences between online and face-to-face students. *Paper presented at the 2015 IEEE Integrated STEM Education Conference*, Princeton, NJ. 10.1109/ISECon.2015.7119933

Walker, A. (2001). British psychology students' perceptions of group-work and peer assessment. *Psychology Learning & Teaching*, *1*(1), 28–36. doi:10.2304/plat.2001.1.1.28

Wang, Y., & Haggerty, N. (2011). Individual virtual competence and its influence on work outcomes. *Journal of Management Information Systems*, *27*(4), 299–334. doi:10.2753/MIS0742-1222270410

Warkentin, M. E., Sayeed, L., & Hightower, R. (1997). Virtual teams versus face-to-face teams: An exploratory study of a Web-based conference system. *Decision Sciences*, *28*(4), 975–996. doi:10.1111/j.1540-5915.1997.tb01338.x

Whittaker, B. (1999). What went wrong? Unsuccessful information technology projects. *Information Management & Computer Security*, *7*(1), 23–30. doi:10.1108/09685229910255160

This research was previously published in the International Journal of Information Technology Project Management (IJITPM), 10(3); pages 1-17, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

APPENDIX

Attitudes

- I would rather work on team projects than on my own
- I like to participate in teamwork
- I am usually motivated to participate in teamwork

Value

- Teamwork improves the quality of the final project outcomes
- Teamwork keeps me more engaged and interested in project tasks
- Teamwork helps me learn new concepts from others
- Teamwork makes it possible to complete class projects in a timely manner
- Teamwork helps me to improve my communication skills

Technology-Mediated Teamwork Self-Efficacy

- Communicating effectively with other team members using the available online technologies
- Communicating effectively online with your team members without observing their social cues and body language
- Resolving conflict through online communication
- Developing team goals using the online technologies
- Encouraging team participation using the offered online communication technologies
- Providing, seeking, and accepting feedback well through communicating with the online technologies
- Participating in an online team discussion, such as discussion boards and online forums

Learning Engagement

- Read a book about teamwork
- Read an online article about teamwork
- Attended a speaker event about teamwork
- Performed a web search to learn about effective teamwork
- Watched a documentary or training video about teamwork

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 82
Virtual Leadership:
How Millennials Perceive Leadership Attribution and Its Impact on Database System Development

Christian Graham
University of Maine, USA

Harold Daniel
University of Maine, USA

Brian Doore
University of Maine, USA

ABSTRACT

This chapter is an updated review of the results of a study completed in 2015 on leadership's impact on virtual team effectiveness and the quality of the completed virtual team project. Findings in 2015 suggested that leadership style and virtual team effectiveness did predict project quality, and specific leadership styles had a negative relationship with virtual team effectiveness. After summarizing the results of the studies purpose, methodology, and findings, the chapter concludes with a literature review of virtual team's leadership research between 2015 and present. It provides a discussion on the relationship between the previous studies' findings and what has been found since with recommendations on future research on shared leadership and relationship building in virtual teams.

INTRODUCTION

Virtual spaces continue to infiltrate themselves into various aspects of both our personal and professional lives. Millennials in particular know this having lived their whole lives immersed in the Internet. Some of the activities Millennials have done and continue to do include: social networking, synchronous real-time video gaming with friends who are geographically separated from them, and retrieving answers to every

DOI: 10.4018/978-1-7998-7297-9.ch082

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

imaginable question they've ever had thanks to Internet search engines. Millennials have now reached the age in which they are graduating from colleges and joining the workforce. Giving the ubiquitous nature of the Internet as a platform to communicate, coordinate, collaborate, and share information the research reviewed in this chapter sought to answer the question: "what is the effect of three leadership types on the quality of virtual team projects and what is the effect of these same leadership types on virtual team effectiveness?" This chapter is a review of the original research done by Graham, Daniel, and Doore (2015) titled: *Millennial Leadership: The Oppositional Relationship between Leadership Type and the Quality of Database System's Development in Virtual Environments*. The chapter also updates the literature review on the subject to better understand leadership types and its impact on database systems development and virtual team effectiveness in virtual environments.

The Millennial: The Net Generation

According to Williams and Chin (2009) Millennials, also referred to as "the Y generation" are those people who were born between 1977 and 2003. Another common term for Millennials is that they are the "net generation" (Tapscott 1998, 2008). Tapscott (2009) defined the net generation as:

- "People who grew up shaped fundamentally by technology and they are shaping it" (Tapscott, 2009);
- "People who use computer technology naturally and easily" (Tapscott, 2009);
- "People who prefer to learn and work collaboratively" (Tapscott, 2009);
- "People who anticipate fast and frequent communication" (Tapscott, 2009);
- People who judge corporations by their integrity, workplace practices, and concerns for the environment" (Tapscott, 2009);
- People who want to be evaluated on performance, not seniority or loyalty (Tapscott, 2009);
- People who don't make sharp distinctions between work and play, or their public and private spheres" (Tapscott, 2009).

Jones, Ramanau, Cross, and Healing (2010) reported that previous generations such as baby boomers (individuals born between 1946 and 1964) were "at least one step behind using new technologies than Millennials" and "unable to reach the kinds of natural fluency that comes with having grown up with new digital technologies".

Another interesting attribute of Millennials according to Bracey, Bevill, and Roach (2010) is that they have been discovered to be much more accepting of diversity and are more global-centric. All of this information demonstrates clear distinctions from previous generations. For example, Oblinger (2003) reported that while Millennials were more accepting diversity and global centric, baby boomers just beginning the civil rights movement and many were drafted into the Vietnam war. According to Billington and Billington (2010) in terms of working, baby boomers used experience and perspective to complete work or perform job tasks while Millennials who were more technically inclined preferred to use technology to complete tasks.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

BACKGROUND

Failure in Information Systems Development

To begin, Hannola and Ovaska (2011) stated that a systems development project goal is to "develop and modify systems that satisfy customers and end users needs on schedule and within budget." (p. 66). Hannola and Ovaska added that "early activities involved in information systems development are critical and important steps. Poor execution of these activities will almost guarantee failure of the final information systems project. Dalcher and Drevin (2003) reported that "the greater part of database systems development projects end in failure. This is a problem not limited to database systems development, but most information systems development of any type. Warkentin, Moore, Bekkering, and Johnston (2009) added that "up to 80% of all systems development projects failed for a number of different reasons. Almost two decades ago Ewusi-Mensah (1997) found that these failures or cancellations of information systems projects can be attributed to any combination of the following factors:

- A lack of general agreement on a well-articulated set of project goals;
- A weak or problematic project team;
- Lack of clear project management;
- A deficiency in technical expertise, experience, or relevant application-domain knowledge;
- Current information technology infrastructure within the organization not able to support the system being developed;
- Senior management delegating decision-making at critical junctures in the development to the technical experts and not investing themselves into the project;
- The project costs and time going well beyond the original project plan.

Virtual Teams and Virtual Team Challenges

Today, many systems development projects are being done by teams that are physically separated by geographic space and time. That is, many members of systems development team projects work remote from one another. This remote team work is facilitated by telecommunication technologies that are no longer just limited to computers. Graham et al. (2015) stated it this way:

"People working together from remote locations can also use other electronic devices for communication such as tablets and the telephone. Today, the telephone would include smart phones with texting capabilities, email, and social networks. Kock (2005) added that Internet-enabled technologies such as smart phones have made collaboration significantly more mobile (p.35-36)."

Telecommunication technologies in its many forms, Internet connected computers, tablets, or smart phones to name just a few, have made possible the creation of virtual teams. In the original research, Graham et al. (2015) described virtual teams this way.

"According to Brandt, England, and Ward (2011), the ability to construct extremely adaptable and effective virtual teams is becoming essential to firms. Brandt et al. stated that virtual teams can be individuals working together who have never met in person and often will not meet face-to-face during the assigned project. There are variations of this definition. Virtual teams, according to Green and Roberts (2010), are geographically separated teams that have little face-to-face contact and are dependent upon computers and telecommunication technologies to communicate with each other. (p.31). In research that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

followed the Graham et al. 2015 publication, Graham and Daniel (2016) further expanded the definition of virtual teams by citing the existing literature on the topic between 2004 and 2011.

"There are many variations of the definition of virtual teams. Virtual teams, according to Green and Roberts (2010), are geographically separated teams that have little face-to-face contact and are dependent upon computers and telecommunication technologies to communicate with each other. Martins, Gilson, and Maynard (2004) developed their own definition of virtual teams as "teams whose members use technology to varying degrees in working across locational, temporal, and relational boundaries to accomplish an interdependent task" (p. 808). Martins et al. (2004) added that virtual teams are teams first, and that the 'virtualness' is a team characteristic. Powell, Piccoli, and Ives, (2004) stated that virtual teams are "groups of geographically, organizationally, and or dispersed workers brought together by information and telecommunication technologies to accomplish one or more organizational tasks (2004; p. 7)."

It should be noted that these virtual teams bring with them certain value to the organization that use them. For example, Zivick (2012) stated that organizations are using virtual teams to accomplish business goals. Martins et al. (2004) reported that the use of virtual teams that use technology to interact with each other across geographic, organizational, and other boundaries are becoming very common in organizations (p. 805). Not only are virtual teams used more frequently in organizations, Brandt, England, and Ward (2011) stated that firms report these teams must have the ability to be constructed rapidly and be extremely adaptable to meet each individual project's goals. Kayworth and Leidner (2000) reported that many benefits are derived from these virtual teams: cost reductions, cycle-time reductions, integration of distant members, and improved decision-making and problem-solving skills. Arguably, the significance of virtual teams is best stated by Hargrove (1998) who stated: "in the future, the source of human achievement will not be extraordinary individuals, but extraordinary combinations of people."

That said, virtual teams, like information systems development, come with their own set of challenges that must be overcome or mitigated to achieve their goals. Some of the challenges associated with virtual teams include:

- Difficulty in establishing trust among team members that may have never met face to face (Brandt et al., 2011);
- Cultural and language differences become more pronounced and can result in increased distrust in virtual teams (Brandt et al., 2011);
- Lack of rules for communication, combined with cultural and language differences, can lead to a "break down" of communication amongst virtual team members. Like cultural and language differences, a lack of rules for communication can also result in increased distrust in virtual team members (Brandt et al., 2011);
- Inadequate social skills. Brandt et al. (2011) reported that expertise should not be the only reason for assembling a virtual team. Social skills are required for the effective exchange of "know how" among virtual team members;
- Like one of the reasons for any information systems development projects cancellation, a lack of clear well-articulated set of project goals keep virtual teams from performing effectively as well (Brandt et al., 2011);
- Ruggieri (2009) stated that another challenge virtual teams must overcome is the ability of team leaders or managers to "encourage, reward, and motivate" their employees through physical presence and comments. In virtual teams, the lack of physical presence makes rewarding employees

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

more difficult. Differences in cultural norms can contribute to this as well as it makes it harder to create a common award system for all virtual team members;

- Decreased time. Sridhar, Nath, Paul, and Kapur (2007) reported that trust and relationships between virtual team members and team leaders improves over time and this more mature relationship among virtual team members and team leaders has been shown to impact the quality of outcomes both for virtual team projects and virtual team cohesiveness. Shorter term virtual projects do not get the opportunity to mature their relationships and resultant team cohesiveness;
- Blackburn, Furst, and Rosen (2003) report that in addition to what is listed above, that certain "knowledge, Skills, and Abilities (KSAs)" are also required in successful virtual teams. According to Blackburn et al. these KSAs include: comfort with technology and technology change.

Bhat, Pande, and Ahuja (2017) found that virtual teams face problems that face-to-face teams do not. Specifically, they found that virtual teams experience "decreased social interaction, communication and emotional expression (p. 35)". The findings presented by Bhat et al. (2017) state that virtual team may suffer a consequence for this. This is supported by research conducted by Brandt et al. (2011) and Hoegl and Muethel (2016) that have emphasized the importance of quality communication within virtual teams as requirement for successful virtual team project outcomes. Pozin, Nawi, and Romle (2016) report much of the same. Pozin et al. (2016) investigated he effect of communication on difference project stages and identified key factors to enhance virtual team communication. The findings primarily supported previous research that virtual teams are an effective way to have project teams communicate but add that the ability to rapidly develop communication technology that is flexible enough to support multi-national communication is necessary.

Virtual Leadership Impact on Virtual Teams Study

The original study conducted by Graham et al. (2015) was described this way:

This was a cross-sectional study that examined the impact of the type of leadership among Generation Y leaders and the effectiveness of leadership on virtual team project quality and virtual team effectiveness. The study was conducted with sophomore students at the Maine Business School. Millennial students worked in randomly assigned teams on the design and development of an MS Access database management system. The quality of the completed team project was defined as one that met the team project criteria which included:

- *Creating a list of three to five business requirements which state how the database management system should work;*
- *An entity-relationship (ER) model that graphically represents specific database management systems entities such as tables, relationship types, fields, and field data types;*
- *The completed database management system itself which would need to include physical tables, relationships, forms, queries, and reports.*

The Virtual Environment

According to Graham et al. (2015), the virtual environment was described this way:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The environment available for use in this study was Google Sites. Google Sites allowed students to work on the group / team project in a virtual environment. This virtual environment allowed students to communicate, asynchronously and synchronously; upload and download files such as word documents and database files; and collaborate on documents. Students were told at the beginning of the study that they must conduct all communication within the Google Sites. (Graham et al., 2015)

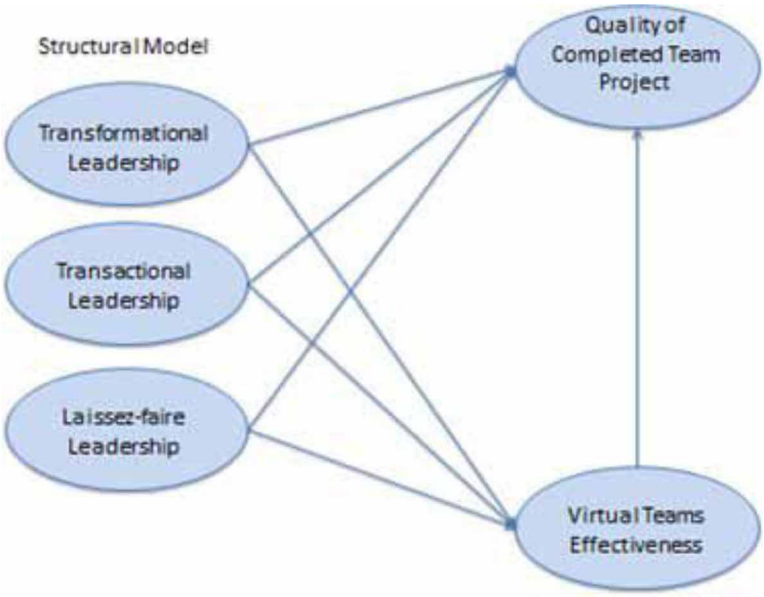
To determine leadership types impact on both virtual team project quality and virtual team effectiveness, Graham et al. (2015) developed three hypotheses for the study. They were:

H1: In comparison to Transactional and management by exception leadership types, Transformational leadership type will be most effective in leading a virtual team in developing a database management system.

H2: In comparison to Transformational and management by exception leadership types, Transactional leadership type will be most effective in leading a virtual team in developing a database management system.

H3: In comparison to both Transformational and Transactional leadership types, Management-by-Exception leadership type will be most effective in leading virtual team in developing a database management system. Figure 1 shows the structural model used in this study (Graham et al., 2015).

Figure 1. Structural model for determining the effect of leadership type impact on virtual team effectiveness and quality of completed team project



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Instruments Used to Measure Leadership Type and Virtual Team Effectiveness

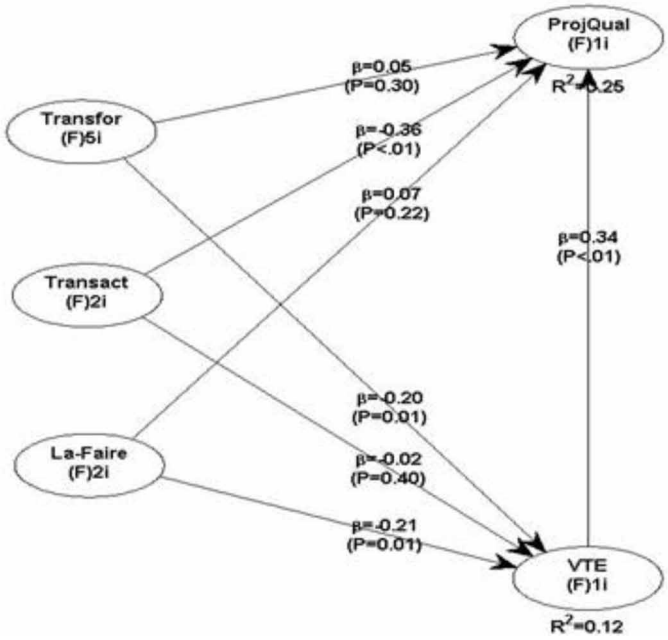
Graham et al. (2015) described the instruments used in the study to measure leadership type and virtual team effectiveness this way:

At the end of the study period, team members and leaders were required to complete the Multifactor Leadership Questionnaire (MLQ) survey and the Virtual Teams Survey (VTS) instruments through Qualtrics, a web-based survey tool. The MLQ measured leadership attributes and ascribed a leadership type to the team leaders based on leader attributes. Leadership types as measured by the MLQ are Transformational leadership, Transactional leadership, and Management-by-Exception (passive-avoidant) leadership. Virtual Team Effectiveness was measured by the global average of measurements of Team Formation, Team Member Relations, Team Leader Processes & Attributes and Overall Performance & Satisfaction with Team Members on the VTS. The resulting data were analyzed to understand which leadership type resulted in a successfully completed team project.

Study Findings in 2015

Graham et al. (2015) analyzed the data using a combination of descriptive statistics and Partial Least Squares – Structural Equation Modeling with WarpPLS. Figure 2 presents the findings of PLS-SEM analysis of the effect of leadership type on virtual team effectiveness and quality of completed team project.

Figure 2. Findings of PLS-SEM analysis on the effect of leadership type impact on virtual team effectiveness and quality of completed team project



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Graham et al. (2015) in their original publication of this research reported the findings of the three hypotheses investigated in the study. The results for each hypothesis is below:

H1: In comparison to Transactional and Management by Exception leadership types, Transformational leadership type will be most effective in leading a virtual team in developing a database management system. Upon data analysis, the study found that H1 was not supported. Rather, Transformational leadership style achieves a statistically significant and negative relationship with Virtual Team Effectiveness (β=-.20).

Factors of Transformational leadership that were significant included idealized influence and intellectual stimulation, however, they showed an inverse relationship, meaning they negatively influenced database systems development in a virtual team environment. One interpretation of the negative correlation of idealized influence associated with Transformational leadership on the quality of completed virtual team projects is that in the virtual environment, leaders do not get the opportunity to arouse and inspire those they lead due to the lack of face to face interaction. According to Purvanova and Bono (2009) Transformational behaviors exhibited by leaders are "emotional in nature and may occur less frequently in virtual teams" (p. 344). Purvanova and Bono (2009) went on to state that idealized influence in particular employ nonverbal and para-verbal cues and as such it may be hard to display and perceive those Transformational behaviors in computer mediated communication settings. Thompson and Coovert (2003) stated that an additional problem for Transformational leadership in virtual teams is that communication is much more labor intensive and more cognitively taxing than face to face communication. Purvanova and Bono (2009) stated that, for example, it takes at least four times longer to type than to speak and as a result these Transformational leaders may engage in less intellectual stimulation because "challenging team members to re-think their assumptions and engage employees in the decision-making process may prove too difficult and time consuming in virtual environments" (p. 345). One explanation of the negative correlation of intellectual stimulation associated with Transformational leadership on virtual team effectiveness is that according to Hambley, O'Neill, and Kline (2007) in the virtual environment leaders tend to use a one-way, top-down approach to communication and these leaders tend to micromanage. This suggests, according to Hambley et al. (2007), that virtual followers will not find their leaders to be very intellectually stimulating. Additionally, Chidambaram (1996) suggested that managers think of computer-mediated communication as a tool to achieve goals rather than a tool for relationship building. As such, if socio-relational communication is displaced by a more task orientated communication, Transformational leadership behaviors may suffer as well. In virtual environments both idealized influence and intellectual stimulation proved to have a significant and negative influence on database systems development. The rationale for these outcomes was stated above and suggests that virtual team leaders cannot successfully convey much of the required communication, verbal, nonverbal, and para-verbal, in the virtual environment necessary to inspire and arouse team members to follow them, much less motivate team members to think on their own about problem-solving. This finding reinforces Purvanova's et al. (2009) findings that "technology-deterministic communication theories predict and preliminary data from qualitative studies reveals, that each of the Transformational leadership behaviors will be harder to display in virtual than in face to face teams" (p. 345). This study's research on leadership types agreed with Purvanova et al. (2009) Technology-facilitated communication has been shown to have an overall negative effect on leadership behavior, as well as on followers' perceptions of leadership behaviors."

Graham et al. (2015) Reported Findings on H2:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In comparison to Transformational and management by exception leadership types, Transactional leadership type will be most effective in leading a virtual team in developing a database management system. Upon data analysis, the study found that H2 was not supported. Transactional Leadership Style achieved a statistically significant and negative relationship with Project Quality (β=-.36).

Graham et al. (2015) Reported Findings on H3:

In comparison to both Transformational and Transactional leadership types, Management-by-Exception leadership type will be most effective in leading a virtual team in developing a database management system. This Laissez-Faire leadership style achieved a statistically significant and negative relationship with Virtual Team Effectiveness (β=-.21).

Additional Findings Reported in 2015

- Leadership style and Virtual Team Effectiveness predict Project Quality (R2 = .25);
- Virtual Team Effectiveness achieves a statistically significant positive relationship with Project Quality (β=.34);
- Leadership style predicts Virtual Team Effectiveness (R2 = .12).

All three leadership styles influence project quality. Transactional Leadership style influenced project quality directly, while Transformational and Management-by-Exception styles influenced project quality indirectly through their direct influence on virtual team effectiveness.

Summary of Graham et al. (2015) Findings

The 2015 findings proposed that leadership type and virtual team effectiveness did predict project quality and virtual team effectiveness. However, the relationship yielded some surprising outcomes such as:

- Transformational leadership had a negative relationship with virtual team effectiveness;
- Transactional leadership has a negative relationship with project quality;
- Management-by-Exception (Laissez-Faire) had a negative relationship with virtual team effectiveness.

Recent Findings on the Topic of Leadership and Virtual Teams

The findings of Graham et al. (2015) study provides a few interesting associations for those leading millennials in the development of database management systems and more generalizable, information systems as a whole, in virtual environments. The first finding that leaders should take away is that the more they assert specific leadership attributes, the quality of the completed system goes down. What does this suggest in terms of leadership in virtual teams? Gilson, Maynard, Jones-Young, and Hakonen (2015) reported that in terms of transformational leadership, leaders that focused on relationships instead of project tasks were "perceived as more intelligent, creative, and original (p.7)." While Graham et al. (2015) study focused on team effectiveness and project quality, the leadership attributes measured did not address relationship building. The research proposed by Gilson et al. may suggest that if transfor-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

mational leaders focused more on relationship building among virtual team members they may create a more positive result on virtual team effectiveness. That research is supported by previous research by Sridhar et al. (2007) that found that virtual teams could be more effective if they had the time to develop better relationships among the virtual team members.

In another recent study, Carlson, Carlson, Hunter, Vaughn, and George (2017) investigated the moderating role of experience with instant messaging on team cohesion and openness had on virtual team effectiveness. Carlson et al. found that team cohesion had a major effect on virtual team effectiveness and that experience with instant messaging had a major effect on team openness; i.e., *this type of communication strengthened relationships among virtual team members*. This research by Carlson et al. (2017) reinforces finding presented here by both Gilson et al. (2015) and Hoegl et al. (2016) that relationship building in virtual teams seems paramount to improving virtual team effectiveness which should result in improved virtual team project quality.

Developing better relationships within virtual teams however will be more difficult for leaders than those leaders who benefit from co-location. For example, Liao (2017) stated that leadership in virtual teams is more challenging than face-to-face teams and building trust, forming shared mental models, and managing conflict will require more effort. Liao pointed out that "while relationship development in traditional teams can be organic and natural, virtual leaders might need to proactively guide the relationship building process, given the reduced richness of social information through computer mediated communication tools (p.649)".

In a more recent study, Hoegl et al. (2016) reported that many virtual teams perform better when leadership is shared. Their findings suggested that virtual team leaders who asserted more of their individual authority often tended to underestimate virtual team member's ability to lead themselves. Hoegl et al. (2016) goes on to state that this underestimation creates an environment in which virtual team members may feel that they do not have sufficient levels of autonomy to complete their specific tasks and that this lack of autonomy contributes to lower quality on the project. This research conducted by Hoegl et al. (2016) appears to reinforce the negative influence leadership styles had on both virtual team effectiveness and virtual team project quality as reported by Graham et al. (2015). Paradoxically, Hoegl et al. (2016) reported that "it is thus team leaders themselves hindering leadership effectiveness in virtual teams. (p.7)."

Hoch and Dulebohn (2017) define shared leadership as "a collective leadership process, whereby multiple team members step up to take the lead or to participate (p.681)." Hoch and Dulebohn (2017) go on to state that shared leadership is a mutual influence process carried out by team members where they lead each other toward the achievement of goals. According to Bell and Kozlowski (2002) and Hoch and Dulebohn (2013) this shared leadership in virtual teams makes sense since most virtual teams are made up of team members who possess skills and abilities that include: collaborative decision-making processes, foster motivation, take responsibility for project outcomes, and can influence and support other team members.

CONCLUSION

The Graham et al. (2015) original study on leaderships impact on the successful completion of database management systems and team effectiveness in virtual environments found that all three leadership styles influence outcomes (project quality). Transactional Leadership style influenced project quality directly,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

while Transformational and Laissez-Faire styles influenced project quality indirectly through their direct influence on Virtual Team Effectiveness. The research literature since 2015 suggests several reasons why this is but really appear to point to traditional styles of leadership as not being effective when leading virtual teams. Some of this is likely the result of the obvious differences between teams that work remotely from one another and teams that are co-located. The research literature in this area has plainly stated that the lack of physical presence in leaders diminishes traditional leadership attribution and that perhaps new approaches to leadership in virtual teams should be investigated more and developed. For example, research in the area of shared leadership approaches within virtual teams makes sense since each member of the team is likely a subject matter expert in their area and would not benefit from managers trying to assert themselves into how something should be done that they themselves are not experts in! Additionally, the research literature on relationship building among virtual team members appears to point towards better outcomes in virtual team projects as well. Intuitively this makes sense as well. We as human beings generally like to know that our leaders, managers, and teammates care about our well-being and have some emotional investment in us. Having a more stable relationship with us appears from the recent literature to lend themselves towards more successful project outcomes. Future research should investigate the relationship between shared leadership and improved relationships between team leaders and team members, improved relationships amongst virtual team members, and the links between them.

Another area of future research could investigate the linkages between improved collaboration technologies that create a greater sense of presence within virtual teams. The use of avatars for example in synchronous environments that allow for the acknowledgement and communication of non-verbal cues and its resultant impact of the quality of completed virtual team projects and or its impact of virtual team effectiveness.

QUESTIONS FOR PROFESSORS TO ASK

1. What are some challenges that virtual teams must overcome to successfully complete assigned tasks?
2. Why does the author of this chapter feel that shared leadership can benefit the performance of virtual teams?
3. Why does the author of this chapter feel that improved relationships among leaders and teammates can improve both the rate of successful virtual team projects and improve virtual team effectiveness?
4. Is the author of the chapter missing something? Beyond concepts related to shared leadership and improved relationships, what else could improve the success rate for successfully completed virtual team projects and improve virtual team effectiveness?

REFERENCES

Bell, B. S., & Kozlowski, S. W. J. (2002). A typology of virtual teams: Implications for effective leadership. *Group & Organization Management*, *27*(1), 14–49. doi:10.1177/1059601102027001003

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bhat, S. K., Pande, N., & Ahuja, V. (2017). Virtual Team Effectiveness: An Empirical Study Using SEM. *Procedia Computer Science*, *122*, 33–41. doi:10.1016/j.procs.2017.11.338

Billington, M., & Billington, P. (2010). Innovative business education methods for leaders and managers. *The Journal of Applied Business and Economics*, *11*(4), 44–55.

Blackburn, R., Furst, S., & Rosen, B. (2003). *Building a winning virtual team. Virtual teams that work: Creating conditions for virtual team effectiveness*. San Francisco, CA: Jossey-Bass.

Bracy, C., Bevill, S., & Roach, T. D. (2010). The millennial generation: Recommendations for overcoming teaching challenges. *Proceedings of the Academy of Educational Leadership*, *15*(2), 21–25.

Brandt, V., England, W., & Ward, S. (2011). Virtual teams. *Research Technology Management*, *54*(6), 62–63.

Carlson, J. R., Carlson, D. S., Hunter, E. M., Vaughn, R. L., & George, J. F. (2017). Virtual team effectiveness: Investigating the moderating role of experience with computer-mediated communication on the impact of team cohesion and openness. In Remote Work and Collaboration: Breakthroughs in Research and Practice (pp. 687-706). IGI Global.

Dalcher, D., & Drevin, L. (2003). Learning from information systems failures by using narrative and ante-narrative methods. In *Proceedings of the 2003 annual research conference of the South African Institute of Computer Scientists and Information Technologists on Enablement through technology* (pp. 137-142). South African Institute for Computer Scientists and Information Technologists.

Ewusi-Mensah, K. (1997). Critical issues in abandoned information systems development projects. *Communications of the ACM*, *40*(9), 74–80. doi:10.1145/260750.260775

Gilson, L. L., Maynard, M. T., Jones Young, N. C., Vartiainen, M., & Hakonen, M. (2015). Virtual teams research: 10 years, 10 themes, and 10 opportunities. *Journal of Management*, *41*(5), 1313–1337. doi:10.1177/0149206314559946

Graham, C. M., Daniel, H., & Doore, B. (2015). Millennial Leadership: The Oppositional Relationship between Leadership Type and the Quality of Database System's Development in Virtual Environments. *International Journal of e-Collaboration*, *11*(3), 29–48. doi:10.4018/ijec.2015070103

Graham, C. M., Daniel, H., & Doore, B. (2016). Millennial Teamwork and Technical Proficiency's Impact on Virtual Team Effectiveness: Implications for Business Educators and Leaders. [IJeC]. *International Journal of e-Collaboration*, *12*(3), 34–50. doi:10.4018/IJeC.2016070103

Green, D., & Roberts, G. (2010). Personnel implications of public sector virtual organizations. *Public Personnel Management*, *39*(1), 47–57. doi:10.1177/009102601003900103

Hambley, L. A., O'Neill, T. A., & Kline, T. J. (2007). Virtual team leadership: The effects of leadership style and communication medium on team interaction styles and outcomes. *Organizational Behavior and Human Decision Processes*, *103*(1), 1–20. doi:10.1016/j.obhdp.2006.09.004

Hannola, L., & Ovaska, P. (2011). Challenging frontend-of-innovation in information systems. *Journal of Computer Information Systems*, *52*(1), 66–75.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hargrove, R. A. (1998). *Mastering the art of creative collaboration*. New York, NY: McGraw-Hill.

Hoch, J. E., & Dulebohn, J. H. (2013). Shared leadership in enterprise resource planning and human resource management systems implementation. *Human Resource Management Review*, *23*(1), 114–125. doi:10.1016/j.hrmr.2012.06.007

Hoch, J. E., & Dulebohn, J. H. (2017). Team personality composition, emergent leadership and shared leadership in virtual teams: A theoretical framework. *Human Resource Management Review*, *27*(4), 678–693. doi:10.1016/j.hrmr.2016.12.012

Hoegl, M., & Muethel, M. (2016). Enabling shared leadership in virtual project teams: A practitioners' guide. *Project Management Journal*, *47*(1), 7–12. doi:10.1002/pmj.21564

Jones, C., Ramanau, R., Cross, S., & Healing, G. (2010). Net generation or Digital Natives: Is there a distinct new generation entering university? *Computers & Education*, *54*(3), 722–732. doi:10.1016/j.compedu.2009.09.022

Kayworth, T., & Leidner, D. (2000). The global virtual manager: A prescription for success. *European Management Journal*, *18*(2), 183–194. doi:10.1016/S0263-2373(99)00090-0

Kock, N. (2005). What is e-collaboration. *International Journal of e-Collaboration*, *1*(1), 1–7.

Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2010). *Social Media & Mobile Internet Use among Teens and Young Adults. Millennials.* Pew internet & American Life Project.

Liao, C. (2017). Leadership in virtual teams: A multilevel perspective. *Human Resource Management Review*, *27*(4), 648–659. doi:10.1016/j.hrmr.2016.12.010

Oblinger, D. (2003). Boomers gen-xers millennials. *EDUCAUSE Review*, *500*(4), 37–47.

Powell, A., Piccoli, G., & Ives, B. (2004). Virtual teams: A review of current literature and directions for future research. *ACM Sigmis Database*, *35*(1), 6–36. doi:10.1145/968464.968467

Pozin, A. M. A., Nawi, M. M. N., & Romle, A. R. (2016). Effectiveness of virtual team for improving communication breakdown in IBS project delivery process. *International Journal of Supply Chain Management*, *5*(4), 121–130.

Purvanova, R. K., & Bono, J. E. (2009). Transformational leadership in context: Face-to-face and virtual teams. *The Leadership Quarterly*, *20*(3), 343–357. doi:10.1016/j.leaqua.2009.03.004

Ruggieri, S. (2009). Leadership in virtual teams: A comparison of transformational and transactional leaders. *Social Behavior and Personality*, *37*(8), 1017–1021. doi:10.2224bp.2009.37.8.1017

Sridhar, V., Nath, D., Paul, R., & Kapur, K. (2007). Analyzing Factors that Affect Performance of Global Virtual Teams. *Proceedings of the Second International Conference on Management of Globally Distributed Work*, 159-169.

Tapscott, D. (2009). *Grown up digital* (Vol. 361). New York: McGraw Hill.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Thompson, L. F., & Coovert, M. D. (2003). Teamwork online: The effects of computer conferencing on perceived confusion, satisfaction and post-discussion accuracy. *Group Dynamics*, *7*(2), 135–151. doi:10.1037/1089-2699.7.2.135

Warkentin, M., Moore, R. S., Bekkering, E., & Johnston, A. C. (2009). Analysis of systems development project risks: An integrative framework. *SIGMIS Database*, *40*(2), 8–27. doi:10.1145/1531817.1531821

Williams, J., & Chinn, S. (2009). Using Web 2.0 to support the active learning experience. *Journal of Information Systems Education*, *20*(2), 165–174.

Zivick, J. (2012). Mapping global virtual team leadership actions to organizational roles. *The Business Review, Cambridge*, *19*(2), 18–25.

This research was previously published in the Handbook of Research on Technology Integration in the Global World; pages 422-435, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 83
Critical Thinking of Human Resources in the Goal:
A Research Note

Brian J. Galli
https://orcid.org/0000-0001-9392-244X
Assistant Professor and Graduate Program Director, Master of Science in Engineering Management Industrial Engineering, Hofstra University, USA

ABSTRACT

Recently, changes within the business industry have led to human resource management (HRM) positions and structures being reconsidered. Human resources (HR) used to be centralized, but the constant changes to organizational culture has caused HR to become decentralized. The HR operations have been incorporated into other departments, as well. Now, HRM is essential to business processes that mirror other departments, such as accounting and finance, but HR is still centralized in specialized areas, such as recruitment and compensation. Examining Goldratt & Cox's "The Goal" reveals its involvement with HRM. This study evaluates the implication of HRM on a business, its relationship to the Theory of Constraints (TOC), and the ways in which these concepts can aid a business in reaching its main objective.

1. INTRODUCTION AND BACKGROUND

The Town of Bearington had been losing major employers. Many companies left to escape the union politics and economic pressures. They also started paying lower wages to make more money. This increased the town's unemployment rates. Also, Uni-Co had some major layoff six months prior, adding to unemployment rates. The impending plant closure meant that there will be layoffs. As a symbol of the town's resurrection and the anchor that unites the company, the plant symbolizes vitality, but Uni-Co is a unionized plant with consistently good union relations and labor. The book did not address any significant complaints or filings of grievances.

DOI: 10.4018/978-1-7998-7297-9.ch083

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bearington is the hometown of Alex Rogo, a plant manager of Uni-Co. He had been away for many years, and was transferred there six months earlier inheriting the plant in its current state. His boss Bill Peach sees potential for improvement in the plant and believed Alex could turn it around. Alex Rogo came from a different culture. Peach was his manager, open to innovative ideas, and a strong belief that employees must feel good about their work to be productive, but that was when sales and budgets were doing well. With a promotion, the profit in his division's plants are decreasing, so he relies on Rogo to make improvements to save his job. Essentially, Alex is responsible for the plant's failure, and he feels responsible for Uni-Co helping to advance his career.

In the factory, there were no sufficient performances, timely shipments (a warning sign in manufacturing plants) or profits. The root of many of these issues was competition. High quality products cannot be manufactured at a cheap price when competing in aspects like price, deliveries, and product design. However, Uni-Co's technology was a benefit, as it has the best computer systems, machines, and it has the most advanced robots of any other plant. Also, Uni-Co has excellent HR with exceptional employees and an absence of union issues. Uni-Co has great quality and they never ship an item without testing it, but they need money, so they also need to be competitive.

Therefore, this discussion focuses on a critical analysis of the human resource management perspective, based on the decisions made by several figures in the company's management positions. This paper also focuses on the implications and learned lessons from the book regarding effective HR management in global corporations (Schindlholzer et al., 2011). Section 1 presents key background information about The Goal and the major factors in the book. Section 2 presents the key findings of applying human resource management principles to the scenario in The Goal, while section 3 outlines the managerial relevance and implications of the role human resource management plays in any organization. Section 3 also concludes the paper by presenting the limitations and future research of the topic, while also presenting the originality and contribution of this research to different research areas and topics.

2. ANALYSIS AND INSIGHTS

2.1. HRM Role in the Original State of the Performance

HR uses performance standards (for each job position) as a tool to measure employees' performance, set goals, and identify development needs and potential improvements. The same concept can be applied to factory performance. Any organization without performance development and improvement can die. The performance perception is that employees are always working, resulting in company productivity and profitability (Schindlholzer et al., 2011). Measurements were needed to review processes and determine if the company is productive and profitable or not. Traditionally, management reduces capacity to decrease costs and increase profits (Galli, 2018; Nabi et al., 2015; Schindlholzer et al., 2011).

The problem with Uni-Co was that they were just meeting the performance standards and the status quo. That is not an improvement. According to Rogo, measures of productivity and efficiency were up, and costs were down in his plant. This disregarded the overall performance measurements on the divisional level. The only thing that mattered was reducing cost and boosting revenue. However, according to Jonah, those measurements were just a game of numbers and words (Galli, 2017). A realistic evaluation of the factory's progress was not performed nor measured. Moreover, the goal was not understood, so productivity is meaningless unless the goal is known (Kaoud, 2017).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bob Donovan, the production manager for nine years, is portrayed as a conscientious employee, responsible for controlling labor costs; creating and maintaining employee morale; protecting employee's health and physical conditions; improving job performance, and creating cooperation and smooth working relationships (Schindlholzer et al., 2011). However, at first, just to get things done he suggested putting everyone to work on delayed orders regardless of the rules. He did not think that policies exist for a purpose and have consequences, such as increased costs and decreased efficiencies (Badsi et al., 2017). He assumed that driving productivity would increase the urgency to produce (Galli, 2017; Nabi et al., 2015).

HRM's tools challenge managers and employees in their creativity and capacity to develop plans to address the causes of problems. Moreover, HRM adds value to a company, in this case, Alex's plant, which is considered a profit center, because its techniques are needed to manage issues and to help improve performance, productivity, and profitability by evaluating checking progress regularly (Svejvig & Anderson, 2015). In addition, HRM is related to the management process of planning, organizing, staffing, leading, controlling, and improving performance, as well as formulating and executing policies and practices to produce (employee) performance improvement and effectiveness (Schindlholzer et al., 2011Therefore, a few sacrifices were required to reduce expenses, increase productivity, and to maintain consistent and standard parameters. The problem with the division was that sales and efficiencies were down, costs increased, and the division's cash flow was low (Nabi et al., 2015).

2.2. HRM Principles and Improvement in Operations

According to Jonah, productivity has no meaning if the goal is not known Goldratt & Cox (2016). Therefore, once Alex learned the goal, he started applying HR principles to improve his management style and hopefully performance. He realized that to achieve the goal he must have cost-effective purchases, good employees, high technology, quality products, market share, communication, and customer satisfaction (Svejvig & Anderson, 2015).

Alex managed diversity well. Although the selection of his team was made using halo effects, Alex did not discriminate against age, sex or race. Each overall member's contribution to the plant was reviewed regarding competencies and behaviors that the factory needed to achieve the goal. Alex Rogo and his selected managers (Bob, Stacey, Lou, Ralph Nakamura) worked together to identify and execute a plan to match the plant's capabilities with the demands of its market to reach the goal (Galli, 2017; Tinnilä, 2013). Alex used workforce management to encourage his team's involvement, commitment, and self-management (Svejvig & Anderson, 2015). The team experienced a high level of connectivity to their tasks – this drove performance and productivity, which translated, into sales increase, higher quality, revenue growth, and less expedited orders. He also maintained communication with workers to make them understand how their units contribute to achieving the goal (Svejvig & Anderson, 2015).

The team used evidence-based management to (1) support proposals, decisions, practices, and conclusions and (2) to drive performance, communication, and leadership. They also evaluated the plant using a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. Strengths: market leadership, high-quality products, costs advantages. Weaknesses: large inventories, weak market image, lack of management depth. Opportunities: new overseas markets, competitors failing, and diversification. Threats: the threat of closing, low-cost foreign competition, slow market growth, unions (Svejvig & Anderson, 2015). These principles helped improve the operation of the plant and competition by generating more productivity and higher quality products (Badsi et al., 2017). Alex's continuous process to manage operations was:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Define Current Business:** PLANNING
- **What are the Challenges Faced? Weakness and Strengths:** PLANNING
- **Formulate a New Direction:** PLANNING
- **Translate the Mission into the Goal:** PLANNING
- **Formulate Strategies to Achieve the Goal:** PLANNING
- **Implement the Strategies:** EXECUTION
- **Evaluate Performance:** EVALUATION

Moreover, three measurements Jonah gave him and defined – throughput (sell more), inventory (should decrease), and operational expenses (should decrease) – were used as measurements. According to Goldratt & Cox (2016), measurement not defined is worse than useless.

2.3. Stakeholders Role in Improving Operations, Quality and in TOC

A stakeholder is any person with interest in the business (Snyder, 2014). Their involvement level and roles vary, depending on the type of stakeholder: internal or external. HRM describes ways to manage people by staffing, employee compensation, benefits, and defining/designing work with the purpose to maximize the productivity of an organization by optimizing the effectiveness of its employees (Galli, 2017; Tinnilä, 2013). People are considered the most important asset for any company and no business can do without effectively acquiring, motivating, developing, and managing that resource. HR managers are committed to managing the productivity and development of workers whose talents and desires are consistent with the organization's needs and goals (Svejvig & Anderson, 2015).

However, some stakeholders can be categorized as constraints that prevent achievement of the organization's goal. Consequently, stakeholders and TOC can play a decisive role regarding operations and quality of the organization. TOC focuses on identifying and eliminating bottlenecks (constraints) that limit the company's profitability by measuring inventory, throughputs, and operational expenses performance to improve product quality and profit.

- **Company Employees (Internal Stakeholders):** top management set the direction for the company and company's employees to carry out the tasks by working directly with products. Success depended on their skills, knowledge, and dedication to reach profits (Margulis & Galli, 2017; Tinnilä, 2013). Managers motivated employees and improved their efficiency. Improving employee skills and maintaining a positive, productive work environment contributed to improving operations and ability to fill orders on time with the highest quality. The TOC does not highly focus on cutting expenses, but more on boosting sales. Large amounts of idle inventory were turned over and efficiently utilized (Elloumi et al., 2017). Machines with bottlenecks (the weakest link and the constraint), that were preventing better performance, were identified and put to work at its highest potential compared to non-bottleneck machines (Galli, 2017; Margulis & Galli, 2017). The improvements led to a decrease in inventory, an increase in throughput (more productivity and sales) and improved profitability. The order in which quality control was performed was changed, contributing to less waste and rework and ultimately, an increase in quality product (Tinnilä, 2013; Alfes et al., 2013).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Alex Rogo and his team's role were to build competitive advantage by differentiating their product turnaround from those of the competitors thus increasing product quality, market share and profits on a functional level. Alex worked with managers from other departments and used their input to hammer out a plan to accelerate deliveries and improve the quality of the output. He took the advice of Jonah and successfully changed the order in which quality control was performed and achieved not only better quality but also more productivity (Alfes et al., 2013). Alex and his team, with the help of Jonah's advice, figured out how to take care of bottlenecks against non-bottlenecks to boost sales and profitability and to reduce inventory while maintaining on-time deliveries of high-quality products (Schindlholzer et al., 2011). Stakeholders on the organizational level resisted Alex's plant procedures for improving operations and quality because Alex's plant was not following protocol and not in compliance with the mandated laws and procedures of accounting. They only paid attention to productivity improvement with emphasis on cost reduction, which was not emphasized in the TOC (Galli, 2017; Schindlholzer et al., 2011).

- **External Stakeholders:** Rogo's family. His wife Julie was a big influence on decisions that Rogo made at the plant. Julie can also be portrayed as a constraint because of the problems (inventory) that occurred at home that prevented the household from achieving complete happiness (throughput) (Elloumi et al., 2017). Rogo's mother can be portrayed as a non-bottleneck.
- **Customers:** Customer's role is critical to the factory's existence and success. The product has to meet the customer's needs. Customers determine the success or failure of a product or company through feedback. This feedback enables a product to improve its quality and a company to produce more orders if more orders if the customer is satisfied with the product quality and delivery timelines. Customers influenced the demands regarding sales because of delivery delays (Tinnilä, 2013). However, after the application of the TOC, they were pleased, not only with the fact that they were receiving their product by or before the deadlines, but that the product had better quality. This led to a better customer relationship and more sales (Schindlholzer et al., 2011).
- **Vendors:** play a role when companies need supply of raw materials or components. If vendor's activities are interrupted, a major disruption in manufacturing, scheduling and deadlines are the result. Vendors can also be innovative, in that they can offer more efficient and productive items causing the company to offer various products. The more raw materials that were sold to the plant (decreased inventory) not only increased their internal sales and profits, but also the cost of the factory (Agrawal and Sharma, 2014; Schindlholzer et al., 2011). Above noted stakeholders' roles reflected had a major influence in achieving the (plant's) goal.

2.4. How Did (Does) HRM Impact Goldratt & Cox's TOC?

HRM mainly focuses on employee commitment; the human factor and the TOC influenced the plant's decision-making. Organizations are now able to identify employee constraints and adequately apply HR strategies such as training programs and compensation plans to compensate for the constraints (Margulis & Galli, 2017). HRM can influence the TOC in a day-to-day process in manufacturing by enhancing skills, communication, and cooperation (among workers) that help operate in a unified manner to sustain employee development. Development of quality employees increases productivity and efficiency resulting in more sales and profits (Margulis & Galli, 2017; Tinnilä, 2013).

Building a cohesive team by enhancing member participation, commitment, involvement, and leadership skills contribute to satisfactory productivity, motivation, morale, and discipline. Working together

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

towards a common goal decreases constraints and increases the ability to reach the goal much sooner (Baumgartner, 2014). Incorporating a plant's cultural transformation regarding new processes and improvement in the attitudes of the workers helps them become more efficient and oriented towards the goal "to make money" (Felfel et al., 2017).

2.5. How Does "Herbie" (aka the Bottleneck) Impact the Use of HRM

The idea of "Herbie" was brought at the time when Alex went on a boys Scout hiking trip with his son and the troop and became the only boy's scout leader on the hiking trip. This trip became an analogy of Alex and his plant. Alex, the plant manager, and his plant resources were the boys' scouts. As the hike went on, Alex compared and analyzed the hike performance with the plant performance (Tinnilä, 2013). A boy scout represented each machine in the plant, and each is a link (resource) of a chain (organization). Herbie was one of the boys in the troop, and it is impressive how Alex made used the halo effect to describe him and to imply that he was going to be trouble (Baumgartner, 2014; Svejvig & Anderson, 2015). He was the slowest one from the troop (Tinnilä, 2013).

He identified Herbie's performance and determined that he was the limiting factor that prevented the others from reaching their destination within timeframes. The idea of "Herbie" was born and used for constraint analysis. "Herbie is the one who is governing the throughput for the troop as a whole" (Galli, 2017; Goldratt & Cox, 2016, p. 115). The idea of dependent events and statistical fluctuations became clear to Alex. He understood, then, that he had to identify and assess the Herbies at the plant and stop spending time optimizing non-bottlenecks because they will only add to the constraint and hinder achievement of the goal (make money). He used that theory to manage the resources at his plant and identified two bottlenecks (Herbies) at the plant, which were addressed in collaboration with his team (Tinnilä, 2013.). The successful synchronization of the links will satisfy the company's goal. Identifying and assessing the Herbies (the weakest links) helped HR implement new strategies such as training programs, working conditions (example: break time) and, most importantly, performance improvement (Felfel et al., 2017; Galli, 2017; Svejvig & Anderson, 2015).

2.6. What Is the Role of Management and Leadership in HRM?

Leadership is about leading people. Management is about managing tasks or requests resulting in changes in HR policies. Managers work with their employees regularly. Leaders manage the group of managers in the business units. While leaders provoke changes, managers prefer the stability. While the leader gives the vision, the managers (followers) make changes happen. However, initiatives and changes must be supported by HR (Singh & Vyas, 2016; Armstrong & Taylor, 2014).

This excerpt shows the difference between a leader and a manager. "Managers have not yet internalized the conceptual difference in guiding operations to concentrate on improvement throughput rather than concentrating on reducing cost" (Goldratt & Cox, 2016, p. 347). Nowadays, companies need managers with strong competencies, in particular, leadership skills so they can be groomed for higher roles and responsibilities and career advancement. In the case of Alex Rogo, he allocated for career progression based on his skills and capability assessment (Kaoud, 2017; Svejvig & Anderson, 2015). Therefore, HRM plays a vital role throughout the employee lifecycle regarding skill development and profitability (Armstrong & Taylor, 2014).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Alex is a leader (a coaching type of leader), and his team is managers. Alex innovates, inspires trust, motivates, asks, explains, and gives direction. He was a significant contributor to the cultural change in his plant that affected day-to-day activities and changed perceptions of employees. On the other hand, a manager administers, relies and controls short-term views, asks (how and when), and executes (Singh & Vyas, 2016). Managers, especially Ralph Nakamura, were inspired and motivated by the Theory Y. According to this theory, people like to work and are motivated by a greater responsibility and engagement in problem-solving. They take pride in a job well done. Thru motivation based on improvements, Alex gets better outcomes, more accountability, and more efficient use of resources (waste and defect reduction). This helped in job amplification and enrichment to boost productivity (Storey, 2014).

Leading change: that journey required lots of communication and associations with history, current status, and who is to be impacted by the change (Tinnilä, 2013). CHANGE= MOTIVATION * VISION * NEXT STEPS. Alex's vision included building a long-term competitive position in the marketplace. The motivation was there, and his team progressively learned his vision. The steps to take next, to progress toward the vision, had to be explained, as they each will fit into that vision. The team was able to adapt to changing needs. Changes were done in small parts and measured accordingly to keep interest and motivation, and to unfold self-learning using problems as precursors to come up with solutions. Changes are good, but they caused stress in Alex's life not only at work and but at home (Kaoud, 2017; Singh & Vyas, 2016; Storey, 2014).

2.7. How Does a Bottleneck Impact HRM?

Bottlenecks limit the ability to improve throughput. Bottlenecks can be a capacity constraint, market constraint, physical constraint, policy constraint, behavioral constraint, and so forth. For example, "no overtime" policy is a constraint put upon the company (system) (Gera et al., 2017). Physical constraints are resources, which can be a machine or a person, whose capacity is less than the demand placed on them (Tinnilä, 2013). So how do we identify the constraint to control the flow of a product? In applying the TOC, companies can control the pace of the system, so an hour gained by the physical constraint is an hour gained for the entire organization (Kaoud, 2017). If the concept is applied on non-bottlenecks, then the concept has no impact. Rogo and his team discovered that some machines represented the bottlenecks, and, through the process of on-going improvement, they evaluated the capacity of the machines, the machinists, and the inputs and output of inventory to improve the performance of that bottleneck (Soderlund & Bakker, 2014).

2.8. Relationship Between Technology and HR

Technology has changed the business world because most of businesses cannot function without the use of technology, including HR. Technology has made recruiting and training new staff members (locally or remotely) more efficient and effective. Moreover, the use of technology has assisted HR with practically an elimination of paperwork (Agrawal and Sharma, 2014). Storing it and retrieving files has been very efficient and it is easy to reproduce and available on-demand. Employee performance assessment and company measurements have been used for the betterment of the organization (Singh & Vyas, 2016; Gera et al., 2017).

However, technology alone does not generate improvement and cannot set its own pace. Technology is dependent on another area. The idea of dependent events from the TOC is re-introduced, where

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

technology can be the bottleneck and HR the area that feeds it. The idea of garbage in garbage out comes to mind (Gera et al., 2017). The results of technology can be as good as the input and are useful in providing projections, improved employee (Kaoud, 2017). Technological changes affect the nature of jobs, but robots create precision. Alex was not sure of the effect of robots on throughput (without applying the TOC) because not only did inventory increase, but robots increase depreciation (new equipment), operational expense, and efficiencies. Technology, along with HR, plays an essential role in any organization because a bottleneck can be easily highlighted with the use of software (Kaoud, 2017). Thus, companies can act proactively, and improvements can be implemented, thereby increasing performance and revenue (Singh & Vyas, 2016; Soderlund & Bakker, 2014).

2.9. HRM Role in Quality

HRM provides training, employee empowerment, team-based reward systems, and communication of workers' role in quality. The concepts of TQM applied to HRM can have positive results, generating good product quality and organizational growth (Gera et al., 2017).

The need for quality improvement allows HR to contribute to the bottom-line and to add value to the products like other departments (production, accounting, and marketing) add value. It brings senior managers and HR executives together to involve and empower them in the decision-making and problem-solving of how to provide training, reduce error and mistakes, and provide quality products (Galli et al., 2017; Gera et al., 2017). This empowerment is achieved through training and, not only requires skills, but makes executives responsible and accountable for accomplishing the task. This task, if successful, accomplishes high quality, customer satisfaction, and ultimately profits. Therefore, HRM impacts quality products by having employee involvement and commitment (Gera et al., 2017). HR, with the help of technology, record metrics related to activities required to achieve the goal, quantify them later, and measure them to get performance results. Prioritization of improvement activities is the goal to reach to increase quality and profits, which help with getting fast improvements, better capacity, and less inventory (Singh & Vyas, 2016; Nabi et al., 2015).

3. CONCLUSION

3.1. Relevance anf Implications for Management and Project Environments

Based on the acquired skills and management strategies from the research, there is a need to utilize human resources in conducting business projects and in project management. This can be achieved by ensuring well-functioning human resources, where distinct skills are combined to create a team that envisions and realizes the company's or project's ultimate goals. In this case, there is a need to invest substantially in human resources before thinking of the mode of technology to use in the project or management (Galli et al., 2017; Soderlund & Bakker, 2014). The findings from this research study of *The Goal* helps to identify several managerial implications. More specifically, these results highlight the importance of a top-down and bottom-up approach to leadership and strategic planning, especially with regards to elements of operations management and process improvement. The results of this study highlight the criticality of integrating human resource principles into the leadership styles and tools used by leaders to manage their human resources (Margulis & Galli, 2017).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The findings from this study also highlight the importance of human resources throughout all aspects of an organization; obviously HRM is one element in an organization's business model, but this study shows that the human resource element directly impacts many other elements of an organization. Management and leadership of any organization need to have the training and skill sets to, not only manage their human resources, but to effectively do so. This study has shown that many of the current-state issues seen within the factory of *The Goal* stemmed from the leadership's lack of effectively leading and managing their employees. If the leadership is equipped with the tools and knowledge to effectively manage their human resources instead of focusing on the bottom line (i.e. profits and costs), then the performance of an organization will improve and, as a result, the profits and costs will also improve. Highlighted in this study is that business leaders tend to focus mainly on the financial elements of their business, at the expense of ignoring or minimizing the human resource element (Galli et al., 2017; Gupta & Boyd, 2008). This might work in the short term, but the factory in *The Goal* shows that it is not a good long-term strategy. Over the long term, leadership must have a multi-faceted approach where they manage operations, human resources, financials, performance, and strategy from one overarching understanding that all of these elements are critical and they are all related. By understanding this view, a business leader will be better equipped to lead a successful company in both the short term and long term.

3.2. Contributions to the Literature

Many researchers agree that organizations have a high likelihood of improving their business profitability when they promote and implement TOC. The companies' human resources through strategies of continual improvement develop TOC. However, it would be advisable for companies to follow the five steps of the thinking process of TOC. Based on the analysis of *The Goal*, much can be derived about the need for proper management skills that boost the company's production and profitability. Good management should be based on the fact that, for a company to achieve the ultimate goal of profit maximization, there is a need for well-established coordination that ensures both the human capital and technology are adequately used. Human capital should be nurtured to foster performance at the most efficient and optimal levels. There is also the need to ensure the company produces the product that will create and maintain customer loyalty. In this case, the quality of the product must be taken into consideration throughout all processes and decision-making. This quality can only be ensured through standards set by the human resource and proper planning on the step-by-step strategies to be employed. The book, therefore, demonstrates the management techniques that engage the human resource in achieving the goals of a company.

Review of the literature shows that there is limited research that explored the concepts and their relationships. Therefore, this study sought to further analyze these concepts and the relationships between them in general. In an effort to fill a void in the research identified earlier on this study and alleviate previously preconceived risks and uncertainty. The results of this research study contribute to several different fields of research and topics, including: human resource management, theory of constraints, project management, and process improvement. By performing this study, the results help to enhance and evolve these fields of research and topics since this study, not only built on existing research, but attempted to expand and fill a gap in the research that was identified earlier on this study. By more thoroughly understanding these concepts and their relationships, we can understand their advantages and disadvantages, which in turn should help improve their effectiveness.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

This study also contributes, since it introduces new ideas and avenues for future research in each of these fields of research and topics. This study not only sought to explore different concepts and their relationships, but it also sought to understand the relationships and identify new ways of thinking about the variables under study. The results of this study were also valuable from a practitioner perspective, since the understanding of these variables and relationships helped to introduce ideas and strategies that a practitioner can deploy to be more effective in their profession. The results from this study help a practitioner to understand the relationships and variables but also the implications related to these variables and relationships.

3.3. Limitations

Some research limitations restrict the study and results. Mainly, there was a limited sample size of only one book that only focused on this sample's key factors. Such a small sample size leaves the validity and conclusions open to bias and validity. To avoid this, a larger sample size is necessary. Additionally, the research only studied the relationship in reference to project environment between key factors. As a result, the conclusions and analyses can only be applied to project environments, but the findings cannot be applied to other areas (strategic management, operations management, etc.). Seeing as the conclusions and analyses are only applicable to these factors, one cannot confidently say that the findings can be used for other managerial settings or businesses.

3.4. Recommendations for Future Research

This report finds that the implementation of HRM strategies such as training, recruitment, and safety programs build effective teamwork. Performance appraisal may also improve the performance of businesses because employees can feel more motivated and engaged with the company. As a result, the company's profit can increase, which is the main goal of every company. After all, "The company exists to make money" (Goldratt & Cox, 2016, p. 46) as it is described in *The Goal*.

This paper recommends companies to follow the five steps of thinking of TOC. They are: (1) identification of constraints, (2) address and fix the constraints, (3) prioritize management of the constraints, (4) prevent its occurrence, and (5) be prepared for the next bottlenecks and go back to step one to repeat the process. This process will support companies in improving their performance and profitability. Also, the author strongly recommends for future researchers to include more strategies from Goldratt's other book *The Theory of Constraints.* This book can expand the viewpoint of HRM as an integral part of companies (Gera et al., 2017).

Future research should explore a few different arenas. For example, future research could investigate the HRM-TOC relationship, but in the context of other industries and managerial settings. In these settings or contexts, it would be interesting to study the strength of these variables and the relationship, as well as the factors that impact them. Another avenue of research could be to explore these strategies and their relationship from different perspectives, such as an organizational, strategic, or cultural point of view. This would shed further light into the how this relationship is perceived across many different views and further understand the depth of the impact that factors such as culture, strategy, human resources, operations have on the key variables and their relationship (Gera et al., 2017).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Agrawal, T., & Sharma, J. (2014). Quality function deployment in higher education: a literature review. *International Journal of Service Science, Management, Engineering, and Technology*, *5*(1), 1–13. doi:10.4018/ijssmet.2014010101

Alfes, K., Shantz, A. D., Truss, C., & Soane, E. C. (2013). The link between perceived human resource management practices, engagement and employee behaviour: A moderated mediation model. *International Journal of Human Resource Management*, *24*(2), 330–351. doi:10.1080/09585192.2012.679950

Armstrong, M., & Taylor, S. (2014). *Armstrong's handbook of human resource management practice*. Kogan Page Publishers.

Badsi, H. B. A., Ghomari, A. R., & Zemmouchi-Ghomari, L. (2017). A CRM Process Model for Agent-Based Simulation. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(4), 56–82. doi:10.4018/IJSSMET.2017100104

Baumgartner, R. J. (2014). Managing corporate sustainability and CSR: A conceptual framework combining values, strategies and instruments contributing to sustainable development. *Corporate Social Responsibility and Environmental Management*, *21*(5), 258–271. doi:10.1002/csr.1336

Elloumi, N., Kacem, H. L. H., Dey, N., Ashour, A. S., & Bouhlel, M. S. (2017). Perceptual metrics quality: comparative study for 3D static meshes. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(1), 63–80. doi:10.4018/IJSSMET.2017010105

Felfel, H., Ayadi, O., & Masmoudi, F. (2017). Pareto optimal solution selection for a multi-site supply chain planning problem using the VIKOR and TOPSIS methods. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(3), 21–39. doi:10.4018/IJSSMET.2017070102

Galli, B. (2017). HRM's importance throughout the organization: Analyzed through the concepts and views portrayed in Eli Goldratt's the goal. *IEEE Engineering Management Review*, *45*(3), 54–63. doi:10.1109/EMR.2017.2734322

Galli, B. (2017). The Economics of Lean Six Sigma in Healthcare. *Industrial Management (Des Plaines)*, (September/October), 26–30.

Galli, B., Kaviani, M. A., Bottani, E., & Murino, T. (2017). An investigation of shared leadership & key performance indicators in Six Sigma Projects. *International Journal of Strategic Decision Sciences*, *8*(4), 1–45. doi:10.4018/IJSDS.2017100101

Galli, B., Kaviani, M. A., & Margulis, C. (2017). The impact of change management on leadership in Six Sigma Teams. *Middle Eastern Journal of Management*, *4*(4), 267–282. doi:10.1504/MEJM.2017.087507

Galli, B. J. (2017). Lessons from Lincoln's leadership. *The Journal of Leadership Studies*, *11*(2), 72–80. doi:10.1002/jls.21517

Galli, B. J. (2017). How to truly win in business with leadership-a case study report. *Middle East Journal of Management*, *4*(3), 235–245. doi:10.1504/MEJM.2017.086426

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Galli, B. J. (2018). Using marketing to implement a strategic plan: reflection of practiced literature. *International Journal of Service Science, Management, Engineering, and Technology*, *9*(1), 41–54. doi:10.4018/IJSSMET.2018010104

Gera, R., Mittal, S., Batra, D. K., & Prasad, B. (2017). Evaluating the effects of service quality, customer satisfaction, and service value on behavioral intentions with life insurance customers in India. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(3), 1–20. doi:10.4018/IJSSMET.2017070101

Goldratt, E. M., & Cox, J. (2016). *The goal: a process of ongoing improvement*. Routledge.

Gupta, M. C., & Boyd, L. H. (2008). Theory of constraints: A theory for operations management. *International Journal of Operations & Production Management*, *28*(10), 991–1012. doi:10.1108/01443570810903122

Kaoud, M. (2017). Investigation of customer knowledge management: a case study research. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(2), 12–22. doi:10.4018/IJSSMET.2017040102

Margulis, C. S., & Galli, B. J. (2018). GPS patents and their effects on our future and rights. *International Journal of Service Science, Management, Engineering, and Technology*, *9*(1), 55–67. doi:10.4018/IJSSMET.2018010105

Nabi, G., Wei, S., & Shabbir, M. (2015). Does selection mechanism for temporary employees in public sector universities affect right selection? *International Journal of Service Science, Management, Engineering, and Technology*, *6*(3), 1–11. doi:10.4018/IJSSMET.2015070101

Schindlholzer, B., Uebernickel, F., & Brenner, W. (2011). A method for the management of service innovation projects in mature organizations.

Singh, B., & Vyas, O. P. (2016). A PSO based approach for producing optimized latent factor in special reference to big data. *International Journal of Service Science, Management, Engineering, and Technology*, *7*(3), 55–70. doi:10.4018/IJSSMET.2016070104

Snyder, C. S. (2014). *A Guide to the Project Management Body of Knowledge: PMBOK Guide*. Project Management Institute.

Söderlund, J., & Bakker, R. M. (2014). The case for good reviewing. *International Journal of Project Management*, *32*(1), 1–6. doi:10.1016/j.ijproman.2012.11.007

Storey, J. (2014). *New Perspectives on Human Resource Management*. Routledge.

Svejvig, P., & Andersen, P. (2015). Rethinking project management: A structured literature review with a critical look at the brave new world. *International Journal of Project Management*, *33*(2), 278–290. doi:10.1016/j.ijproman.2014.06.004

Tinnilä, M. (2013). Measurement of service efficiency in different types of banking services: Mass services, service factories, service shops, and professional services. *International Journal of Service Science, Management, Engineering, and Technology*, *4*(1), 47–67. doi:10.4018/jssmet.2013010104

This research was previously published in the International Journal of Service Science, Management, Engineering, and Technology (IJSSMET), 10(1); pages 19-29, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 84
Impediments in Healthcare Digital Transformation

Robert Furda
Department of Information Systems, Faculty of Management, Comenius University, Bratislava, Slovakia

Michal Gregus
Department of Information Systems, Faculty of Management, Comenius University, Bratislava, Slovakia

ABSTRACT

This article is addressing the specific impediments that appear in the process of healthcare digital transformation. Enterprise architecture provides the framework for investigating the behavioral and active structural aspects that apply to business and application layers. This includes an analysis of, including inherent relationship between, selected scopes such as strategy, business, and education to standard elements such as process, service, and function of an application. The presented classification and assignment of individual impediments indicate to healthcare managers where they may potentially struggle during different stages of digital transformation. Among others, they facilitate strategic planning and managerial decisions during implementation of the emerging information technologies and techniques. In addition, the idea is to contribute to the successful implementation of healthcare digital transformation, thereby delivering business value within healthcare sector, and consequently to a better quality of life.

INTRODUCTION

Healthcare digital transformation (HDT) was already widespread globally. Within this context this article focuses on business dimension in continuous optimization across processes and the entire business ecosystem that embraces the managerial view as well. This affects not only the conjunctions of Information Systems (ISs), emerging information technologies (IT) and techniques, and other resources in processing of massive amounts of health information. To facilitate further developments in HDT the authors addressed the impediments that include challenges and gaps. The Open Group Enterprise architecture

DOI: 10.4018/978-1-7998-7297-9.ch084

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

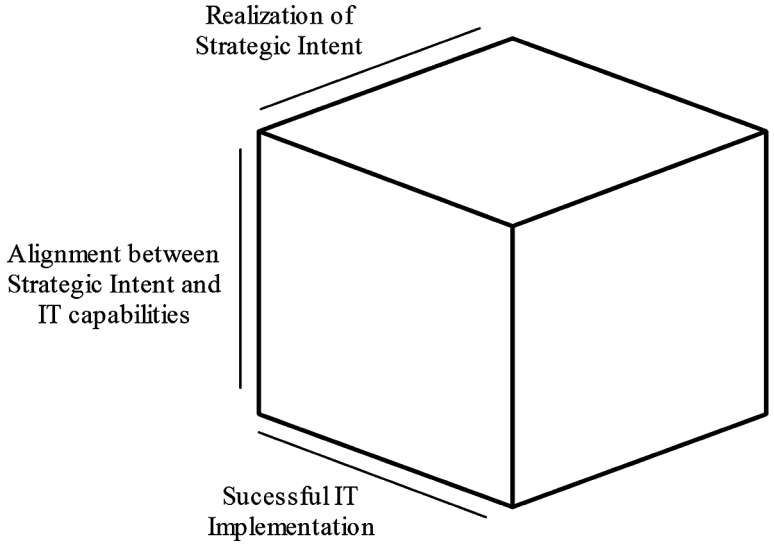
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

standards comprise the TOGAF and/or ArchiMate frameworks for investigating the behavioral, and active structural, aspects that apply to business and application layers (The Open Group, 2014, 2017). This includes an analysis of, including inherent relationship between, selected scopes such as strategy, business and education to standard elements such as process, service, and function of an application. The classification and assignment of individual impediments indicate to healthcare managers where they may potentially struggle during different stages of HDT. Among others, the findings facilitate strategic planning and managerial decisions during implementation of modern IT, emerging techniques, and developments of supportive ISs.

BACKGROUND

The business processes during digital transformation have increasingly significant impact on organizations' operations where ISs play strategic role. Within context of business and IT Arvidsson et al. described three critical dimensions (Figure 1) to consider successful implementation of IS strategy (Arvidsson, Holmström, & Lyytinen, 2014). In healthcare, the proper adoption, and effective use, of strategic IS can be the key component of business strategy within HDT in achieving a competitive advantage in patient's care (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Chesney, 2003).

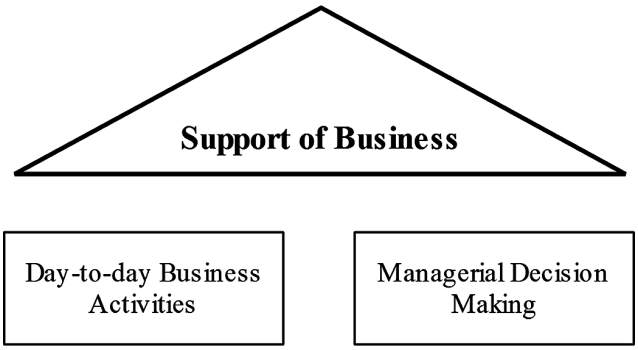
Figure 1. Three critical dimensions within IS strategy implementation [source: (Arvidsson et al., 2014)].



In providing the real-time decision support during process of digital transformation the businesses should rely on business ISs. In healthcare the composites of many applications, functions, technology, and people (both developing and using) include Electronic Health Record (EHR) in order to ensure clinical, and financial, information functions (HIMSS Enterprise Information Systems Steering Committee, 2007; Møller, 2006). The business ISs (Figure 2) on one side support an organization's day-to-day business activities and on other side they support managerial decision making (Hardcastle, 2011).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 2. Two fundamental roles of business ISs



Healthcare management has been challenged by decades of institutional reforms and, more recently, by the emergence of new forms of patient–doctor relationships. This is often struggled with cost and proper information deficiency. However, healthcare management is responsible and should boost own competitiveness in improving the healthcare. To achieve strategic business goals in that dimension it should either increase a competitive advantage or decrease a competitive disadvantage. The strategic and business ISs can become the valid facilitators in achieving the strategic business goals, including proper enablement of organizational transformation (Besson & Rowe, 2012; Chesney, 2003; Tran & Voyer, 2015; Wang, Kung, & Byrd, 2018).

MATERIAL AND METHODS

The production of new knowledge by designing the innovative artifacts, by improving and understanding the behavior of ISs can be facilitated with Design Science Research (DSR) methodology (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). In previous research the authors focused on HDT and its conjunction with modern technologies such as Big Data and analytics (Furda & Gregus, 2017). The corpus of the previous research served to pull out various impediments, for example, challenges, gaps, and others. The pulled out list of impediments the authors sorted to groups that are result of classification and assignment of individual impediments. This included an analysis of, including inherent relationship between, selected scopes such as strategy, business and education to standard elements such as process, service, and function of an application. (Figure 3).

RESULTS

The result of analysis was interconnection between selected scopes, standard elements, and supportive ISs (Figure 4). There is shown that the education scope does not have direct relationship to the function of an application element. However, if artificial intelligence (AI) capabilities were included in the education scope, for example, the deep learning in using a layered structure of algorithms, called artificial neural networks, then the relationship between the function of an application element and the education scope can be substantiated. The function of an application element contributes to developments of strategic ISs (strategy scope), and to developments of business ISs (business scope) as well.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. DSR flow

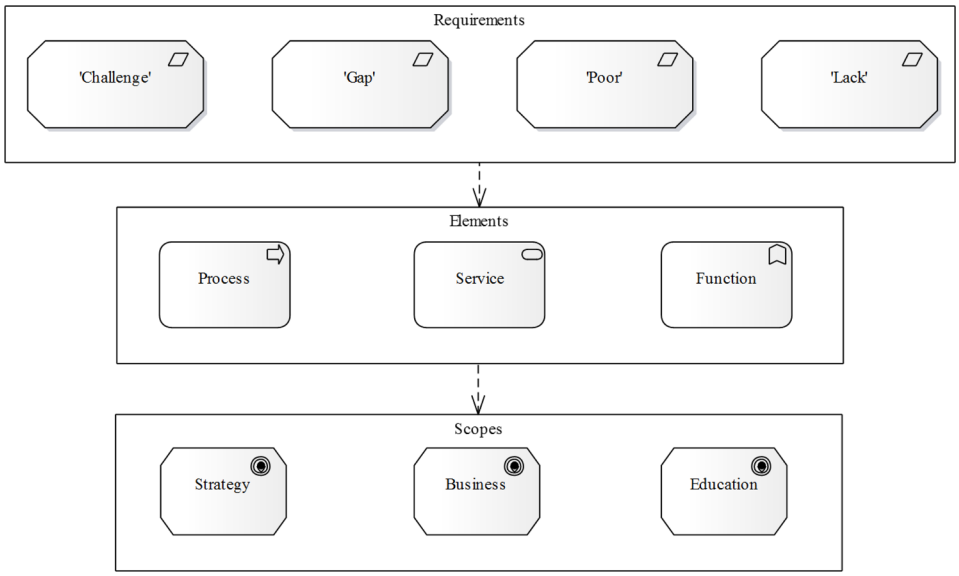
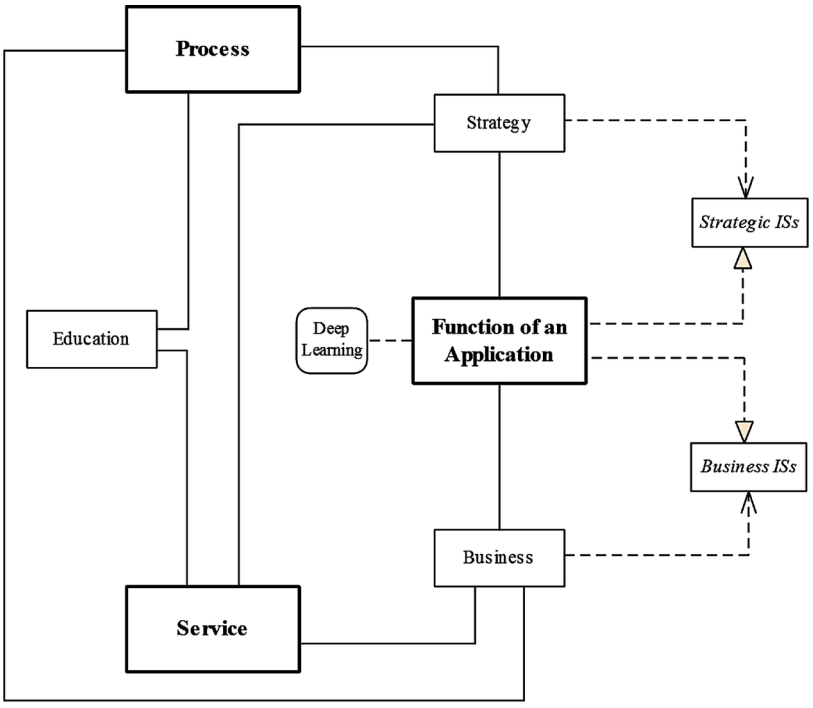


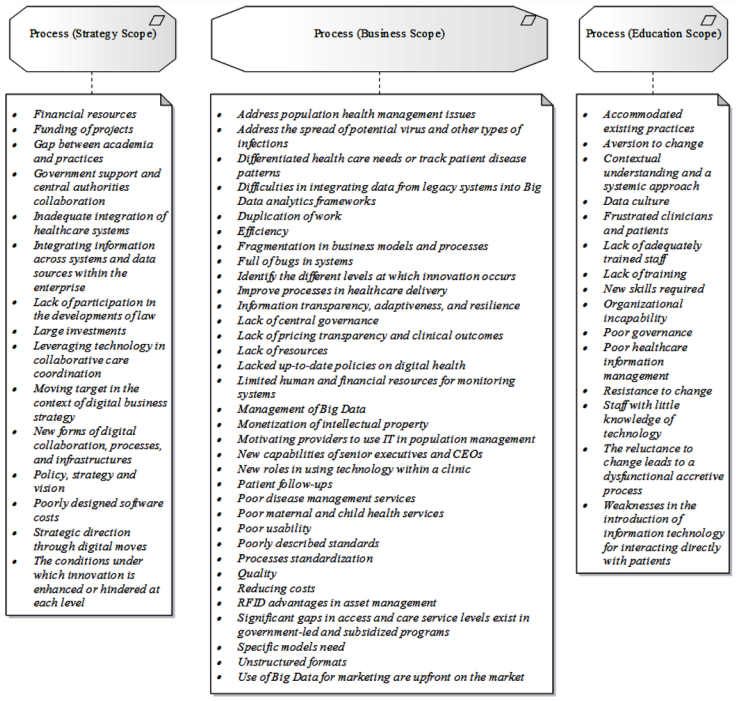
Figure 4. Schematic map of relationships between the researched elements, scopes, and ISs



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

From the corpus the authors pulled out altogether 114 impediments that were finally classified and assigned to eight groups. The process, and also the service, element contains three groups (Figure 5, 6). The function of an application element contains only two groups (Figure 7). This element has, as mentioned above, limitations with relationship to education scope.

Figure 5. List of impediments falling within process element to the scopes of strategy, service, and education



Evaluations and Findings

Process Element

In the three groups of process element, 64 (56%) impediments were classified and assigned: the strategy scope group with 15 (13%) impediments, the business scope group with 34 (30%) impediments, and the education scope group with 15 (13%) impediments.

Strategy Scope Group

The financials are significant factor that cannot miss in strategic planning. The role of government is important factor in support process of HDT - from country perspective and including visions, laws, and governance. The central point of decision must ensure the conditions, extension of collaboration, leading integration, and others, that the proper policy can be guaranteed from the government or healthcare institution management.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

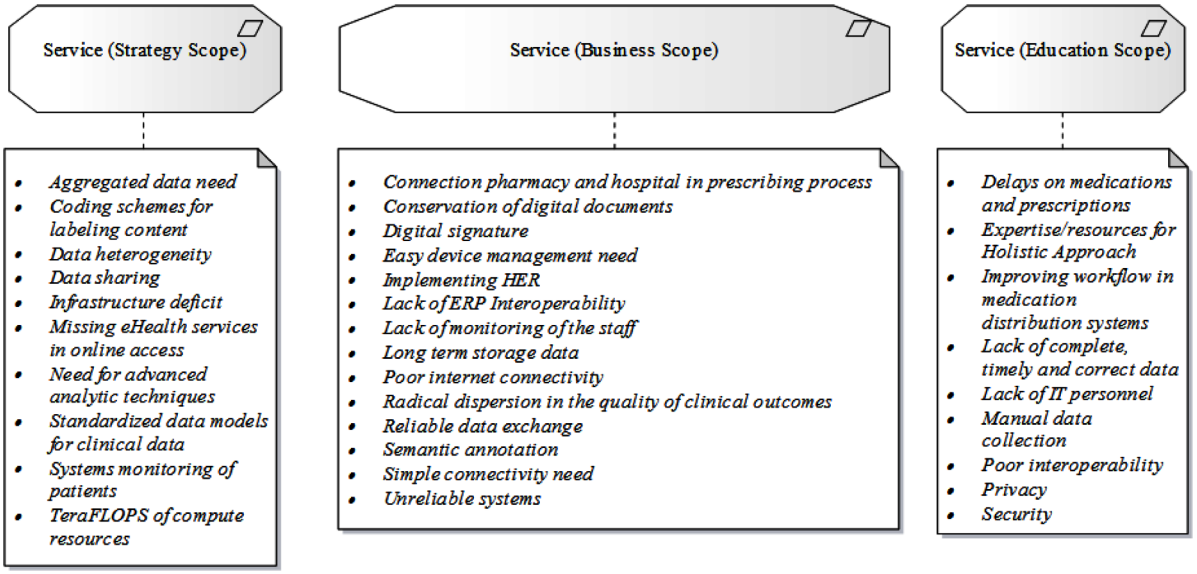
Business Scope Group

The significant need for various business services at operational level of healthcare institution/company is presented. The importance of healthcare management is shown in activities of perpetual innovation, monitoring, and motivation of the people, that are strongly involved in healthcare business processes. The role and tasks of healthcare management should be oriented to the de-duplication, efficiency, integration of legacy healthcare ISs, optimizing services, keeping adequate IT resources, standardization, the Big Data management, and manage costs through the entire healthcare organization.

Education Scope Group

The innovation in HDT brings huge demands in investments to people. It should cover not only the perpetual healthcare staff education but also their perpetual motivation and trainings. It is the role of management to suppress the natural reluctance, frustration, and resistance to change. Often physicians understand the HDT activities as a hindrance in their daily work.

Figure 6. List of impediments falling within service element to the scopes of strategy, service, and education



Service Element

In the three groups of service element, 33 (29%) impediments were classified and assigned: the strategy scope group with 10 (9%) impediments, the business scope group with 14 (12%) impediments, and the education scope group with 9 (8%) impediments.

Strategy Scope Group

The strategy planning of new services should ensure the planning of investments into new services to cover standardization, interoperability, enhanced monitoring, and perpetual infrastructure modernization.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Because of constant complexity grooving this should ensure deployment of modern technologies such as Big Data analysis and advanced analytics techniques, new standards deployment, extended monitoring of patients, and planning for new compute resources.

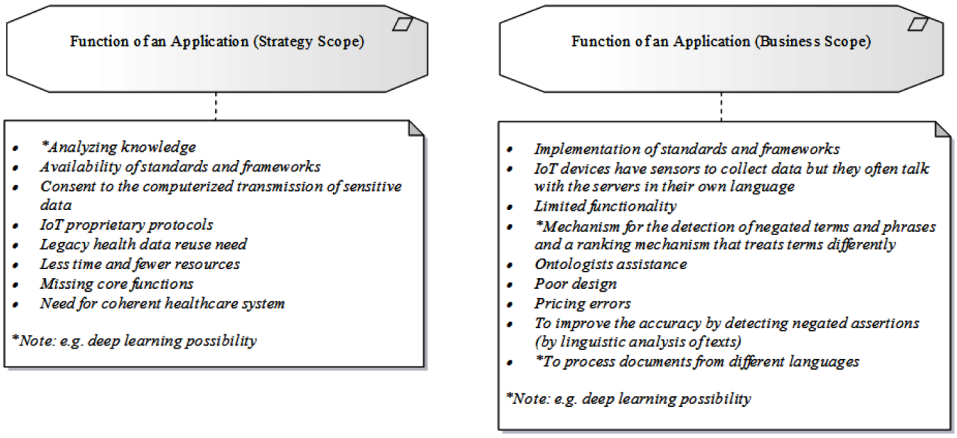
Business Scope Group

The healthcare management should ensure the daily healthcare operations are working with reliable ISs, enough storage, permanent availability of proper information about the patients, treatment and drugs, uninterruptible connectivity with monitoring, and recovery capability that are available 24/7.

Education Scope Group

In the healthcare the medical education is crucial factor. The management in healthcare should not forget to incorporate also IT based education for medical staff. The expected outcome of this activity can avoid mistakes or errors while healthcare staff is using an IT for patients' data collection. Often the lack of IT personnel moves more responsibility and work to medical staff. So its awareness in the area of patients' data privacy and IT security in process of HDT should be regularly complemented by education about current and newly prepared IT healthcare services. It is the role of healthcare management to continually monitor the education status in its healthcare organizations that the medical staff is trained and has the latest knowledge.

Figure 7. List of impediments falling within function of an application element to the scopes of strategy, service, and education



Function of an Application Element

In the two groups of service element, 17 (15%) impediments were classified and assigned: the strategy scope group with 8 (7%) impediments, and the business scope group with 9 (8%) impediments.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Strategy Scope Group

In HDT process the modern technologies need constant attention. In connection with that the strategic planning should consider what is or can be the suitable to deploy in future healthcare ISs. The vendors of IoT (Internet of Things) use proprietary protocols so the transmission of the sensitive patients' data should calculate with additional investments. The healthcare management should ensure in strategy planning the interoperability, to reuse of legacy health data, and processes optimization due to the less time and fewer resources. The strategic ISs could reuse the previous analysis based on Big Data collected in healthcare systems. As mentioned above, although the traditional education is not bounded with function of an application element the education via adopting AI technologies is already making its way forward with real results in healthcare area.

Business Scope Group

In HDT is often missing the implementation of standards and frameworks, the functionality of ISs is limited, modern IoT devices use proprietary protocols, and the natural language processing needs assistance from ontologists. The speed in HDT often causes the deployment of ISs with poor design, not enough tested applications that cause the pricing errors. The healthcare business ISs should incorporate the education role via AI technologies such as natural language understanding, sentiment analysis, machine learning, and others, in computing environment. This leads to enhancing the existing function of an application element, for example, in detection of negated terms and phrases, ranking mechanisms, in processing and understanding documents from different languages.

DISCUSSION

Planning

Healthcare is a crucial and growing sector of the world's economies. This industry needs to ensure better quality of healthcare, and to bring value for money, because billions of dollars are spent on improving healthcare ISs. Fundamental changes in health care financing and delivery have resulted in an unprecedented need for data and information. To achieve the goals and objectives in healthcare organizations, to make informed decisions, the strategic ISs in planning are needed. The strategic planning process is critical within healthcare reform to develop strategic plans for three-to-five years. It is because of the new technology with personnel issues in industry are becoming more and more common (Drewniak, 2010; Lee, Ghapanchi, Talaei-Khoei, & Ray, 2015).

Decision Making

The quality of strategic decisions, though, is dependent upon the quality of the data that is delivered by the various ISs deployed for healthcare delivery and management. There are questions about healthcare data quality how to measure and control data quality in strategic ISs used for decision making. Most healthcare organizations frequently struggle with cost for data storage. The rapid changes of technology reveal Big Data issues that lead to increase in data-intensive operations. Thus the healthcare organizations need strategically resolve new challenges related to data storage, analysis, backup, recovery, interoper-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ability, and others. The decision making processes in healthcare need to access different formats of data, including the 3D printed models, by using innovative solutions, for example, where traditional storage servers do not cover new requirements. The services of cloud computing could offer powerful and timely processing and analyzing computing for healthcare, including the advantage of Big Data analytics. The data from legacy systems in most healthcare organizations meets issues in integrating with new Big Data analytics frameworks. The known challenge of IT adoption lag in the healthcare, in comparison with other sectors, requires pragmatic analysis of Big Data analytics. This needs to enable the transformation of analytical and decision support capabilities (Bean, 1994; Furdova, Furdova, Sramka, Furda, & Kralik, 2018; Furdova, Sramka, Thurzo, & Furdova, 2017; Wang et al., 2018).

Big Data Impact

The HDT seems to concentrate on data such as the trend toward Big Data. There large amounts of data are made available through the Internet and analyzable in the cloud. This kind of digital data itself represents a model of the world that it describes. Most of the data collected explicitly describe artifacts of the real world, often in a raw and unstructured format. With a growing amount of diverse and unstructured data, there is an urgent need for advanced analytic techniques such as deep learning that allows computers to detect items of interest in large quantities of unstructured data and to deduce relationships without needing specific models or programming instructions. To generate any IT business value the three core dimensions must be linked: process, IT, and people. Many business cases demonstrate that Big Data analytics could be an effective IT artifact in creating IT capabilities and business benefits. The healthcare organizations can leverage Big Data analytics as a means to create business value for healthcare. Five strategies that healthcare organizations could use to implement their big data analytics initiatives are: implementing (Big) data governance, developing information sharing culture, training key personnel to use Big Data analytics, incorporating cloud computing into the organization's Big Data analytics, and generating new business ideas from Big Data analytics. (Gray & Rumpe, 2015; Wang et al., 2018)

Realizing personalized medicine for every patient around the world would result in Big Data challenges of unprecedented scale. Large investments in computing and storage facilities are required. All stakeholders, including patients, doctors, nurses, insurers, lawmakers and the public, need to get involved, educated and trained. Cloud computing systems offer during digital transformation in healthcare sector a solution for the Big Data challenge by accommodating flexible storage resources, by facilitating the process of sharing healthcare data between providers, and by accessing Big Data sets via broad network from managed resource pooling. Big Data applications expect in the seamless health data sharing. The availability of frameworks and standards are increasing the impact of Big Data applications, especially if the acquiring of data is accessible from various data sources that can be combined to gain new insights. This combination of administrative, financial, and clinical data, used by Big Data technologies, can improve the efficiency and quality of healthcare delivery. It is important for clinicians to get data from registries, for example, oncology registries. New websites were developed for researchers to examine the descriptive oncology data produced by the population-based oncology registries. The modeling approach generally provides reasonable estimation of prevalence of oncological diseases. These estimates can be useful because that are more representative than previously obtained and reported. Analyses can be used in many types of oncological diseases such as carcinoma or melanoma. The EHR has the potential to become the central digital fingerprint of a patient and it will be the basis for optimal personalized treatment decisions. It could provide valuable information for a learning healthcare system. Completeness

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

and accuracy of information is a precondition that interventional causal conclusions can be derived. A tight and timely integration of EHR information, for example, real-world data, can ensure that newest findings can immediately be transported into clinical practice (Furdova & Lukacko, 2017; Furdova, Olah, Svetlosakova, & Kusenda, 2012; Gu, Li, Li, & Liang, 2017; Tresp et al., 2016; Zillner et al., 2014).

Data Normalization

The challenges fall into two main categories: fiscal/policy and technology. Fiscal and policy issues cover a fee-for-service environment where healthcare practitioners get paid is to have face-to-face encounters with patients. This creates heavy bias against promoting technologies that streamline non-face-to-face interactions. The existing state of health data, created by legacy EHR systems, is the technical barrier to achieving vision. Health data is often largely fragmented into institution-centered silos. More and more people in the health information exchange arena are seeing that the next generation of health technology is around aggregating data but not simply exchanging copies of individual records (the traditional query-response approach). Not only collecting the data from many different sources but also normalizing it into a consistent structure can resolve that the data around unique patient identifiers as well as unique provider identifiers could lead to status "the data become truly useful". The healthcare delivery at the Micro Health Centers can be monitored through cloud computing, thereby providing highly efficient and quality healthcare. Centralized and normalized health records will further aid in provisioning of health insurance to the masses. Thus it can dramatically increase the reach of healthcare and bridge the gap in healthcare. Clinicians expect the EHR applications can store and retrieve information of one or more patients by including multimedia content. Although the use of cloud computing the enterprise ISs lack the capability to integrate images and multimedia data as a component of the data sourced of EHR applications (Bhattacharya, Ghosh, & Nanda, 2012; Dimitrov, 2016; Li, Li, & Shih, 2014).

Time and Resources

If anybody asks any doctors about the biggest challenges facing them today they are likely to say that they are under constant pressure to do more, with less time, and with fewer resources. They need help. IT is coming to aid in many different ways, making the health tech industry a hotbed of growth and innovation. EHRs may be an effective answer to the concerns when patients and/or doctors fail to remember their own (or their patient's) case history. Moreover, EHRs have the potential to easily overcome language gaps. The journey of continuous healthcare system reform is at a turning point. Also it is faced with contrasting elements. On the one hand an effective EHRs management could satisfy new needs in healthcare services, but on the other hand the pressure to reduce costs might undermine the very effectiveness of its functionality. It is possible, at least partly, to face the current and future challenges of national, and transnational, healthcare systems by expanding the reach of modern IT. However the most common barriers in implementation are the lack of funds, the risk of a malfunction in the system, the resistance to change, and the lack of training and proper information (Bonis, 2016; Comandé, Nocco, & Peigné, 2015; Pędziński et al., 2013).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

E-Health

The development of a national e-health strategy aims, at the digitalization of patient records, to enable better connectivity among health care professionals, and to improve value of healthcare delivery and overall care given to patients. In addition, the e-health strategy aims to completely digitalize all in country health records to facilitate the spread of specialist knowledge. An example, where the strategic information is fundamental, is the formulation and delivery of effective HIV (Human Immunodeficiency Virus) programs. But generating that information is a complex process. For example, most countries in south and south-east Asia lack capacity and supporting structures. Although these countries have made tremendous strides in collecting relevant data, advances in the ability, to translate that data into strategic information and evidence for action, have not kept pace. Capacity building of the national HIV strategic information system is a core component of the response to the HIV epidemic because it enables understanding of the evolving nature of the epidemic. It is critical for program planning and identification of the gaps and deficiencies in HIV programs (AlShammery & others, 2015; Azim, Saidel, & Brown, 2010; Bozicevic, Handanagic, Cakalo, Rinder Stengaard, & Rutherford, 2017).

IoT

The IT is a key component of healthcare strategy in HDT process that can facilitate the HDT. The healthcare management is expecting better patient management, enhanced service quality, improved operational efficiency, and enhanced patient care. All this can be achieved in deployment of new technologies and concepts such as IoT. These new technologies brought challenges in implementing. Many devices often talk with the server in their own language and devices by different makers can't necessarily speak with each other (Dimitrov, 2016; Wamba & Ngai, 2013).

New Skills

The IT products and services offered in digital age can lead to questions that are concerning to their development, implementation, or deployment. HDT process brought the need to perform further management tasks that often require new skills. The motivational interviewing, goal setting, and coaching support are often not core skills in healthcare trainings, but the traditional model of education is still mainly focused on diseases (Hart & Eastman, 2016; Leimeister, Österle, & Alter, 2014).

The agenda of HDT is becoming more and more familiar with local politics and the strategic direction of international organizations. The missing contextual understanding and system approaches to deploy successful digital solutions and to avoid incorrect project funding need to be addressed in process of HDT. Perpetual education and consequent intellectual efforts are needed to highlight the importance of a long-term, systematic approach to addressing persistent inefficiencies in expanding the transformation potential of IT in healthcare. The new skills and knowledge can help to resolve one of the major challenges faced by hospitals. They face with long delays in prescription. Benefits in identifying delays in drug distribution systems and further preventing drug mistakes could be achieved by implementing the modern IT and techniques in the process of HDT (Bara-Slupski, 2016; Ker, Wang, Hajli, Song, & Ker, 2014; Leimeister et al., 2014).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In strategic direction should be intendant to encourage students, researchers and collaborators considering a foray into IT education and research area. There is still demand for experts from Data Science and Big Data Analytics, and demand for solutions in Data Science for different business areas such as strategic decisions, marketing, sales, logistics, and others. IT education needs to eliminate the lack of understanding about digital transformation of primarily physical industries whose products cannot be completely digitized, for example, automotive industry. In addition to the internal challenges associated with HDT in the organization such as leadership, deployment of users, design and development of technologies there are several external challenges that need to be addressed through education and research. These challenges include patients' expectations in a mobile and technically healthy population about the desire to manage their own health. Demographic changes with an increasing number of patients entering the healthcare market with little or no maturity on how to efficiently use IT healthcare to promote prevention and adherence to medication after exclusion, evolving government mandates. That will continue to be regulated through sanctions and incentives. The adaptation of IT delays can be attributed to two specific knowledge gaps: (1) behavioral (organizational) focus: poor understanding of how IT systems can provide patient care value to healthcare professionals, and (2) insufficient understanding of the complex care environment that IT systems must operate and which provide value to those who build these systems (Hanelt, Piccinini, Gregory, Hildebrandt, & Kolbe, 2015; Khuntia, Karimi, Tanniru, & Meyers, 2014; Molnar, Molnar, & Gregus, 2017).

CONCLUSION

In this article, authors investigated the specific HDT impediments such as challenges, gaps, and others. The authors used Enterprise Architecture framework for investigating the behavioral and active structural aspects that apply to business and application layers. They analyzed of, including inherent relationship between, selected scopes such as strategy, business and education to standard elements such as process, service, and function of an application. The collected and presented information can facilitate and optimize the managerial activities in process of HDT. The healthcare managers can apply the collected information in gathering, processing, and reuse the healthcare data. Within process of HDT the development and further research of strategic and business ISs can benefit as well. Among others the provided results can help in minimizing negative impacts of modern IT deployment and in optimizing of HDT strategy and business models.

REFERENCES

AlShammery, A. R. (2015). Education in the era of digitalization: The role of the dental school in the promotion of digital dentistry. *Saudi Journal of Oral Sciences*, *2*(2), 53. doi:10.4103/1658-6816.160755

Arvidsson, V., Holmström, J., & Lyytinen, K. (2014). Information systems use as strategy practice: A multi-dimensional view of strategic information system implementation and use. *The Journal of Strategic Information Systems*. *Information Systems Strategy-as-Practice*, *23*(1), 45–61. doi:10.1016/j.jsis.2014.01.004

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Azim, T., Saidel, T. J., & Brown, T. (2010). Essential elements of strategic information systems to guide focused HIV responses in south and south-east Asia. *AIDS (London, England)*, *24*(Suppl 3), S54–S61. doi:10.1097/01.aids.0000390090.68306.8a PMID:20926929

Bara-Slupski, T. K. (2016). Holistic Approach: Paradigm shift in the research agenda for digitalisation of healthcare in Sub-Saharan Africa. *The African Journal of Information Systems*, *8*(4), 3.

Bean, K. P. (1994). Data quality in hospital strategic information systems: A summary of survey findings. *Topics in Health Information Management*, *15*(2), 13–25. PMID:10138524

Besson, P., & Rowe, F. (2012). Strategizing information systems-enabled organizational transformation: A transdisciplinary review and new directions. *The Journal of Strategic Information Systems*, *21*(2), 103–124.

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). *Visions and voices on emerging challenges in digital business strategy*. Retrieved February 3, 2017, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2379579

Bhattacharya, J., Ghosh, R., & Nanda, A. (2012). Micro Health Centre (μHC) A Cloud enabled Healthcare Infrastructure. *Journal of Health Informatics in Developing Countries*, *6*(2), 480–495.

Bonis, P. (2016). Clinical decision support technology: saving lives. *Clinical Services Journal*. Retrieved February 13, 2017, from http://www.uptodate.com/sites/default/files/cms-files/pdf/press-releases/091616.pdf

Bozicevic, I., Handanagic, S., Cakalo, J. I., Rinder Stengaard, A., & Rutherford, G. (2017). HIV Strategic Information in Non-European Union Countries in the World Health Organization European Region: Capacity Development Needs. *JMIR Public Health and Surveillance*, *3*(2), e41. doi:10.2196/publichealth.7357 PMID:28645888

Chesney, T. (2003). Strategic Information Systems. In *Competitive Information in Small Businesses* (pp. 33–46). Springer. Retrieved October 13, 2017, from https://link.springer.com/chapter/10.1007/978-94-017-0355-0_3

Comandé, G., Nocco, L., & Peigné, V. (2015). An empirical study of healthcare providers and patients′ perceptions of electronic health records. *Computers in Biology and Medicine*, *59*, 194–201. doi:10.1016/j.compbiomed.2014.01.011 PMID:24674011

Dimitrov, D. V. (2016). Medical Internet of Things and Big Data in Healthcare. *Healthcare Informatics Research*, *22*(3), 156–163. doi:10.4258/hir.2016.22.3.156 PMID:27525156

Drewniak, R. (2010). *7 Steps to Healthcare Strategic Planning*. Hayes Management Consulting. Retrieved October 24, 2017, from http://www.hayesmanagement.com/thought-leadership/white-papers/7-steps-healthcare-strategic-planning/

Furda, R., & Gregus, M. (2017). Conceptual View on Healthcare Digitalization - An Extended Thematic Analysis. *International Journal of Big Data and Analytics in Healthcare*, *2*(1), 35–54. doi:10.4018/IJBDAH.2017010103

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Furdova, A., Furdova, A., Sramka, M., Furda, R., & Kralik, G. (2018). 3D Printing Planning Stereotactic Radiosurgery in Uveal Melanoma Patients. In *3D Printing* (pp. 155–171). Rijeka: IntechOpen. Retrieved October 10, 2018, from https://www.intechopen.com/books/3d-printing/3d-printing-planning-stereotactic-radiosurgery-in-uveal-melanoma-patients

Furdova, A., & Lukacko, P. (2017). Periocular Basal Cell Carcinoma Predictors for Recurrence and Infiltration of the Orbit. *The Journal of Craniofacial Surgery*, *28*(1), e84–e87. doi:10.1097/SCS.0000000000003242 PMID:27906855

Furdova, A., Olah, Z., Svetlosakova, Z., & Kusenda, P. (2012). The Current Status of the Evidence of Malignant Tumours of the Eye and its Adnexa (dg. C69) in the Slovak Republic and in the Czech Republic. *Ceska a Slovenska Oftalmologie*, *68*(5), 195–201. PMID:23461371

Furdova, A., Sramka, M., Thurzo, A., & Furdova, A. (2017). Early experiences of planning stereotactic radiosurgery using 3D printed models of eyes with uveal melanomas. *Clinical Ophthalmology (Auckland, N.Z.)*, *11*, 267–271. doi:10.2147/OPTH.S123640 PMID:28203052

Gray, J., & Rumpe, B. (2015). Models for digitalization. *Software & Systems Modeling*, *14*(4), 1319–1320. doi:10.100710270-015-0494-9

Gu, D., Li, J., Li, X., & Liang, C. (2017). Visualizing the knowledge structure and evolution of big data research in healthcare informatics. *International Journal of Medical Informatics*, *98*, 22–32. doi:10.1016/j.ijmedinf.2016.11.006 PMID:28034409

Hanelt, A., Piccinini, E., Gregory, R. W., Hildebrandt, B., & Kolbe, L. M. (2015). Digital Transformation of Primarily Physical Industries-Exploring the Impact of Digital Trends on Business Models of Automobile Manufacturers. In *Wirtschaftsinformatik* (pp. 1313–1327). Retrieved February 8, 2017, from https://www.researchgate.net/profile/Everlin_Piccinini/publication/277325717_Digital_Transformation_of_Primarily_Physical_Industries__Exploring_the_Impact_of_Digital_Trends_on_Business_Models_of_Automobile_Manufacturers/links/562b81da08aef25a2441b0ff.pdf

Hardcastle, E. (2011). *Business Information Systems*. Retrieved October 13, 2017, from http://archive.org/details/BusinessInformationSystems

Hart, O., & Eastman, K. (2016). How to support patient-centred care: Roof of the House of Care framework. *The British Journal of General Practice*, *66*(644), 164–165. doi:10.3399/bjgp16X684229 PMID:26917655

HIMSS Enterprise Information Systems Steering Committee. (2007). *Clinical Perspectives on Enterprise Information Technology*. Healthcare Information and Management Systems Society. Retrieved from https://s3.amazonaws.com/rdcms-himss/files/production/public/HIMSSorg/Content/files/ClinicalPerspectives_whitepaper_052907.pdf

Ker, J.-I., Wang, Y., Hajli, M. N., Song, J., & Ker, C. W. (2014). Deploying lean in healthcare: Evaluating information technology effectiveness in US hospital pharmacies. *International Journal of Information Management*, *34*(4), 556–560. doi:10.1016/j.ijinfomgt.2014.03.003

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Khuntia, J., Karimi, J., Tanniru, M., & Meyers, A. (2014). The University of Colorado Digital Health Consortium Initiative: A collaborative model of education, research and service. *Journal of Commercial Biotechnology*, *20*(3), 31–37. doi:10.5912/jcb651

Lee, T., Ghapanchi, A. H., Talaei-Khoei, A., & Ray, P. (2015). Strategic information system planning in healthcare organizations. *Journal of Organizational and End User Computing*, *27*(2), 1–31. doi:10.4018/joeuc.2015040101

Leimeister, J. M., Österle, H., & Alter, S. (2014). Digital services for consumers. *Electronic Markets*, *24*(4), 255–258. doi:10.100712525-014-0174-6

Li, K.-C., Li, Q., & Shih, T. K. (2014). *Cloud Computing and Digital Media: Fundamentals, Techniques, and Applications*. CRC Press. doi:10.1201/b16614

Møller, C. (2006). On Managing the Enterprise Information Systems Transformation: Lessons learned and research challenges. In *Research and Practical Issues of Enterprise Information Systems, IFIP International Federation for Information Processing* (pp. 307–317). Springer. Retrieved October 17, 2017, from https://link.springer.com/chapter/10.1007/0-387-34456-X_31

Molnar, E., Molnar, R., & Gregus, M. (2017). Business schools and RIS3 - Enterprise architecture perspective. In *2017 15th International Conference on Emerging eLearning Technologies and Applications (ICETA)* (pp. 1–7). Presented at the 2017 15th International Conference on Emerging eLearning Technologies and Applications (ICETA).

Pędziński, B., Sowa, P., Pędziński, W., Krzyżak, M., Maślach, D., & Szpak, A. (2013). Information and communication technologies in primary healthcare–barriers and facilitators in the implementation process. *Studies in Logic*, *Grammar and Rhetoric*, *35*(1), 179–189. doi:10.2478lgr-2013-0035

Peffers, K., Tuunanen, T., Rothenberger, M., & Chatterjee, S. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, *24*(3), 45–77. doi:10.2753/MIS0742-1222240302

The Open Group. (2014). *TOGAF Version 9.1.* Retrieved January 2, 2017, from https://books.google.sk/books/about/TOGAF_Version_9_1.html?hl=sk&id=m11eAgAAQBAJ

The Open Group. (2017). *ArchiMate 2.1 Specification*. Retrieved December 13, 2017, from http://pubs.opengroup.org/architecture/archimate2-doc/

Tran, V., & Voyer, B. (2015). Fostering innovation: An organisational perspective. *British Journal of Healthcare Management*, *21*(3), 141–145. doi:10.12968/bjhc.2015.21.3.141

Tresp, V., Overhage, J. M., Bundschus, M., Rabizadeh, S., Fasching, P. A., & Yu, S. (2016). Going Digital: A Survey on Digitalization and Large-Scale Data Analytics in Healthcare. *Proceedings of the IEEE*, *104*(11), 2180–2206. doi:10.1109/JPROC.2016.2615052

Wamba, S. F., & Ngai, E. W. (2013). Internet of Things in healthcare: the case of RFID-enabled asset management. *International Journal of Biomedical Engineering and Technology, 11*(3), 318–335.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wang, Y., Kung, L., & Byrd, T. A. (2018). Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. *Technological Forecasting and Social Change*, *126*, 3–13. doi:10.1016/j.techfore.2015.12.019

Zillner, S., Oberkampf, H., Bretschneider, C., Zaveri, A., Faix, W., & Neururer, S. (2014). Towards a technology roadmap for big data applications in the healthcare domain. In *Information Reuse and Integration (IRI), 2014 IEEE 15th International Conference on* (pp. 291–296). IEEE. Retrieved February 10, 2017, from http://ieeexplore.ieee.org/abstract/document/7051902/

This research was previously published in the International Journal of Applied Research on Public Health Management (IJARPHM), 4(1); pages 21-34, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 85
Domestication of Telecentres by Malawian Rural Women

Sellina Khumbo Kapondera
Mzuzu University, Mzuzu, Malawi & Royal Holloway University of London, London, UK

Wallace Chigona
Department of Information Systems, University of Cape Town, Cape Town, South Africa

ABSTRACT

The potential of telecentres to bridge the digital divide can only be realised when their services are appropriated by all groups in the community. Previous studies show that in Malawi only a few women use telecentres. This article used Domestication Theory to explain the processes through which women in rural Malawi encounter technologies, deal with them and integrate them into their lives. Data was obtained via interviews with women (both users and non-users) and a Telecentre Manager. The study shows that: i) commodification was influenced mainly by word of mouth; ii) the women who appropriated the Telecentre used it for instrumental and hedonic purposes; iii) the appropriation was influenced by convenience, compatibility with the needs of women and perceived usefulness of the Telecentre; and iv) non-use was due to lack of awareness, illiteracy, limited financial resources, cultural roles and perceptions about the telecentres. The findings could help policymakers in maximising use of telecentres among women.

INTRODUCTION

Access and use of Information and Communication Technologies (ICTs) have the potential to develop communities (Chisango, 2014). For instance, ICTs improve skills, enhance social life and offer economic opportunities (Chikumba, 2011). Despite the benefits of using ICTs, access to these ICTs is low in Malawi. In 2014, of the total 16 million people, only 5,590 people were broadband internet subscribers, while 6,487,304 were mobile phone subscribers (Nyirenda, 2014). As such, over the past two decades, just as in many developing countries, the government of Malawi, with aid from various international organisations, has been establishing telecentres (Chikumba, 2011). A Telecentre is a public facility of-

DOI: 10.4018/978-1-7998-7297-9.ch085

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

fering access to ICT services for educational, social and economic purposes (Chisa & Hoskins, 2016). Telecentres offer access to ICT services such as the internet, phone, fax, computer and, sometimes, library services (Chisa & Hoskins, 2016).

The potential of telecentres to bridge the digital divide can only be realised when the services they provide are appropriated and used by all groups of people in the communities they serve. However, research studies in many developing countries show that usage of telecentres does not cross all categories of people. Specifically, only a few women, as compared to men, use the facilities (Chisango, 2014; Kumar & Best, 2007). In Malawi, previous studies on usage of telecentres show that only a few women use these facilities (for example, Kapondera & Hart, 2016). This paper focuses on domestication of telecentres by women in rural communities in Malawi. In this study, our concern is to understand the process through which telecentres are appropriated in women's lives in rural Malawi. Specifically, we ask the following questions:

- How do rural women in Malawi integrate telecentres in their lives?
- What influences the use or non-use of telecentres by rural women in Malawi?

This study contributes towards generating information aimed at helping ICT policymakers regarding domestication of telecentres by women in rural communities in Malawi. Domestication theory was used to guide the research in understanding how women adopt and integrate telecentres into their lives. Malawi is particularly interesting because there are limited studies on the use of ICTs in Malawi and Malawi is one of the countries with low technology uptake; it is interesting, therefore, to see how communities in that environment deal with technology. Domestication refers to the processes through which people encounter technologies and deal with them by either rejecting them or accepting and integrating them into their everyday lives (Haddon, 2006). The use of Domestication Theory allowed us to explore the adoption as a process and not as a binary phenomenon.

BACKGROUND

Malawi is classified as a low-income country (The World Bank, 2016). On the 2016 Human Development Index, the country is ranked as number 170 out of 185 countries (Human Development Report, 2016). The country has a population of 17.2 million and more than half of the population live on less than $1 a day (Malawi, 2012). The majority (83.9%) live in rural areas (Human Development Report, 2016) which have few roads and means of transport, low income levels, limited access to ICTs and electricity, and high dependence on fishing and farming (International Fund for Agricultural Development (IFAD, 2017).

The ICT penetration level in Malawi is low and there are disparities in ICT access between urban and rural areas; the rural areas of Malawi have limited access. In 2014, of the 64,247 people who had access to fixed telephones, only 18.7% were from rural areas (Nyirenda, 2014, p. 7). The national survey on access to and usage of ICT services in Malawi in 2015 shows that in the rural areas only 42% of the households had access to mobile phones as compared to 85.1% of households in urban areas; in rural areas 30.6% of the population had access to mobile phones as compared to 71.8% in urban areas; only 13.9% of people in rural areas owned a computer device as compared to 36.1% in urban areas; and 2.9% of people in rural areas accessed the internet, while urban areas had 23.7% access (Malawi Communications Regulatory Authority (MACRA, 2015).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The government of Malawi has been engaging in various initiatives to bridge the digital divide by increasing the penetration of ICTs in rural areas. Some of these initiatives include the formulation of the Rural Telecommunications Policy which enabled the provision of cellular phones at cheaper prices, and the formulation of the Malawi ICT Policy and the Malawi Growth Development Strategy which facilitated the establishment of telecentres in rural areas (Kapondera & Hart, 2016).

The idea of establishing telecentres in Malawi emerged in the early 2000s, with the aim of bringing the benefits of ICTs to rural areas and bridging the digital divide through universal access to, and affordable, ICTs (Chikumba, 2011). The first Telecentre started operating in 2007. There are currently more than 51 telecentres in rural areas of the country (Malawi, 2013) and the country is establishing more.

LITERATURE REVIEW

Overview of Telecentres

Telecentres are mainly established in rural and marginalised communities to enable individuals who cannot afford ICTs such as computers and the internet to have access to ICTs (Mbangala & Samzugi, 2014; Owen & Darkwa 2000); they offer access to services at low costs as compared to the alternatives (Gcora et, al., 2015).

The concept of telecentres was born in the early 1980s. Telecentres may be established by individuals as commercial ventures and by governments as a social good. Telecentres are known by different names in different countries (Owen & Darkwa, 2000) and exist in different models offering different services. Despite the difference in models, all telecentres aim at bridging the digital divide, thereby developing disadvantaged communities.

Telecentres have the potential of transforming and developing disadvantaged communities due to the numerous roles they play. They provide economic opportunities to the communities by providing users with information on available jobs; by helping users save money by bringing the services closer to people and at lower costs (Kapondera & Hart, 2016; Kumar & Best 2007); by employing people to work within the telecentres (Kapondera & Hart, 2016); by helping the users expand businesses thereby increasing their finances; and enabling farmers to communicate with buyers and allowing people to advertise their farm products through the internet and radios within the telecentres (Roman & Colle, 2002). Telecentres play an educational role by improving the skills and knowledge of the users through computer tutorials and providing access to information for educational purposes (Kapondera & Hart 2016). Telecentres facilitate social interaction among community members. The ICTs within telecentres enable users to communicate with their families and friends (Mbangala & Samzugi 2014) and telecentres are considered as social spaces where bonds and ties are formed among users (Attwood, Diga, Braathen & May, 2013; Kapondera & Hart, 2016). Telecentres also help rural communities to access government services on different areas including education, health and agriculture (Chapman & Slaymaker, 2002). Furthermore, telecentres play a role in improving the health of the users; some people use telecentres to find information on how to deal with health problems (Roman & Colle, 2002). This, eventually, helps develop communities as only healthy people can contribute to development of these communities.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ICTs and Rural Women

Most rural women in many developing countries are poor, oppressed, deprived of many things, less educated, discriminated against with opportunities and dominated by the patriarchal system. In other words, in most rural communities, women are marginalised (Chapman & Slaymaker, 2002; Chisango, 2014) and this affects their self-efficacy negatively (Madima, 2007). Provision of access to ICTs through facilities such as telecentres in rural areas, which target all categories of people including women, has the potential to empower women. ICTs have the potential to transform women's lives. The previous section demonstrated the benefits of ICTs available within telecentres to members of the communities, including women.

Although ICTs offer several benefits to rural women and have the potential to transform the lives of these rural women, women's usage of and access to the ICTs are low. In the main, women access and use ICTs that require a low level of skill, are free to use and do not require literacy, such as radios and televisions; women shun ICTs such as the internet (Bakar, 2011; Kwake, & Adigun, 2008). Many studies have also found that only a few women benefit from ICTs available within public access venues. In a study by Kapondera and Hart (2016) on usage of telecentres in Malawi, out of 130 respondents, only 27% were females. There are a number of factors that hinder women from accessing and using ICTs. One of the factors is education. In many rural areas, women are less educated as compared to men. This has a negative impact because literacy is fundamental to ICT access and use (Best & Maier, 2007). The low educational levels of women also lead to women having a negative perception that ICTs are for men who are more educated than they are (Dlodlo, 2009; Gcora et al., 2015).

Cultural factors also affect women's access to ICTs in rural areas. In many developing countries, women are predominantly occupied with family care-giving roles; they are responsible for taking care of the children, the elderly and also caring for the needs of their husbands. This leaves women little time to access ICTs (Best & Maier, 2007; Mbangala & Samzugi, 2014). The costs of ICTs also affect women's usage of ICTs in rural areas. Many rural women are uneducated and are not employed, so do not earn an income which they would use to access ICTs, both at an individual level such as cell phones (Kwake & Adigun, 2008) and from the shared facilities such as telecentres (Mbangala & Samzugi, 2014; Roman & Colle, 2002). The situation is exacerbated by the fact that most women in the rural areas in developing countries have limited control over finances at household level (Dlodlo, 2009).

Perceptions that computers are complicated to use (Dlodlo, 2009; Gcora, et al., 2015); distances to the facilities with ICTs such as telecentres (Gcora, et al., 2015; Kwake & Adigun, 2008); and lack of interest in ICTs (Best & Maier, 2007) also contribute to the low usage of ICTs by rural women.

Malawian Rural Women

Rural Malawi has a higher female population of 51.7%; in urban Malawi the figures are reversed. The number of female-headed households is also higher – 24% in rural areas of Malawi as compared to 15% in urban Malawi (Food and Agriculture Organisation (FAO 2011). Most Malawian rural women are illiterate. Women in rural areas are occupied and dedicate their time to unpaid domestic work which leaves them with no time to participate in paid economic activities (FAO, 2011). They rely on farming and wage jobs (*ganyu*) to earn their living (FAO, 2011) and the majority of Malawian women engage in subsistence farming (Greco, Skordis-Worrall, Mkandawire & Mills, 2015). Furthermore, many Malawian rural women have limited say on reproductive choices which may result in having a high number

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of children; this, in turn, negatively impacts on their economic as well their health situation (Greco, et al., 2015).

DOMESTICATION THEORY

Domestication Theory outlines and explains the processes through which innovations or technologies are adopted and become part of individuals' daily lives (Chigona, Mudavanhu, Siebtriz & Amerika, 2016; Habib & Sønneland, 2010). The theory was firstly used in media studies and later widely applied in science and technology studies (Haddon, 2006; Chigona et al., 2016). In ICT studies, the theory focuses beyond the adoption and use of ICTs to find out what the ICTs mean to people, how people experience them and the roles that these ICTs can come to play in their lives (Haddon, 2006). Furthermore, the theory emphasises that "domestication, essentially, is about giving technology a place in everyday life. The concept catches the practical, temporal, spatial place, but most importantly, it underlines how this is mixed with the cultural as an expression of lifestyles and values" (Hynes& Richardson, 2009, p. 483). The theory was deemed appropriate for the study as it helped to understand how Malawian rural women make telecentres, which are usually not part of their daily routines, become integrated and be part of their lives.

The theory has three main concepts also known as stages: commodification, appropriation and conversion (Frissen, 2000; Silverstone & Haddon, 1996).

Commodification, also known as imagination (Chigona, Chigona, Koyongo & Kausa, 2010), is concerned with the acquisition of the technology by the potential user which could be an individual, a household or an institution. Here the potential users come to know about the technology. It is the stage through which a technology emerges in a public space of exchange values, which could be through advertisements (Silverstone & Haddon, 1996), and is given an image by the potential user (Chigona et al., 2010). In many studies (e.g., Chigona 2015; Chigona et al., 2016) this has focused on how the individuals began using the ICTs and the factors that influenced the use of the ICTs.

A*ppropriation*, the second stage, is about purchasing the material, taking it home and integrating the technologies in users' daily routines and lives. This stage is when a technology is accepted or rejected (Silverstone & Haddon, 1996). Silverstone et al. (1992), as cited in Habib & Sønneland (2010), divide the stage into objectification and incorporation. The objectification phase is when the technology or innovation is displayed or exhibited, thereby integrating it in the user's environment while incorporation is when the user uses the technology and integrates it into their daily routines and lives (Habib & Sønneland, 2010; Hynes & Richardson, 2009). In the context of telecentres, this can be understood by examining when people make a decision to use, the purposes for using, how they engage with the telecentres and their services, and factors influencing the use and non-use of the telecentres.

The third and last stage, *conversion*, is about activities that users engage in and display to signal to others such as friends, peers and families their participation in adopting and using the ICTs (Habib & Sønneland, 2010; Silverstone & Haddon, 1996). Conversion helps to give feedback to the producers, marketers or regulators of the technology, as the users in this stage engage themselves in showing technological competence and talk about how useful or not useful the ICTs are with others (Frissen, 2000). In the context of telecentres, conversion could be seen when users display the benefits of using the telecentre and recommend the use of telecentres to others.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

METHODOLOGY

The research used an interpretive paradigm. Studying domestication of telecentres by Malawian rural women required in-depth understanding of the context. Therefore, the study employed a qualitative case study approach (Thomas, 2006). The study targeted Vikwa Community Telecentre. The case was purposively selected for two reasons: it is the oldest community-managed telecentre and it is the one that is mostly used (confirmed by MACRA officer in private communication in 2016).

Sampling and Data Collection Procedures

Data were collected from Vikwa Community Telecentre women users, women non-users and the Telecentre Manager of Vikwa Community Telecentre, using semi-structured interviews. For the purpose of the study, a user is defined as every woman who comes to the Telecentre to access the services offered in the Telecentre, except for the kiosk. Non-users were those who either came to the Telecentre to buy items from the kiosk or those who did not even come to the Telecentre. Purposive sampling was used to select the respondents; 11 users and 10 non-users were interviewed. The authors acknowledge that the sample size is small enough to allow them to make generalisations. However, this is not the intention of the study. The aim is to gain insights into the patterns of use–the study is primarily exploratory. The interviews with women were in Chichewa, the language spoken in the area, while the interview with the Manager was in English. The interviews were conducted by one of the researchers who has an understanding of the culture of the area.

The authors opted for interviews for data collection because they allowed for getting participants involved, allowed for participants to give expression from their point of view and allowed for probing. Furthermore, interviews allowed for getting responses from those with limited literacy (Kajornboon, 2005). This was important, especially as most women, especially the non-users, are illiterate.

Data Analysis

The collected data were transcribed and analysed using thematic analysis techniques (Fereday & Muir-Cochrane, 2006). The analysis allowed identification of themes which were linked to Domestication Theory. Due to ethical considerations, codes were used to identify the respondents. For users, prefix US (followed by sequential number) was used while, for non-users, prefix NU (followed by a sequential number) was used. For example, code for user respondent number 1 was US1 and code for non-user respondent number 1 was NU1.

Ethical Consideration

Consent was sought from all the respondents before they participated in the interviews. Respondents were assured of confidentiality and anonymity and were not asked to give their names. Participation in the study was voluntary.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Case Study Description

Vikwa Community Telecentre is one of three community-managed telecentres in Malawi. It is located in Mphepo Village, Traditional Authority Wimbe in Kasungu District. The community is about 25 kilometres from Kasungu Municipality. The community is characterised by poor roads, limited access to electricity and difficulty in accessing clean water. It has a catchment area of about nine villages whose population is approximately 180,000 people. There are about eight secondary schools, over 30 primary schools, and three health centres in the area. The community is dominated by subsistence farmers, mostly engaged in tobacco farming.

The Telecentre was established by the Government of Malawi through MACRA. It offers various services to the community including the internet; printing; photocopying; book binding; lamination; library services; identity card design and printing; scanning; a tuck shop and computer training on basic computer literacy. The Telecentre started operating in May 2010. It is managed by the community which set up a committee of nine people of which only three are females; the committee is male-dominated.

FINDINGS AND DISCUSSIONS

Table 1 summarises demographic data of the respondents. The users' ages ranged from 16 to 55 with the majority (9) being below 30; the age range of for non-users was between 18 and 45. The users were more educated than the non-users. Most of the users were students with a junior secondary school qualification. There were only two primary school dropouts among users. Seven non-users did not complete primary school; two non-users had junior secondary school qualification; and one had not attained any education.

Table 1. Demographic information of users and non-users

		Number of respondents	
		Users	**Non-users**
Education	No education	0	1
	Did not complete primary school	2	7
	Primary school qualification	2	0
	Junior secondary school qualification	6	2
	Senior secondary school qualification	1	0
Occupation	Student	7	1
	Farmer	2	3
	Business	2	2
	Wage jobs (*ganyu*)	0	4
Marital status	Single	7	1
	Married	3	9
	Widow	1	0

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Most of the women users were single while nine of the ten non-users were married; this is consistent with previous studies suggesting that single women are more likely to use the telecentres than those who are married (Madima, 2007). Married women are usually preoccupied with family-care roles, leaving them little time for the Telecentre (Mbangala & Samzugi, 2014). Regarding occupation, the majority of users (seven) were secondary school students, mostly in senior secondary school; two were business women and two were farmers. The majority of the non-users, four, earned their living through wage jobs (*ganyu*); two were business women; three were farmers and one was a student.

Commodification of Telecentres by Malawian Rural Women

Table 2 summarises the results based on the constructs from the Domestication Theory. Under Commodification, the authors identified two themes: publicity and word of mouth. Consistent with other domestication studies (Silverstone & Haddon, 1996), the authors noted that advertisements contributed to the commodification of the Telecentre. Advertisement was associated with the publicity of the Telecentre through an opening ceremony. Some users stated that they knew about the Telecentre from the opening ceremony of the Telecentre in 2010. The ceremony involved a high-profile cabinet minister and other national politicians coming to the rural area. This made it a big event and attracted the attention of the community:

The main driver for awareness of the Telecentre was by word of mouth. The majority of users heard from their friends, and some from the Telecentre Manager. The findings suggest that word of mouth is critical to commodification of telecentres in rural communities in developing countries. This may be attributed to the fact that Malawi is considered an oral society where information is passed on from one person to the other by word of mouth (Lwanda, 2003); there is also a lack of media (e.g., newspapers) in rural areas. Furthermore, word of mouth could have played a great role in creating awareness of the Telecentre because people in communities are more likely to adopt an innovation when they become aware of it through associates such as relatives and friends who are likely to persuade them (Mark & Poltrock, 2001). Word of mouth has also contributed to the use of ICTs in previous studies on marginalised communities (Chigona et al., 2016; Kapondera & Hart, 2016; Mark & Poltrock, 2001).

Appropriation of Telecentres by Malawian Rural Women

Appropriation is associated with purchasing and ownership of technologies such as computers (Chigona et al., 2016). In this study, appropriation is associated with the use of the Telecentre.

Period and Frequency of Use

As depicted in Table 3, the women users' period of use ranged from two weeks to seven years. The results show that the Telecentre received new women users almost every year.

The majority of the women users used the Telecentre every day. The ones who used it on daily basis were all students – two used it once a week; one used it once a month; and the other one was not certain – she used it when the need for use arose, which could range from a month to three months. The student users used the Telecentre as one of their daily routines and it was integrated into their lives. These findings differ from the findings by Best and Maier (2007) on women's usage of ICTs in kiosks in India. In their study, the majority reported low usage of once a month or less. The higher usage in our study

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Stages of domestication of telecentres by Malawian rural women

Aspect of domestication	Units of meaning	Selected quotations
Commodification	• Publicity-opening ceremony	• This other day there was an opening function for everyone to know that it is a telecentre [US5]. • I just saw them building this house and this is when people were saying it is a telecentre. Thereafter they came for an opening ceremony. This is how I came to know about it and its functions [US6].
	• Word of mouth	• I heard about it [telecentre] when I asked my friends the place they go to for studying. So, this is when they told me about the Telecentre [US11]. • I heard about the Telecentre from the Manager. This other day I met the Telecentre Manager who told me they have a nice place for studying. So, I came to see the place and like it [US8]. • I heard about the Telecentre from the Telecentre Manager [US9].
Appropriation	**Purposes of using** • Academic purposes • Leisure purpose	• Since I have just started using the Telecentre, I only come here to study because it is conducive environment for my studies [US1]. • …the Telecentre to photocopy pamphlets for academic work [US2]. • This Telecentre is useful in various ways… it helps to photocopy materials. When, say, there is a wedding in my community and would want… to print wedding invitation cards, we come here to print them. [US4].
	Factors influencing the integration of telecentres by Malawian rural women • Compatibility with their needs • Convenience • Perceived usefulness	• I use the Telecentre because it stocks materials necessary for my education [US8]. • I like coming here because the place is always quite which is ideal for reading [US8]. • Because when studying here, one can concentrate because there is no one to disturb you here unlike home where parents would want you to help them with some household chores [US10]. • [We use] it is because it is closer to the school as compared to other places. So, when we knock off from school, we just come here [US10]. • I would like be computer literate so that I can have a computer certificate because most jobs these days require people who are computer literate [US5].
	Factors influencing the non-integration of telecentres by Malawian rural women • Lack of awareness of the functions and benefits • Illiteracy • Cultural roles • Perception that telecentres are for the educated	• It is true that some women do not use the Telecentre because they lack knowledge… because most women just see it as a house and do not know what it is all about[US3]. • In this community I think it is because most women do not know that everyone can use the Telecentre. They just say that, aah let those who use it continue using it, it is not for everyone… they lack knowledge [US1]. • It is just that we [women], do not know its benefits [NU3]. • Because of the household chores we are expected to do at home, by the time the chores are done one finds that it is late and cannot make it to the Telecentre… so yeah, lack of time [NU2]. • I think it is due to the fact that those women say that place [Telecentre] is for the educated and for me who never went to school I cannot go there [US3]. • The telecentre] should introduce adult literacy programme so that we become literate… [NU8] • As I have said, this is for the educated. Like for '*Komvuters*'. Do you call them Komvuters? How do you expect me to operate them? [NU9]
Conversion	Recommend to friends	• The Telecentre is useful to me… I tell my friends that you should be visiting the Telecentre where you will find such materials in the library that you can use [US2].
	Teach others	• I use the skills that I gain from using this Telecentre to show and teach my friends who do not know anything about the Telecentre and on the topic I have studied here [US2].

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3: Users' period and frequency of using the Telecentre

		Number of respondents
Period of use	Two weeks	1
	Three months	1
	Six months	1
	One year	4
	Two years	1
	Three years	1
	Four years	1
	Seven years	1
Frequency of use	Every day	7
	Once a week	2
	Once a month	1
	When need arises	1

could be due the fact that, in our study, most of the users were students who needed services such as the library on a regular basis for their academic work.

Purposes of Using the Telecentre

The majority of the women users used the Telecentre for academic purposes. Being students, they needed a space for reading. In addition, homes and schools in rural Malawi may lack ideal space and facilities for doing academic work. Some users also used the Telecentre for social and leisure purposes. A 55-year-old user said she uses the Telecentre services to print and photocopy wedding invitation cards. Some students also used the Telecentre to read non-academic books. The services that the women used were consistent with the literature which states that women mainly use the ICTs that do not require skills or literacy (Bakar, 2011; Kwake & Adigun, 2008), as most of the users did not use the services such as computers. Nine of the participants indicated that they used library services: to read the books in the library and or use the reading space. As much as some women (five) used the ICTs, the ICTs that they used were photocopiers and printers that did not require skills; while only two of the women came to the Telecentre for computer classes.

Factors Influencing the Integration of Telecentres by Malawian Rural Women

Several factors influenced the use and non-use of the Telecentre and its services, as depicted in Table 2. When women users were asked why they used some particular services and not others, the most common reason was compatibility with their needs. Most women, especially students, used services like the library because it provided the materials that they needed in their education, as well as a conducive environment for reading or studying. In addition, the students felt that there were no disturbances, compared to studying at home where girls would be sent to do household chores. A number of studies have shown that, in

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

rural Malawi, parents burden girls with household chores at the expense of their education (Valentini, 2004). In this way, the Telecentre offered a space to "*escape*" from home and focus on their studies.

Convenience also influenced the women's use of the Telecentre. Women used the Telecentre because it was closer than other facilities providing similar services. The effect of distance on the usage of telecentres by women has been reported in previous studies (e.g., Gcora et al., 2015). Perceived usefulness, which is the belief that the use of computers will result in achieving personal goals (Umrani & Ghadially, 2003), also influence women to use the Telecentre, especially those attending the computer course. The two women who indicated that they attended the computer classes said that they had decided to acquire computer skills because that would enable them to find jobs which normally demand people who have computer skills.

Factors Influencing Non-Integration of Telecentres by Malawian Rural Women

Women non-users were asked why they do not use the Telecentre. Women users were asked to give their views on what they think affects other women who do not use the Telecentre. All the ten non-users were aware of the Telecentre in their community. This is in line with findings by Chisango (2014) which found that most rural women are aware of the existence of ICTs but do not use them. Several factors contributed to the women's non-use.

Lack of awareness of the functions of the Telecentre was the main reason why women did not use the Telecentre, as the majority, 15 (users and non-users) of the participants, gave reasons related to lack of appreciation of the functions and benefits of the Telecentre and stated that women did not know that everyone could use the Telecentre. Similar findings have been reported in the literature (Attwood et al., 2013; Mbangala & Samzugi, 2014). It is recommended that the management work on sensitising women about the Telecentre, its functions and its benefits. Findings further suggest that the Telecentre make more efforts to raise the awareness of the Telecentre in the community. According to the Telecentre Manager, the only publicity the Telecentre had promoted was the opening ceremony in 2010 (seven years prior). Although the Manager also told people within the community about the Telecentre, community leaders should be involved to raise more awareness in the community. Kumar and Best (2007) argue that in rural communities like this, local leaders should be involved in the promotion of telecentres because they are respected and have substantial influence on their communities.

As in many studies (Best & Maier, 2007), illiteracy negatively affected the use of the Telecentre by women because it affected their use of the Telecentre. This could be due to the fact that literacy levels of most Malawian rural women are low (FAO, 2011); and that eight of the ten women non-users had not completed primary school and hence were not functionally literate. At the same time, there are no literacy programmes in the Telecentre and in the whole community. This finding implies that the Telecentre benefited only the women who were already empowered through literacy, thereby exacerbating the inequalities which might have existed in the community prior to the existence of the Telecentre.

Cultural roles also affected the integration of telecentres in women's lives. Most women were responsible for most of household chores and this limited time for accessing telecentres. This result is consistent with the literature (Best & Maier, 2007; Mbangala & Samzugi, 2014).

Perception of women about telecentres being a place for the educated affected their use. Since most of the non-users had not completed primary school, they felt inferior and excluded from the Telecentre. Non-user NU9, who had dropped out of primary school (Standard Two), also perceived the Telecentre to be for the educated. The respondent struggled to say the word "computer"; she called them "*Komvut-*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ers" (instead of the correct Chichewa word which is Kompyuta). The perception of the Telecentre to be only for the educated in the community could be attributed to the fact that people who usually visit the Telecentre are students. The perception of telecentres has also affected use of ICTs by women in other countries such as South Africa (Dlodlo, 2009; Gcora et al., 2015).

The financial situation in the rural communities affected the domestication of telecentre services. All the services offered in the Telecentre including library services are offered at a fee. Even those using the Telecentre could not access all of the services because they could not afford them. A user explained that she could not complete her computer course in the Telecentre because she did not have enough money. As stated above, most of the women engaged in wage jobs (*ganyu*) and earned only a small amount of money. This hindered their use of the Telecentre. Similar findings were reported in other ICT studies (Kwake & Adigun 2008) and from the shared facilities of telecentres (Mbangala & Samzugi, 2014; Roman & Colle, 2002).

Conversion of Telecentres by Malawian Rural Women

The results show that some users have reached the conversion stage. Most women users started using the Telecentre after their friends or relatives who had been using it recommended it to them. In the appropriation stage, it is clear that some users had made it part of their lives as most users made use of the telecentre and visited it on a daily basis.

Some users also stated that they recommended the Telecentre to others. Conversion is also reflected in how users used the skills they gained from using the Telecentre. Most users, especially students, used the skills to teach others who were facing challenges in their academic life.

CONCLUSION

The study sought to understand the process through which telecentres are appropriated in women's lives in rural Malawi. The study employed Domestication Theory as a theoretical lens. The study shows that commodification was influenced by a number of factors that included advertisements and word of mouth. The users used the Telecentre for a variety of reasons, both instrumental and hedonic. The students used the Telecentre mainly for academic purposes. The findings provide insights into the services that women use and the factors that determine the services that they use. The women primarily used services that did not require ICT skills, such as photocopiers, printers and books, and reading space in the library. A number of factors influenced the appropriation of the Telecentre and its services. Convenience, compatibility with the needs of women and perceived usefulness influenced women to use the Telecentre. On the other hand, lack of awareness, illiteracy, lack of money, cultural roles and perception that telecentres are for the educated made some women not use the Telecentre. The results show that some users, especially students, have integrated the use of the Telecentre in their daily routines; some have reached the conversion stage so that they could recommend the Telecentre to others.

The study recommends that telecentre management should create awareness in the community on an on-going basis. The awareness campaigns should focus on sensitising women on the functions of the telecentre and its benefits. This will also help to minimise the perception that telecentres are for the educated. The study also recommends that telecentres should start offering literacy classes to facilitate the use of telecentres by the women. The committee should be gender-balanced. A gender-balanced

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

committee would be more sensitive to women's needs and women would feel the centre is for women's needs as well. The study also recommends continuation of establishing telecentres in rural communities, as they have the potential to transform the rural communities. This study was limited to a small sample size; future studies should be conducted using larger sample sizes.

ACKNOWLEDGMENT

The authors are grateful to All Africa House Fellowship by University of Cape Town. The paper was written when Sellina Khumbo Kapondera was taking up the Fellowship.

REFERENCES

Attwood, H., Diga, K., Braathen, E., & May, J. (2013). Telecentre functionality in South Africa: Re-enabling the community ICT access environment. *The Journal of Community Informatics*, *9*(4). Retrieved 27 March, 2017 from http://cijournal.net/index.php/ciej/article/view/970/1060

Bakar, A. B. A. (2011). Information seeking behaviours of rural women in Malaysia. *Library Philosophy and Practice.* Retrieved April 13, 2017, from http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1479&context=libphilprac

Best, M. L., & Maier, S. G. (2007). Gender, culture and ICT use in rural south India. *Gender, Technology and Development*, *11*(2), 137–155. doi:10.1177/097185240701100201

Chapman, R., & Slaymaker, T. (2002). *ICTs and rural development: Review of the literature, current interventions and opportunities for action*. London: Overseas Development Institute.

Chigona, A. (2015). Teacher education students' domestication of ICTs for teaching and learning. *Proceedings of Global Learn*. Retrieved 5 April 2017 from https://www.editlib.org/noaccess/150868

Chigona, A., Chigona, W., Kayongo, P., & Kausa, M. (2010). An empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa. *International Journal of Education and Development Using Information and Communication Technology*, *6*(2). PMID:20852677

Chigona, W., Mudavanhu, S. L., Siebritz, A., & Amerika, Z. (2016). Domestication of Free Wi-Fi Amongst People Living in Disadvantaged Communities in the Western Cape Province of South Africa. In *Proceedings of the Annual Conference of the South African Institute of Computer Scientists and Information Technologists.* Retrieved March 22, 2017 from http://dl.acm.org/citation.cfm?id=2987500

Chikumba, P. A. (2011). Utilization of ICTs in multipurpose community telecentres in rural Malawi. In R. Popescu-Zeletin, I. A. Rai, K. Jonas, & A. Villafiorita (Eds.), *E-Infrastuctures and E-Services for Developing Countries* (pp. 93–101). New York: Springer. doi:10.1007/978-3-642-23828-4_9

Chisa, K., & Hoskins, R. (2016). An Evaluation of a Donor Funded Information and Communication Technology Centre in a South Africa Indigenous Community: Reflections on the Bhamshela Telecentre. *African Journal of Library Archives and Information Science*, *26*(1), 59–71.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chisango, G. (2014). *Technology challenges faced by rural women in the Eastern Cape Province of South Africa: A case in the Chris Hani Municipality*. Unpublished master's thesis, University of South Africa.

Dlodlo, N. (2009). Access to ICT education for girls and women in rural South Africa: A case study. *Technology in society*, *31*(2), 168–175. doi:10.1016/j.techsoc.2009.03.003

FAO. (2011). *Malawi country profile: Gender inequalities in rural employment in Malawi, an overview.* Retrieved April 14, 2017, from http://www.fao.org/docrep/016/ap092e/ap092e00.pdf

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, *5*(1), 80–92. doi:10.1177/160940690600500107

Frissen, V. A. (2000). ICTs in the rush hour of life. *The Information Society*, *16*(1), 65–75. doi:10.1080/019722400128338

Gcora, N., Gopeni, A., Tuswa, M., Lwoga, E. T., & Chigona, W. (2015). The challenges rural women face in using Telecentres: The case of the Eastern Cape Province. In *Proceedings of the 9th IDIA conference*. Retrieved February 10, 2017, fromhttps://www.researchgate.net/profile/Edda_Lwoga/publication/286454596_The_challenges_rural_women_face_in_using_Telecentres_The_case_of_the_Eastern_Cape_Province/links/566abd6608aea0892c4b4110.pdf

Greco, G., Skordis-Worrall, J., Mkandawire, B., & Mills, A. (2015). What is a good life? Selecting capabilities to assess women's quality of life in rural Malawi. *Social Science & Medicine*, *130*, 69–78. doi:10.1016/j.socscimed.2015.01.042 PMID:25687242

Habib, L., & Sønneland, A. M. (2010). From Alien to Domestic? Virtual learning environment use from a domestication perspective. *Journal of Online Learning and Teaching*, *6*(4), 712.

Haddon, L. (2006). The contribution of domestication research to in-home computing and media consumption. *The Information Society*, *22*(4), 195–203. doi:10.1080/01972240600791325

Human Development Report. (2016). *Human development report 2016: human development for everyone.* Retrieved April 6, 2017, from hdr.undp.org/sites/default/files/hdr_2016_statistical_annex.pdf

Hynes, D., & Richardson, H. (2009). What use is domestication theory to information systems research? In Handbook of research on contemporary theoretical models in information systems (pp. 482-494). Hershey, PA: IGI Global. doi:10.4018/978-1-60566-659-4.ch027

IFAD. (2017). *Investing in rural people in Malawi*. Retrieved March 28, 2017, from https://www.ifad.org/documents/10180/c31ccb11-f0e5-4b56-b0ef-0bd74f1e6e79

Kajornboon, A. B. (2005). Using interviews as research instruments. *E-journal for Research Teachers*, *2*(1), 1–9.

Kapondera, S. K., & Hart, G. (2016). The use of multipurpose community telecentres and their services in Malawi: The case of Lupaso Community Telecentre. *South African Journal of Library and Information Science*, *82*(1), 13–25.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kumar, R., & Best, M. L. (2007). Social impact and diffusion of telecentre use: A study from the sustainable access in rural India project. *The journal of community informatics, 2*(3). Retrieved April 16, 2017 from http://cijournal.net/index.php/ciej/article/view/328

Kwake, A., & Adigun, M. (2008). Analyzing ICT use and access amongst rural women in Kenya. *International Journal of education and Development using ICT, 4*(4). Retrieved April 12, 2017, from http://ijedict.dec.uwi.edu/printarticle.php?id=537&layout=html

Lwanda, J. (2003). Orality Music and HIV/AIDS: interrogating the Malawi popular public sphere. In *African Studies Association of Australasia and the Pacific 2003 Conference Proceedings*, Glasgow. African on a Global Stage.

MACRA. (2015). *National survey on access to and usage of ICT services in Malawi*. Blantyre: MACRA. Retrieved April 6, 2017, from http://www.macra.org.mw/wp-content/uploads/2016/01/MACRA-Survey-Report-National-Household-and-Individual-access-to-and-usage-of-ICT.pdf

Madima, N. M. (2007). *A critical investigation of telecentre provision and utilization by rural women: with special reference to Botlokwa Youth Telecentre*. Unpublished doctoral dissertation, University of Limpopo.

Malawi. (2012). *Integrated household survey 2010-2011: household socio-economic characteristics report.* Retrieved February 20, 2017 from http://www.nsomalawi.mw/images/stories/data_on_line/economics/ihs/IHS3/IHS3_Repo rt.pdf

Malawi. (2013). *National ICT Policy: An ICT-led Malawi*. Retrieved April 7, 2017, from http://www.macra.org.mw/wp-content/uploads/2014/07/Malawi-ICT-Policy-2013.pdf

Mark, G., & Poltrock, S. (2001). Diffusion of a collaborative technology across distance. In *Proceedings of the 2001 International Association for Computing Machinery SIGGROUP Conference on Supporting Group Work*, Boulder, Colorado (pp. 232–241). 10.1145/500286.500321

Mbangala, B., & Samzugi, A. (2014). The role of telecentres in Tanzania's rural development. A case study of Sengerema District Council, Mwanza Region. *Library Philosophy and Practice*, p.0_1. Retrieved April 13, 2017, from http://search.proquest.com/docview/1738007995/fulltextPDF/9BD28345B53443A3PQ/1?accountid=14500

Nyirenda, P. B. (2014). *Report #2 on Malawi ICT sector key indicators on infrastructure and access. Regional communications infrastructure programme Malawi project.* Retrieved February 10, 2017, from http://www.nic.mw/RCIPMW-reports/Report-2-ver1.5-Malawi-ICT-Sector-Key-ICT-Indicators-on-Infrastructure-2014.pdf

Owen, W. Jr, & Darkwa, O. (2000). Role of multipurpose community telecentres in accelerating national development in Ghana. *First Monday*, *5*(1). Retrieved April 11, 2017 from http://journals.uic.edu/ojs/index.php/fm/article/view/722

Roman, R., & Colle, R. D. (2002). *Themes and issues in telecentre sustainability,10*. Institute for Development Policy and Management: University of Manchester.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Silverstone, R., & Haddon, L. (1996). Design and the domestication of information and communication technologies: Technical change and everyday life. In R. Mansell, & R. Silverstone (Eds.), Communication by design: The politics of information and communication technologies (pp. 44-74). Oxford: Oxford University Press.

The World Bank. (2016). World Bank country and lending groups: country classification. Retrieved May 20, 2017 from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *The American Journal of Evaluation*, *27*(2), 237–246. doi:10.1177/1098214005283748

Umrani, F., & Ghadially, R. (2003). Empowering women through ICT education: Facilitating computer adoption. *Gender, Technology and Development*, *7*(3), 359–377. doi:10.1177/097185240300700303

Valentini, A. (2004). *Malawi's Rural Adolescent Girls Education.* Retrieved May 24, 2017 from ftp://193.43.36.93/docrep/fao/010/ai437e/ai437e.pdf

This research was previously published in the International Journal of Information Communication Technologies and Human Development (IJICTHD), 10(1); pages 51-64, copyright year 2018 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 6
Managerial Impact

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 86
Strategic and Business-IT Alignment Under Digital Transformation:
Towards New Insights?

Nabyla Daidj
Institut Mines-Télécom Business School, France

ABSTRACT

Digital transformation is at a very early stage. Digital transformation has several impacts on business, on organization and process and raises several questions. Over the years, the aims of strategic fit and IT-business alignment have remained constant but the environment in which companies operate has changed significantly becoming more dynamic, very competitive and global. This chapter attempts to analyse how the digital transformation could affect more specifically strategic and IT-business alignment.

INTRODUCTION

The digital economy marks a historical shift in the approach to businesses and potential commercial activities. In the digital environment, a competitive firm should constantly be able to reposition itself in terms of its value proposition, resources and competences, financial capacity in light of the changing entry (and exit) barriers, the disruptive technologies and business models and periods of evolving competitive dynamics. Hypercompetitivity and digitalization presuppose permanent transformation of competitive advantages and critical success factors (CSFs). D'Aveni et al. (2010) thus have proposed "the age of temporary advantage" as an alternative concept to sustainability. This idea is also shared by McGrath (2013) who has called into question the relevance of sustainability in today's fast moving and hypercompetitive marketplaces.

DOI: 10.4018/978-1-7998-7297-9.ch086

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The digital transformation has several impacts on business, on organization and process and raises several questions. "A digital transformation strategy impacts a company more comprehensively than an IT strategy and addresses potential effects on interactions across company borders with clients, competitors and suppliers" (Hess et al., 2016, p. 1). This chapter attempts to analyse how the digital transformation could affect more specifically strategic and IT-business alignment.

LITERATURE REVIEW: DIGITIZATION, DIGITALIZATION AND DIGITAL TRANSFORMATION

Digital transformation is a polysemous, buzz word (Sugahara et al., 2017, p.71). There are many dimensions of digital transformation sometimes confused with other terms such as digitization or digitalization (Table 1).

Digital transformation is often considered as the next step of digitization. Digitization is the process of converting information from an analog to digital format. For example, in the entertainment industry, the dematerialization of content has had repercussions not only on production, but also importantly on exploitation, broadcasting and distribution. In the context of convergence, these technological changes are also accompanied by changes in common practices adopted by consumers and strategies of the main firms involved (Daidj, 2015; Danowski & Choi, 1998).

The term "digitalization' closely related with computerization was used first by Robert Wachal in 1971 who discussed the social implications of the "digitalization of society". In the Oxford English Dictionary (OED), digitalization refers to "the adoption or increase in use of digital or computer technology by an organization, industry, country, etc." Gartner's IT glossary defines digitalization as "the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business."

As regards digital transformation, definitions are numerous elaborated by both practitioners and academic scholars. Keyur Patel and Mary Pat McCarthy (2000) have been among the first authors to address the digital transformation issue by highlighting three questions as follows: What is digital transformation? How does it change business? What are the challenges for B2B companies and B2C companies in making a digital transformation?

Table 1 presents an overview of definitions of digital transformation summarizing key focus words contained in the definitions.

The digital transformation was first associated with technologies. "Within an enterprise, digital transformation is defined as an organizational shift to big data, analytics, cloud, mobile and social media platforms. The current business environment is witnessing a radical altering of the business landscape fueled by the emergence of digital innovations and opportunities. Firms are increasingly adopting various opportunities such as analytics, big data, cloud, social media and mobile platforms in a bid to build competitive digital business strategies" (Nwankpa & Roumani, 2016, p. 2). Then, according to most definitions, emphasis has been placed on one or two main concepts developed both in the strategic area and the IS/IT literature including (IT) capabilities, process, value (creation and capture), business model and organization. Several scholars have underlined the impact of the digital transformation on performances (Westerman et al., 2011; Peppard, 2016). Very little information and analysis can be found in academic papers on the relevance of new KPIs. Kotarba (2017) presented an analysis of metrics used to measure digitalization activities. Digital KPIs are numerous and there are already too many metrics and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Overview of definitions of digital transformation

Authors	Definition	Key Features/Words
Dörner and Edelman (2015)	Digital transformation is "creating value at the new frontiers of the business world, create value in the processes that execute a vision of customer experiences and building foundational capabilities that support the entire structure". (p. 1)	Marketplace Capabilities Agility
Hess et al. (2016)	"Digital transformation is concerned with the changes digital technologies can bring about in a company's business model, which result in changed products or organizational structures or in the automation of processes. […] (The) conceptual framework for formulating a digital transformation strategy identifies the four key dimensions of every digital transformation endeavor: *The use of technologies* reflects a firm's approach and capability to explore and exploit new digital technologies. *Changes in value creation* reflect the influence of digital transformation on a firm's value creation. *Structural changes* refer to the modifications in organizational structures, processes and skill sets that are necessary to cope with and exploit new technologies. The *financial aspects* dimension relates to both a firm's need for action in response to a struggling core business as well as its ability to finance a digital transformation endeavor." (p. 124)	Strategy Changes in business models organization, process, skills Value creation
Schuchmann, and Seufert (2015)	"Digital transformation is one of the major challenges in all industries. It embraces the realignment of technology and new business models to more effectively engage digital customers at every touchpoint in the costumer experience lifecycle. Therefore, successful digital transformation begins with an understanding of digital consumer behavior, preferences and choices. It then leads to major consumer-centric changes within the organisation that address these needs". (p. 31)	Realignment New business models Consumer experience

Source: elaborated by the author, based on analysis of the articles cited.

targets. As Kotarba (2017, p. 136) mentioned it, "the overall number of digital KPIs already exceeds 100 items raising a problem of selecting the best metrics to monitor with limited control budgets (cost of data acquisition and processing). Further work should be conducted to select the metrics with the highest descriptive/statistical potential to pronounce the development of digital performance". A number of key metrics should be identified according to industries and should be followed by companies accordingly.

The digital transformation is a multidimensional phenomenon that can be studied from many different perspectives and thus requires the decompartmentalization of disciplines, particularly of economics, strategic management, digital marketing and information systems. As the digital transformation may take a variety of forms for company and have diverse (positive or adverse) consequences, several levels of analysis are required as shown in Table 2.

The digital transformation has a direct impact on the enterprise both internally (Abrell et al., 2016; Libert et al., 2016; Porter & Heppelmann, 2015; Yoo et al., 2010) and externally (Markus & Loebbecke, 2013; Porter & Heppelmann, 2014; Von Leipzig et al., 2017). In addition, its business relationships (with its main suppliers, competitors, and customers), partnerships and practices (for example within business ecosystem and/or networks a company belongs to) will change because of the transformation. Value creation mechanisms, value chains and business models (Bock et al., 2017) are expected to be renewed (even disrupted) enabled by the increasing development of cloud computing, data analytics, machine learning, artificial intelligence (AI) and IOT (Internet of Things).

What will drive competitive advantage in the future? The 'traditional' sustainable competitive advantage (based on cost reduction and/or differentiation) is already questioned. The notion of "transient advantage" is more and more used (McGrath, 2013). 'Classical' CSFs such as financial resources, in-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Digital transformation levels: what major issues for companies?

<table>
<tr><td rowspan="3">Strategic & IT business-IT Alignment</td><td colspan="2">Internal Level</td><td rowspan="2">Business Ecosystems / Networks Technological Platforms</td><td colspan="2">External Level</td></tr>
<tr><td>Organization* Information Systems (IS) Process</td><td>Company** (Corporate Level)</td><td>Market</td><td>BtoB / BtoC Suppliers Competitors</td></tr>
<tr><td colspan="5">Reconfiguration of value chains
Value creation (new mechanisms)
Redefinition of business models and revenue models</td></tr>
<tr><td colspan="5">Towards disruption ?</td></tr>
</table>

Note:

* Organization includes SBUs (strategic business units) and/or main functions (Research and Development; Production; Purchasing; Logistics; Marketing; Sales; Human Resources (HR); DevOps etc.).

The black arrow corresponds to the concept of business-IT alignment analyzed in the following section.

** The corporate level refers to the overall scope of an organization, its portfolio of businesses.

Source: elaborated by the author.

novation, marketing and promotion should evolve towards an increasingly customer satisfaction and user experience thanks in particular to a more efficient strategy and IT alignment.

As the digital transformation is a very broad notion, in this chapter,the authors have therefore decided to analyze and to focus on its impact on strategic and business-IT alignment. This issue has not yet been fully explored by scholars. On the business side, companies are aware of the fact that strategic and business-IT alignment could support successful digital transformation. This view has been expressed in several reports and studies. In 2016, MIT Sloan Management Review and Deloitte Digital published their Digital Business Global Executive Study and Research Report (July 2016). Based on a survey of 3,700 executives across 131 countries and 27 industries, the report entitled 'Aligning the Organisation for Its Digital Future', highlighted the key concern of IT alignment called also congruence. "Digital congruence is the crux: To navigate the complexity of digital business, companies should consider embracing what we call *digital congruence* — culture, people, structure, and tasks aligned with each other, company strategy, and the challenges of a constantly changing digital landscape". This is the focus of the next sections.

FROM STRATEGIC FIT AND IT-ALIGNMENT TO DIGITAL BUSINESS STRATEGY

As the notion of alignment has several meanings according to the approach adopted (strategic focus or IT oriented), it is helpful to review how this concept was created and then adopted by scholars from various disciplines.

Strategic alignment dates back to the 1980s and 1990s with the work of several researchers in strategic management (Hamel & Prahalad, 1989; Porter, 1996). Hamel and Prahalad (1989) began to address the issue of strategic intent question then leading them to the analysis of the concept of strategic fit. Creating competitive advantages and (re)gaining competitiveness requires a 'strategic intent' that drives the entire corporation. They made a distinction between 'strategic intent' and 'strategic fit' in their model of strategic leadership and strategic vision. Traditional strategic management involves a search for the strategic fit between business portfolios, market niches and products, customers and distribution chan-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

nels. Strategic fit is related to the degree to which a company is matching its resources and competencies with the opportunities in the external environment. Strategic fit is based on the resource-based view (RBV) of the firm which explains that the key to profitability is rather through unique characteristics of the company's resources and competencies in order to develop a sustainable competitive advantage. The idea of considering firms as a large set of resources goes back to the seminal work of Penrose (1959). This concept received renewed attention in the 1980s in particular by Wernerfelt (1984, 1989) and has become an influential framework for analysing corporate strategy (Barney, 1991; Hoopes et al., 2003; Peteraf, 1993). In 1996, Porter has pursued Hamel and Prahalad' work (1989) and has explained that strategic fit drives both competitive advantage and sustainability. According to him, the success of a business is explained often by the implementation of strategic fit. "Fit locks out imitators by creating a chain that is as strong as its *strongest* link (…). One activity's cost, for example, is lowered because of the way other activities are performed. Similarly, one activity's value to customers can be enhanced by a company's other activities. That is the way strategic fit creates competitive advantage and superior profitability." (p. 70).

The well-known strategic alignment model (SAM) proposed by Henderson and Venkatraman (1993) was the first to clearly describe the relationship between business strategies and information technology strategies. IT has evolved from its traditional role as a support function to a strategic role. The SAM model relies on four key domains of strategic choice: business strategy, information technology strategy, organizational infrastructure and processes, and information technology infrastructure and processes. They illustrated this model in terms of two fundamental characteristics for strategic management: strategic fit (the interrelationships between external and internal components) and functional integration (integration between business and functional domains).

IT-business alignment has been expressed using various words such as 'harmony' (Luftman et al., 1993), 'fusion' (Smaczny, 2001), 'integration' (Weill & Broadbent, 1988), and 'linkage' (Henderson & Venkatraman, 1993). Several IT alignment models have been elaborated and different methodologies have been adopted (Avison et al., 2004; Coltman et al. 2015; Gerow et al., 2014; Gerow et al., 2015; Henderson & Venkatraman, 1993; Luftman et al., 1993; Maes et al, 2000; Marchand et al., 2001; Reich & Benbasat, 1996, 2000) to identify key elements that need to be aligned for business IT alignment. Luftman (2000) developed a framework called the Strategic Alignment Maturity Model (SAMM) based on the twelve components of Business/IT-Alignment, which can be recognized in the model of Henderson and Venkatraman (1993). "Alignment addresses both how IT is in harmony with the business, and how the business should, or could be in harmony with IT. Alignment maturity evolves into a relationship where the function of IT and other business functions adapt their strategies together. Achieving alignment is evolutionary and dynamic. IT requires strong support from senior management, good working relationships, strong leadership, appropriate prioritization, trust, and effective communication, as well as a thorough understanding of the business and technical environments". (Luftman, 2000, p. 6-7).

IT has played a fundamental and powerful role in facilitating business activities and has become a catalyst of fundamental changes in the structure, operations, and management of organizations (Brown & Magill, 1994; Kearns & Sabherwal, 2006; Luftman *et al*., 2006). This place is being strengthened today in the context of digital transformation. Strategy and business-IT issues are closely related and should be more combined in order to achieve a competitive advantage that might be called a 'digital competitive advantage'. Several scholars have stressed the need for companies to take into account all these dimensions in a digital strategy (Bharadwaj et al., 2013; Drnevich & Croson, 2013; Mithas et al., 2013; Pagani, 2013). As explained by Bharadwaj et al. (2013, p. 471), [they] "argue that the time is

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

right to rethink the role of IT strategy, from that of a functional-level strategy—aligned but essentially always subordinate to business strategy—to one that reflects a fusion between IT strategy and business strategy. This fusion is herein termed digital business strategy". This is the purpose of the next section.

Managerial Contributions and Recommendations

The importance of strategic alignment (business-IT) has been recognized for a long time. "The best performing companies are often the best aligned" (Trevor, 2018, p. 2). Digital transformation does not imply the end of alignment but requires addressing new challenges in relation with digital business strategy. As mentioned previously, digital transformation is not only digital upgrades (Libert et al., 2016). A real digital business strategy aligned requires redesigning the "big picture" (Mintzberg, 1994, p. 111) and rethinking the strategic vision in relation with several key pillars as follows:

- **Value Creation & Capture:** "Firms investing in digital transformation are able to align digital insights about customers with innovative processes and investments leading to improved customer experience and performance" (Nwankpa & Roumani, 2016, p. 10). Approaches like co-conception, co-design, co-creation, co-production all emerged in the early 2000s and have grown without interruption ever since. In varying degrees, they all imply a collaborative, collective and interdisciplinary dimension. Instead of relying upon a "technology push" philosophy, which prevailed for a long time, they confide in a "market pull" outlook, which seeks to integrate market needs with the expectations of final users. Co-conception and co-design specifically acknowledge the context in which the goods are consumed to collect information and thus be able to improve and enhance customers´ experience. These collaborative practices transform the relations between the company and its customers, because the latter are now involved in the design of new products, services, applications, information systems before or during the development stage. These different players become "co-producers" of value (Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2004).
- **Organization/Culture:** "Digital business strategy is different from traditional IT strategy in the sense that it is much more than a cross-functional strategy, and it transcends traditional functional areas (such as marketing, procurement, logistics, operations, or others) and various IT-enabled business processes (such as order management, customer service, and others). Therefore, digital business strategy can be viewed as being inherently transfunctional. All of the functional and process strategies are encompassed under the umbrella of digital business strategy with digital resources serving as the connective tissue." (Bharadwaj et al. (2013, p. 473). This new organization requires to hire "digital" workers and managers. It means also the development of an agile culture. The "agility" concept was created in 1991 by a group of researchers at the lacocca Institute (Lehigh University, USA). The agility concept is defined as "a manufacturing system with extraordinary capabilities (Internal capabilities: hard and soft technologies, human resources, educated management, information) to meet the rapidly changing needs of the marketplace (speed, flexibility, customers, competitors, suppliers, infrastructure, responsiveness). A system that shifts quickly (speed and responsiveness) among product models or between product lines (flexibility), ideally in real-time response to customer demand (customer needs and wants)." Principles of agility have been then applied to other functions of enterprise, and the "agile enterprise" concept has been launched (Goldman et *al.*, 1995; Nagel, 1992).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The "traditional business-IT alignment" framework should progressively evolve (Table 3).

Table 3. Towards a renewed alignment framework in the context of digital transformation

	Previous Model **Strategy Drives Technology Towards Alignment**	**Renewed Model** **Technology Drives Strategy Towards the Implementation of a Digital Business Strategy Leading to Alignment**
Internal Level (Organization)		
Organization (structure, management, resources and competencies)	Silos / Functional structure	"Transfunctional structure" Emergence of new functions (e.g. DEV/OPS) Agility Digital skills (chief information officers - CIO)
IT	Information system / Process	Development of dynamic IT capabilities (architecture, data management services, application platforms)
External Level		
Market	Mainly competition	Co-existence of rivalry and cooperation
Relationships with other external stakeholders	Customers Suppliers (subcontracting relationships)	Customers (co-conception, co-creation and co-design practices) Suppliers (real partnerships)
Business Models		
		Data-driven business models

Source: elaborated by the author.

FUTURE RESEARCH DIRECTIONS

Digital transformation is at a very early stage. Multi-disciplinary approaches will be required to address this issue in a comprehensive manner. Further work is required to understand the impact of digital transformation on IT-business alignment and related performances. It includes also case studies with different types of impact assessments (value chains, dynamic capabilities, organizational processes, business processes and managerial models). Among other consequences, digital transformation reshapes also business models. Advanced analytics tools ("business analytics" or "big data analytics") enable an easier access to infinite data and could lead to the adoption of business intelligence (BI) strategies for many kinds of public and private organizations. Advanced business intelligence tools thus contribute to the value creation for the organization and, in addition, an incremental transformation (Loebbecke and Picot, 2015). Business models which are increasingly digitalized and 'BI-Based' (Davenport, 2006) should replace less efficient business models.

CONCLUSION

The 'old' debate on strategic fit is not closed. Since the beginning of the 1980s, the alignment has been more and more linked with IT/IS facilitating the business operations and ensuring that the strategy was implementable. Most of scholars presented previously have stressed the role of IT/IS in creating

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

value. Over the years, the aims of strategic fit and IT-business alignment have remained constant but the environment in which companies operate has changed significantly becoming more dynamic, very competitive and global. Competitors are more innovative and new entrants are more digitally focused (Von Leipzig et al., 2017). As mentioned by Smaczny (2001, p. 797), "…the alignment concept is about a sequential development of strategies and a sequential operationalisation. Unfortunately, now that reliance on IT has increased to the level where a lack of IT agility and responsiveness can create a competitive disadvantage, the sequential model is too slow. [We] promote a notion of fusion. Today's chief information officers are increasingly becoming company strategists who help their chief executive officer colleagues to steer companies. Business and IT strategies have to be developed simultaneously and implemented simultaneously." The digital transformation requires higher value at each chain of the internal and external value chain for the organizations.

REFERENCES

Abrell, T., Pihlajamaa, M., Kanto, L., Brocke, J., & Uebernickel, F. (2016). The Role of Users and Customers in Digital Innovation: Insights from B2B Manufacturing Firms. *Information & Management*, *53*(3), 324–335. doi:10.1016/j.im.2015.12.005

Avison, D., Jones, J., Powell, P., & Wilson, D. (2004). Using and validating the strategic alignment model. *The Journal of Strategic Information Systems*, *13*(3), 223–246. doi:10.1016/j.jsis.2004.08.002

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120. doi:10.1177/014920639101700108

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital Business Strategy: Toward a Next Generation of Insights. *Management Information Systems Quarterly*, *37*(2), 471–482. doi:10.25300/MISQ/2013/37:2.3

Bock, R., Iansiti M., & Lakhani, K. (2017, January 31). What the companies on the right side of the digital business divide have in common. *Harvard Business Review Digital Articles*.

Brown, C. V., & Magill, S. L. (1994). *Alignment* of the IS functions with the enterprise: Toward a model of antecedents. *Management Information Systems Quarterly*, *18*(4), 371–403. doi:10.2307/249521

Coltman, T., Tallon, P., Sharma, R., & Queiroz, M. (2015). Strategic IT alignment: Twentyfive years on. *Journal of Information Technology*, *30*(2), 91–100. doi:10.1057/jit.2014.35

D'Aveni, R. A., Dagnino, G. B., & Smith, K. G. (2010). The age of temporary advantage. *Strategic Management Journal*, *31*(13), 1371–1385. doi:10.1002mj.897

Daidj, N. (2015). *Developing Strategic Business Models and Competitive Advantage in the Digital Sector*. Hershey, PA: IGI Global. doi:10.4018/978-1-4666-6513-2

Danowski, J. A., & Choi, J. H. (1998). Convergence in the information industries. Telecommunications, broadcasting and data processing 1981-1996. In H. Sawhney & G.A. Barnett (Eds), Progress in Communication Sciences (pp. 125-150). Stamford, CT: Ablex Publishing

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Davenport, T. H. (2006). Competing on Analytics. *Harvard Business Review*, *84*(1), 98–107. PMID:16447373

Dörner, K., & Edelman, D. (2015). *What 'digital' really means. McKinsey & Company: Insights & Publications*. Retrieved from http://www.mckinsey.com/insights/high_tech_telecoms_internet/what_digital_really_means?cid=digital-eml-alt-mip-mck-oth-1507

Drnevich, P. L., & Croson, D. C. (2013). Information Technology and Business-Level Strategy: Toward an Integrated Theoretical Perspective. *Management Information Systems Quarterly*, *37*(2), 483–509. doi:10.25300/MISQ/2013/37.2.08

Gerow, J. E., Grover, V., Thatcher, J. B., & Roth, P. L. (2014). Looking toward the future of IT-business strategic alignment through the past: A meta-analysis. *Management Information Systems Quarterly*, *38*(4), 1059–1085. doi:10.25300/MISQ/2014/38.4.10

Gerow, J. E., Thatcher, J. B., & Grover, V. (2015). Six Types of IT-Business Strategic Alignment: An investigation of the constructs and their measurement. *European Journal of Information Systems*, *24*(5), 465–491. doi:10.1057/ejis.2014.6

Hamel, G., & Prahalad, C. K. (1989). Strategic intent. *Harvard Business Review*, *67*(3), 63–78. PMID:10303477

Henderson, J., & Venkatraman, N. (1993). Strategic alignment: Leveraging information technology for transforming organizations. *IBM Systems Journal*, *32*(1), 4–16. doi:10.1147j.382.0472

Hess, T., Matt, C., Wiesböck, F., & Benlian, A. (2016). Options for Formulating a Digital Transformation Strategy. *MIS Quarterly Executive*, *15*(2), 103–119.

Hoopes, D. G., Madsen, T. L., & Walker, G. (2003). Guest Editors' Introduction to the Special Issue: Why is there a Resource-Based View? Toward a Theory of Competitive Heterogeneity. *Strategic Management Journal*, *24*(10), 889–902. doi:10.1002mj.356

Iacocca Institute. (1991). *21st century manufacturing enterprise strategy*. Bethlehem, PA: Lehigh University.

Kearns, G. S., & Sabherwal, R. (2006). Strategic alignment between business and information technology: A knowledge-based view of behaviors, outcome, and consequences. *Journal of Management Information Systems*, *23*(3), 129–162. doi:10.2753/MIS0742-1222230306

Kotarba, M. (2017). Measuring Digitalization - Key Metrics. *Foundations of Management*, *9*(1), 123–138. doi:10.1515/fman-2017-0010

Libert, B., Beck, M., & Wind, Y. (2016). 7 Questions to ask before your next digital transformation. *Harvard Business Review*. Retrieved from https://hbr.org/2016/07/7-questions-to-ask-before-your-next-digital-transformation

Loebbecke, C., & Picot, A. (2015). Reflections on Societal and Business Model Transformation arising from Digitization and Big Data Analytics: A Research Agenda. *The Journal of Strategic Information Systems*, *24*(3), 149–157. doi:10.1016/j.jsis.2015.08.002

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Luftman, J. (2000). Assessing business-information technology alignment maturity. *Communications of the Association for Information Systems*, *4*(1), 1–49.

Luftman, J., Kempaiah, K., & Nash, E. (2006). Key issues for information technology executives 2005. *MIS Quarterly Executive*, *5*(2), 81–99.

Luftman, J., Lewis, P., & Oldach, S. (1993). Transforming the Enterprise: The Alignment of Business and Information Technology Strategies. *IBM Systems Journal*, *32*(1), 198–222. doi:10.1147j.321.0198

Maes, R., Rijsenbrij, D., Truijens, O., & Goedvolk, H. (2000). Redefining business: IT alignment through a unified framework. (PrimaVera working paper; No. 2000-19). Amsterdam: Universiteit van Amsterdam, Department of Information Management.

Marchand, D., Kettinger, W., & Rollins, J. (2001). *Information orientation: The link to business performance*. Oxford: Oxford University Press.

Markus, M. L., & Loebbecke, C. (2013). Commoditized digital processes and business community platforms: New opportunities and challenges for digital business strategies. *Management Information Systems Quarterly*, *37*(2), 649–654.

McGrath, R. G. (2013). *The End of Competitive Advantage: How to Keep Your Strategy Moving as Fast as Your Business*. Boston, Mass: Harvard Business Review Press.

Mintzberg, H. (1994). The fall and rise of strategic planning. *Harvard Business Review*, *72*(1), 107–114.

Mithas, S., Tafti, A., & Mitchell, W. (2013). How a firm's competitive environment and digital strategic posture influence digital business strategy. *Management Information Systems Quarterly*, *37*(2), 511–536. doi:10.25300/MISQ/2013/37.2.09

Nagel, R. N. (1992). *21st Century Manufacturing Enterprise Strategy. An Industry-Led View. Prepared for the Office of Naval Research Arlington, VA*. Bethlehem, PA: Iacocca Institute. Lehigh University. doi:10.21236/ADA257032

Nwankpa, J. K., & Roumani, Y. (2016). IT Capability and Digital Transformation: A Firm Performance Perspective. In Proceedings of the *Thirty Seventh International Conference on Information Systems, Dublin.* Retrieved from https://pdfs.semanticscholar.org/e8c4/16395a5d6690550b4aa74d81950eaa28bd84.pdf

Pagani, M. (2013). Digital Business Strategy and Value Creation: Framing the Dynamic Cycle of Control Points. *Management Information Systems Quarterly*, *37*(2), 617–632. doi:10.25300/MISQ/2013/37.2.13

Patel, K., & McCarthy, M. P. (2000). *Digital Transformation: The Essentials of E-Business Leadership*. New York: McGraw-Hill Professional.

Penrose, E. G. (1959). *The Theory of the Growth of the Firm*. New York: Wiley.

Peppard, J. (2016). A Tool for Balancing Your Company's Digital Investments, *Harvard Business Review Digital Articles*, October 18, 2016, 2-5.

Peteraf, M. A. (1993). The cornerstone of competitive advantage: A resource-based view. *Strategic Management Journal*, *14*(3), 179–191. doi:10.1002mj.4250140303

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Porter, M. E. (1996). What is Strategy? *Harvard Business Review*, *74*(6), 61–78. PMID:10158474

Porter, M. E., & Heppelmann, J. E. (2014). How Smart, Connected Products Are Transforming Competition. *Harvard Business Review*, *92*(11), 64–88.

Porter, M. E., & Heppelmann, J. E. (2015). How Smart, Connected Products Are Transforming Companies. *Harvard Business Review*, *93*(10), 98–114.

Prahalad, C. K., & Ramaswamy, V. (2004). Cocreation experience: The next practice in value creation. *Journal of Interactive Marketing*, *18*(3), 5–14. doi:10.1002/dir.20015

Reich, B., & Benbasat, I. (1996). Measuring the linkage between business and information technology objectives. *Management Information Systems Quarterly*, *20*(1), 55–81. doi:10.2307/249542

Reich, B., & Benbasat, I. (2000). Factors that influence the social dimension of alignment between business and information technology objectives. *Management Information Systems Quarterly*, *24*(1), 81–113. doi:10.2307/3250980

Schuchmann, D., & Seufert, S. (2015). Corporate Learning in Times of Digital Transformation: A Conceptual Framework and Service Portfolio for the Learning Function in Banking Organisations. *International Journal of Corporate Learning*, *8*(1), 31–39. doi:10.3991/ijac.v8i1.4440

Smaczny, T. (2001). Is an alignment between business and information technology the appropriate paradigm to manage IT in today's organizations. *Management Decision*, *39*(10), 797–802. doi:10.1108/EUM0000000006521

Sugahara, S., Daidj, N., & Ushio, S. (2017). *Value Creation in Management Accounting and Strategic Management*. London, UK: ISTE-Wiley. doi:10.1002/9781119419921

Trevor, J. (2018, January 12). Is anyone in your company paying attention to strategic alignment. *Harvard Business Review Digital Articles*.

Vargo, R. F., & Lusch, S. L. (2004). Evolving for a new dominant logic for marketing. *Journal of Marketing*, *68*(1), 1–17. doi:10.1509/jmkg.68.1.1.24036

Venkatraman, N., & Henderson, J. C. (1998). Real strategies for virtual organizing. *Sloan Management Review*, *40*(1), 33–48.

Von Leipzig, T., Gampa, M., Manza, D., Schöttlea, K., Ohlhausena, P., Oosthuizenb, G., & Palma, D. (2017). Initialising customer-orientated digital transformation in enterprises. *Procedia Manufacturing*, *8*, 517–524. doi:10.1016/j.promfg.2017.02.066

Wachal, R. (1971). Humanities and Computers: A Personal View. *The North American Review*, *256*(1), 30–33.

Weill, P., & Broadbent, M. (1998). *Leveraging the New Infrastructure*. Boston: Harvard Business School Press.

Wernerfelt, B. (1984). The Resource-Based View of the Firm. *Strategic Management Journal*, *5*(2), 171–180. doi:10.1002mj.4250050207

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Wernerfelt, B. (1989). From critical resources to corporate strategy. *Journal of General Management*, *14*(3), 4–12. doi:10.1177/030630708901400301

Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading Digital: Turning Technology into Business Transformation*. Boston: Harvard Business Press.

Westerman, G., Calméjane, C., Bonnet, D., Ferraris, P., & McAfee, A. (2011). *Digital Transformation: A Roadmap for Billion-Dollar Organizations*. Retrieved from https://www.capgemini.com/resource-file-access/resource/pdf/Digital_Transformation__A_Road-Map_for_Billion-Dollar_Organizations.pdf

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary-The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research*, *21*(4), 724–735. doi:10.1287/isre.1100.0322

ADDITIONAL READING

Bain & Company. (2017). Orchestrating a Successful Digital Transformation. Retrieved from http://www.bain.com/publications/articles/orchestrating-a-successful-digital-transformation.aspx

Cap Gemini. (2018). Digital Transformation Review Series. Retrieved from https://www.capgemini.com/consulting/digital-transformation-institute/digital-transformation-review

Daidj, N. (2017). *Uberization (or uberification) of the economy. In Encyclopedia of Information Science and Technology* (4th ed., pp. 2345–2355). PA: IGI Global.

Deloitte & MIT Sloan Management Review. (2015). *Strategy, not Technology, Drives Digital Transformation*. Retrieved from https://www2.deloitte.com/cn/en/pages/technology-media-and-telecommunications/articles/strategy-not-technology-drives-digital-transformation.html

Forbes. (2016). *How Digital Transformation Elevates Human Capital Management: Turning Talent into a Strategic Business Force. Insight Report.* Retrieved from https://www.forbes.com/forbesinsights/digitalhr/index.html

Gartner. (2017). IT Glossary. Retrieved from https://www.gartner.com/it-glossary

Kane, G. C., Palmer, D., Nguyen Phillips, A., Kiron, D., & Buckley, N. (2016). Digitally savvy executives are already aligning their people, processes, and culture to achieve their organizations' long- term digital success. *Sloan Business Review*. Retrieved from https://sloanreview.mit.edu/projects/aligning-for-digital-future/

KEY TERMS AND DEFINITIONS

Competencies: They include knowledge, know how, skills, abilities, and behavior.
Digital Business Strategy: Fusion between IT strategy and business strategy.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Digital Economy: The digital economy marks a historical shift in approach to businesses and potential commercial activities thanks to ICT and to new technologies (artificial intelligence, big data analytics, cloud computing, IOT, machine learning).

Digital Transformation: This new trend (in relation with new technologies) will entirely transform organizations, value capture models, current business models, customer experience and will lead to the implementation of radical changes.

Disruption: Often associated to technology or innovation, this phenomenon can create also major changes in industry frontiers, business processes and business models.

IT Alignment: Fit between organization/strategy and IT/IS capabilities.

Resources: They include two main categories tangible (human, physical, technological etc.) and intangible assets. Data are considered as resources and data analytics as skills (see above).

Strategic Fit: Match or congruence between a firm's organization/strategy and environmental issues (internal and external consistency).

This research was previously published in Business Transformations in the Era of Digitalization; pages 93-105, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 87
Organizational Change Management:
Perceptions, Attitude, Application, and Change Management Practices in Nigerian Universities

Nwachukwu Prince Ololube
Department of Educational Management and Planning, Faculty of Education, Ignatius Ajuru University of Education,Port Harcourt, Nigeria

Dennis Ogutum Ololube
Department of Public Administration,Faculty of Management Sciences,Ambrose Alli University, Ekpoma, Nigeria

ABSTRACT

Change management is a continuous method used in transitioning individual employee, groups, and organizations to an anticipated future change. It focuses on the change management processes that addresses individual employee, groups and organizational factors that acts as catalyst for possible changes in organization. The purpose of change management is ultimately to make use of initiatives and ensure that every employee in an organization is willing and ready to switchover to an anticipated new role in the proposed business environment. This current study evaluated the relationship between leadership perception, attitudes and application towards organizational change. Using a structured questionnaire, principal officers, their deputies and faculty perceptions were analyzed and the results revealed that though change matrix are often painful and chaotic, however, significant relationship was found between employee perception, attitude, application and organizational change. The study recommends that Nigerian universities should be proactive in the implementation of changes to improve their employees' perception, attitude and application towards organizational change.

DOI: 10.4018/978-1-7998-7297-9.ch087

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

INTRODUCTION

Administration implies organization influence through a number of persons efforts geared towards achieving certain lay down objectives. It is certain that those involved must be well organized to be able to satisfy and achieve the expected goal. All their efforts must be channeled towards actualizing the same goal through cooperative energy. This can only be possible if there is an organizational structure to channel their effort for organizational development. Therefore, for any administrative action, there must be an organization because no administrative action can be implemented without an organization (Vishoo & Vidya, 2007).

Organizational change is as old as organizational development, what this implies in this context is that organizations find ways to improve and change its current status to a better-developed status. The universities just like any other organization change as they grow. The study of organizational change, its application, effect and management practices in goal attainment in Nigerian universities is a means aimed at higher education reform. If educational reform/change or development was to become effective and yield measurable output, element of quality management needs to be present in the improvement efforts (Detert & Jenni, 2000).

Stakeholders in education and university administrators are responsible for developing a vision and strategy for the understanding and development of university education. Universities as public sector agencies should identify the significance of leadership and management as instrument of quality improvement and sustainability in university system (Julius, 2005). We may have leadership, or in other words leaders (university administrators) either because they do not have what to offer which may be as a result of the means they attain or got to the level they are in the field of academics, professorship is the apex level in academic profession, surprisingly, there may be some who are professors, yet do not have anything to offer in a particular academic domain, this sometimes pose challenges in the process of change since most people believe that once you are a professor, you know it all.

For so many decades, there has been vociferation for improvement in university education, especially in south-south Nigerian. This implies a severe and ever challenging but of vital importance for university management/administrators to ensure that there is organizational change from its current state to a better developed state. It is an established fact that since the year 2000, perceptions on the standard of university education in Nigeria has declined, resulting in universities producing low quality or half-baked graduates that are not generally accepted by both private and public organizations globally (Ololube, Kpolovie, Egbezor, & Ekpenyong, 2009).

University administrators and lecturers no longer adhere to lay down rules, and innovation to enhance goal attainment. Similarly, it would appear that the problem of organizational change, its application, and the effects of management practices in organizational development remains crucial for management to contend with. Therefore, a decline in organizational change in Nigerian universities especially in the south-south has posed a very serious problem in the achievement of the set goals of the universities, such as quality of program, conducting researches, to widen the frontiers of knowledge available to humanities and producing different categories particularly high level human resources for the economy and political system. The notable deficiencies and the need for organizational change are no longer in doubt, what appears uncertain is the effective application, attitude/reaction, effect and management practices. The study identifies the major components of organizational change perception, attitude and application towards goal attainment. This article is written to inform higher education administrators, managers, lecturers, policy makers, and university students of the relationship and advantage of organizational

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

change and goals attainment. The purpose of this study is to relate the findings from research studies to the current situation facing university administration in Nigeria. The zeal to write this research paper was born out of the desire to examine how organizational change perceptions, attitudes and application affect university as an organization.

This brings to mind the touching question of how effectively can organizational change be achieved in Nigerian universities. Specifically, the study addressed three basic objectives:

- Examine leadership perceptions toward organizational change;
- Examine the attitudes of principal officers of the universities and faculty members towards organizational change;
- Examine the application of organizational change and how effective it can be put into practice.

The under listed research questions were used to guide the study:

- To what extent does leadership perception influence change?
- To what extent does attitude of principal officers of the universities and faculty members influence change?
- To what extent does the application of change influence change in universities?

To address the above objectives and further our analytical information, three hypotheses were formulated:

- There are no significant relationships between leadership perceptions and organizational change.
- There are no significant relationships between the attitudes of principal officers of the universities and faculty members towards change.
- There are no significant relationships between the applications of change and how effective can it be put into practice to influence change in universities.

LITERATURE REVIEW

The Concept Organizational Change

Every organization, be it private or owned by government is established for a particular purpose. Organizations are being managed by group of people to achieve the set goals through their day-to-day activities. Julius (2005) states that the administrative system of every Nigerian tertiary institution is design to facilitate efficient attainment of the goals of the institution. Organizational change is an irreversible adaptation of any feature of its structure, personnel, products or processes (Naylor, 1999). Every organization is established to provide solution(s) to certain problems identified in the environment. The expressed solutions constitute the goals of the organization.

Organizational change is a concept rather than a specific technique. Behavior is strongly influenced by context: factors such as culture, rewards, recognition, incentives and established norms play a vital role in organizational change. Therefore, managing the context of organizational change is critical as much as it is crucial where change initiatives are concerned (Terry & Dinsinore, 2006). Behavioral change

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

involves people doing things differently, therefore particular attention need to be directed at projects specifically aimed at stakeholder engagement, employee involvement and communication (Julius, 2005; Ololube, Agbor & Kpolovie, 2016a). Also, in the management of the organizational context, Terry and Dinsinore (2006) argued that specialist in the field of industrial and organizational psychology and organizational development should be an inclusive right at the beginning of the initiative so as to develop change management programs integrated into the initiative. Organizational change is inevitable and organizations that manage change effectively will pull ahead of their competitors.

In ensuring successful organizational change, the leading responsibilities of the administrative sponsor is to communicate and lead, followed by clarifying direction and target. The broad goals of Nigerian universities are first to widen the frontiers of knowledge, followed by impartation of knowledge (Julius, 2005). He went further to state that the first is done through research whereas the second is done through lecturing, teaching and supervising students. Three key features according to Ahiauzu and Ololube (2016), goals, people and influence are necessary when we talk about leadership. Since leadership is a process of influencing people towards achievement of organizational goals, it implies that leadership is a social process that involves interaction with others to achieve goals (Naylor, 1999; Ololube, Agbor & Agabi, 2017).

University administrators (leaders) play vital role in the performance of their institutions. Their major role is to lay down the infrastructure, policies and guidelines for the sub-system of the institution to function at its best. University administrators can help achieve organizational change by being creative, innovative, inspiring and visionary to enhance the institution to work together with their sub-systems to provide a very best service to students and the economy (Julius, 2005). Administrators who understood the importance of working together with their sub-system would develop a cooperative culture for working with their sub-system (Wong, 2001).

Efficient management strengthens success in a university's core business of teaching and researching. In higher institutions, administrators are closely identified with the fortunes of the institution because they adapt styles, approaches that can enhance change to the circumstances facing the university. Modification of their leadership styles and approaches to enhance appropriateness to the organizational context should not be overlooked (Wong, 2001).

University administrators are responsible for the day to day running of the universities, determining academic activities in conjunction with academic board and senate, and managing the budget, resource and proper use of funds. Administrators find themselves under great pressures. They are responsible for setting the key values and direction of the universities with regards to its position in higher education and the wider economy. Strategic planning are key functions of the administrators (Bargh, Bocock & Smith, 2000; Ololube et al., 2016a). The size of an institution, resource generation and allocation, institutional acquisition, investment and disposal, the recruitment and reward of academic and other staff, the creation, closure and merger of department, and external roles and relationship are vital decision to be considered in the change process (Henkel, 2002).

Organizational change is an approach to transformation, which encompasses the organization as a whole when compared to other localized efforts or means to promote change. Organizational change is basically a strategic activity that is founded on a system-concept of organization. This implies that change is seen as a function of (1) the external environment and (2) the internal environment among the sub-system within their organization (Ololube, Aiya, Uriah & Ololube, 2016b).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Leadership Perceptions Towards Organizational Change

Leaders, managers and employees perceptions shape the climate and effectiveness of organizational change. Perception can be viewed as the ways leaders, managers and employees interpret their experiences. It is the most difficult part of human behavior; consequently, organizational leaders should realize that individuals have divergent perceptions (Otara, 2011).

According to Elsbach (2003), perception simply means the way in which we see a particular situation. Our perception is our reality because humans interpret things the very way they see them. When humans see things as they are made to see them, instead of the way they really are, it constitute a barrier to communication. This is due to the fact that our previous experiences, current moods, peers, among other similar factors, obviously influence how humans interpret a given message (Otara, 2011). Credibility gaps are common between management and employees in organizations, which poses communication barrier especially when people have made up their minds and processing information objectively will be very difficult. As such, all sub-system of any organization should be properly communicated on the needs for change (Ololube et al., 2016a; Xie, 2013).

One thing is to initiate change and another is to the extent to which such change can be perceived, applied and sustained. Terry and Dinsmore (2006) argued that delivering strategic change is only half of the story, the other half is all about sustaining the change permanently in other to deliver the strategic benefits in which an organization make case for the initiative. Even though change is inevitable in organization, does it usually have to be so injurious and so badly managed? (Barling & Cooper, 2008). Good communication should not be overlooked because people-related issues constitute the basic reasons for the failure of organizational change efforts (Atkinson, 2005; Smith, 2005; Ololube et al., 2016a). People related issues are not to be viewed as occurring only among the lower-level employees if change must be implemented by management. The fact remains that gaps in the understanding of organizational change and responses occurs among different levels of management (Bartunek, et al., 2006). Employee related issues involve in organizational change may result from organizational culture and the negative impact that changes often have on employees because people are considered the critical factor in the success of organizational change efforts (Belias & Koustelios, 2014).

In university administration, human resources management is a strategic and more coherent approach to the management of the sub-system which includes the academic staff (lecturers), and students work individually and cooperatively to contribute to the attainment of the university set objectives especially during and after organizational change process. The academic staff of a university is the pivot of the system. Akpotu (2000) states that the type and quality of lecturers that a university has is used to measure the development of the university, therefore just like every other organization, university system depends heavily on the administrators and lecturers (faculty) to effect change to enable the attainment of its goals. This implies that improving university standard is possible through administrators and faculty. However, Akpotu (2000) further observed that lecturers are the major focus of change as well as the anchor and determinant of quality in the university system. According to Smith (2005), managing organizational change is a huge task besides managing the people in the processes of change. This in particular impacts the psychological and physical aspects of organizational change. Most employees are not detached from their work but experience a range of emotional involvements through membership of their organization (Adeyemi, 2004). Putting into considering the business side of change, the human side is not entirely rational. It involves emotions like fear, uncertainty and doubt. However, in spite of this, management practices are still grounded in the theory of the rational man (Karp, 2004).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Organizations' failure to address the human side of change often results in detrimental psychological impact on employees (van Dijk & Van Dick, 2009). The study of Paruk and Singh (2012) revealed that as soon as an organization embark on major change efforts, employees find themselves stressed up and confused. It is obvious that stress is one of the major primary psychological consequences of organizational change that employee are subjected to. Stress in the context of the article involves the challenge to a person capacity to adapt to inner and outer demand, which may be physiologically arousing, emotionally tasking and cognitively and behaviorally activating (Okafor & Bode-Okunade, 2005; Gabriel & Oburu, Aduba, 2013). Therefore, stress is as a result of the impact of job demands on employees due to the existence of a stressor, or organizational condition that may require an adaptive response from employees (Ekundayo, 2014; Yaacob & Long, 2015). According to Woodall and Winstanley, a study in 1997 indicated that for most Americans, their jobs are the greatest stressor in their lives. Research further indicated that the most contributors to job stress are time pressures (60%), work overload (54%), threat of job loss (52%), lack of consultation and communication (51%) and understaffing (46%) (Woodall & Winstanley, 2001). It is therefore consequent on this logical review that we are obliged to hypothesize that:

- There are no significant relationships between leadership perceptions and organizational change.

Attitudes Towards Organizational Change

Globally, universities are progressively improving their ability to enhance their staff backing and acceptance of their change initiatives. However, there are fundamental conditions for an intended change to be supported by employees. Most researchers focus on various forms of attitudinal paradigms of employees' attitudes toward change such as employee sincerity towards change, readiness for change, commitment to change, and skepticism about organizational change, which are valuable means to measure employee's assessment and/or concerns about any change move (Choi, 2011). Employees come into organizations with certain needs, skills and expectations. They come into the organization with the hope that they will find the work environment where they can use their abilities and equally satisfy their wants. With these expectations in mind, and if the organization can provide them with the opportunities they desire, there is likelihood that the employees will increase commitment to an intended organizational change (Herscovitch & Meyer, 2002). Employee commitment is characterized into three related factors: strong acceptance of the organization's values and goals, willingness to put forth considerable effort on behalf of the organization and strong desire to sustain membership of the organization. As a result, commitment is determined by a range of individual factors such as personal attitude, characteristics, experience and role related features (Vakola & Nikolaou, 2005).

According to Orobor et al. (2006), attitude is the predisposition to act or not to act in a certain way. It is a mental position regarding a situation that is closely related to perception. Vakola and Nikolaou (2005) defined attitude as certain consistencies in someone's feelings, thoughts and predispositions to act toward aspects of his environment. It reflects someone's propensity to feel, think or conduct him or herself in a positive or negative manner towards change. Attitude toward change consist of an individual's perceptions about change, emotional reactions to change, and behavioral predisposition toward change. To Wittig, employees' reactions to organizational change may be influenced by a number of factors. And it is practically reasonable to see employees react because the process of organizational change involves going from the known to the unknown (Wittig, 2012).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Attitude may be positive or negative. Positive attitude to organizational change means that change is essential for the organization to succeed, while negative attitude to organizational change means that an individual or group believes that change might ruin the organization. For this reasons, change can be received with excitement and happiness or anger and fear while employees' response to it may range from a positive intention to support the change to a negative intention to oppose it. Positive attitudes to change were found to be vital in achieving organizational change (Eby, Adams, Russell & Gaby, 2000).

According to Oparanma and Zeb-Obipi (2012), Gabriel, Oburu and Aduba (2013) and Elrod and Tippett (2002), organizational change efforts tends to be stressful. Specifically, they are of the opinion that emotional conditions and factors like denial, anger, bargaining, chaos, depression, resignation, openness, readiness and re-emergence will emerge for organizational change to take place. To Eby et al. (2000), employee attitude toward change impact their morale, organizational productivity and turnover. Attitude is strongly influenced by contextual factors such as culture, reward, recognition, incentive and organizational norms. To this end, several factors influence university leadership, lecturers and students, and they see change differently within the context of their operational environment (Orobor et al., 2006).

The conditions that favor the change process is determined by financially viabilities secured by the employees, significant room for change, awareness of the value of change, considerable amount of trust between management and employees, degree of commitment by the leaders and the employees, deficiencies in conditions of service and employment, the way university leaders, lecturers and students see change influences their attitude towards change (Barling & Cooper, 2008). It is therefore consequent on this logical review that we are obliged to hypothesize that:

- There are no significant relationships between the attitudes of principal officers of the universities and faculty members towards change.

Applications of Organizational Change

Change is an alteration in an employee, group and organizations production and service processes and the way organizations do business (Oparanma & Zeb-Obipi, 2012). An alteration or initiative in the way organizations do business can be time consuming and costly, especially when it tends to impact and drive organizations towards success. Globally, nearly half of the organizations fail, as a result, change is inescapable and organizations need to resolve how to successfully adapt and sustain change. Completely, strategic change in organization is driven through programs, activities and projects. Unsurprisingly, effective programs, activities and projects by their nature create change that will successfully implement organizational change. For example, in universities, programs, activities and projects managers like top university Administrators, Deans, Heads of Departments and Lecturers with requisite skill drive and navigate change. They are saddled with the responsibilities of making sure that the intended drives towards change are strategically planned and are aligned to the goal(s) in which the change is targeted.

The success or failure of a change initiative is not just about initiating, planning, monitoring, executing and evaluating the projects that will drive the change (Oyebanji, 2009). It also involves preparing organizations for transformation, ensuring the sub-system (stakeholders) buy into it, and engaging administrative sponsors to champion and support the change before, during and after its implementation. Like every organization the success or failure of a university in the change process is determined by the relevant skills, abilities and knowledge of the academic staff (Deans, HODs, Lecturers), non-academic staff and students.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Successful organizational change is dependent upon the need for change, little resistance to change and readiness for change. According to Ramakrishnan (2014), organizational change is only possible when employees display little resistance and readiness for change, accept the need to change and display wiliness to engage in the processes of change, which may be difficult and challenging. Factors such as divergence in opinions, the effectiveness of the intended change, appropriateness and the timing of change and employees support are all fundamental components for transformational change aimed at creating readiness for change (Armenakis, Harris & Feild, 2002).

Organizations, universities inclusive are comprised of people with different perceptions, attitudes, abilities, knowledge and skills when properly channeled and managed determine the success of the university (Abiodun-Oyebanji, 2012). Motivation and training of lecturers enhances improvement of educational standard, quality is sure especially during the process of change (Emechebe, 2009). Appropriately trained and motivated teaching staff are important in the university system and their roles cannot be substituted. If university education is to grow and make progress in consonant with organizational change, it will require greater allocation of competent and qualified humans including adequate material resources. However, the most valuable resources required for change within the university system are its human resources base (Akpotu, 2000; Oyebode, Ajayi & Oyeyipo, 2007). Human resources are fundamental and indispensable agent in the improvement of the potentialities for organizational change.

The effective management of Nigerian universities depends on the availability of competent and adequate staff seems to be critical and possess difficulty in the change processes especially for the academic staff. Abiodun-Oyebanji (2012) suggests that in many Nigerian universities the situation seem to be clear as academic staff appears to be in limited supply. Okebukola (2002) argued that the huge expansion of university education sectors worldwide, added with the increasing diversity of the student base and the very need for university to engage and compete in the global academic arena has made many institutions to re-evaluate how they manage and support their staff. However, employees (academic and non-academic staff) tend to resist change especially when it is not attractive. Worldwide, the growth of universities in the last decade alone has substantially increased the number of academic and administrative staff required to meet the challenges of expansion. Institutions adopt diverse ways to do research, teaching and learning and the delivery of university business. University systems have come virtually to recognize that success is dependent on effective administration and planning for their future staffing needs for organizational change to take place (Daysh & Kubler, 2008). Therefore, it beholds on us to expect that university's administrative capacity, research, teaching and learning are the actual or predictable stimuli in its environment that can drive change. It is therefore consequent on this logical review that we are obliged to hypothesize that:

- There are no significant relationships between the applications of change and how effective can it be put into practice to influence change in universities.

METHODS

Research Design

Most educational management and planning research methods are descriptive. Descriptive research in this context is the conditions or connections that exist; the practices that exist; opinions and attitudes that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

are held. The descriptive research method applied in this study is primarily concerned with portraying the prevailing conditions and connections that exist. In fact, the descriptive research method applied here is exactly a method because many approaches of data analysis were grouped together. However, the analyses have one thing in common—individually and collectively they endeavor to represent the present position of organizational change situation in Nigerian universities. Nonetheless, the main difference between various forms of descriptive research method is not in the process of describing the situation that prevails; it goes beyond just the collection and tabulation of data; but attempts to obtain facts and faculty members opinions about the current condition of organizational change in Nigeria higher education.

The fundamental purpose of this study is to expose to view new knowledge about organizational change. More precisely, the purpose of this study is to evaluate leadership perceptions, attitudes and applications of organizational change in Nigerian universities.

Research Population

The population of this study defines the limits within which the research findings are applicable. In other words, it is defined in such a way that the results of the study are generalizable unto it. The target population of this study are all the academic and non-academic staff of all the universities in Nigeria, whereas the accessible population are the academic and non-academic staff within the reach of the researchers.

The research population for this study is drawn from faculty members of some selected universities in the south-south geo-political zone (accessible) of Nigeria (target). The population comprised of academic and non-academic staff of Nigerian universities: principal officers of universities, senior lecturers and heads of departments (HODs), readers (associate professors) and professors.

The reasons for choosing principal officers of universities, senior lecturers, readers (associate professors) and professors is that they are directly involved in organizational change matrix of universities, therefore, they stand better chance of measuring change in Nigerian universities.

Sampling/Sample Size

The researchers' of this study made a choice of using purposeful sampling procedure for senior lecturers, principal officers and their deputies and simple random sampling was employed in the case of readers and professors because it is by far the easiest and simplest sampling method in terms of conceptualization and application. Simple random sampling does not require knowledge of the exact composition of the population.

Universities in the south-south geo-political zone are many from which ten (10) were randomly selected. The names of all the public universities in the zone were written and selected randomly. The ten (10) selected universities are different in types and in sizes. The researchers considered them representatives of the different universities. A total number of four hundred and fifty questionnaires (450) were distributed, out of which three hundred and twenty-five (325) were returned, from which three hundred and eleven (311) questionnaires were selected. Fourteen of the questionnaires were discarded because of errors in the ways they were completed. The ages of the respondents were between 41-69 years. Responses were limited to three faculties and management staff of the ten selected universities (see Table 1 for further details).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Descriptive analysis of respondents demographic information

Age	Number of Respondents	Percentages (%)
35-44 years	45	14.5
45-54 years	180	57.9
55-64 years	51	16.4
65-70 years	35	11.2
Total Number	311	100
Gender	**Number of Respondents**	**Percentages (%)**
Male	182	58.5
Female	129	41.5
Total Number	311	100
Respondents Status	**Number of Respondents**	**Percentages (%)**
Principal Officers and their Deputies	40	12.9
Senior Lecturers and (HODs)	140	45.0
Readers (Assoc. Prof.)	86	27.6
Professors	45	14.5
Total Number	311	100
Units/Faculty of Domicile	**Number of Respondents**	**Percentages (%)**
Management Staff	40	12.9
Arts and Humanities	80	25.7
Education	108	34.7
Management Sciences	83	26.7
Total Number	311	100

Data Collection

Questionnaire

The researchers structured a suitable design (questionnaire) along a four-point Likert-type scale of strongly agree (4), agree (3), disagree (2) and strongly disagree (1), which has approximately equal "value" for all the items on leadership perceptions toward organizational change, attitudes towards organizational change, and applications of organizational change. The respondents responded with the degree of agreement or disagreement. The questions were made simple and direct. The questionnaire comprised two sections:

Section A of the Questionnaire (Contents)

Section "A" of the questionnaire focuses on items such as age, gender, respondents' status and units/ faculty of domicile.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section B of the Questionnaire (Contents)

Section "B" focuses on possible factors that may or may not be perceived as being capable of influencing organizational change, such as:

- Leadership perceptions towards organizational change
- Attitudes towards organizational change
- Applications of organizational change

Validity of the Study

The instrument used for this study was validated. First, the research instrument was valid because the researchers took time to act in accordance with the principles and processes of designing an academic questionnaire (see Ololube, 2006). Second, the questionnaire was given to professional colleagues that are experts in instruments evaluation; they read through and made necessary corrections. Third, the questionnaire was pre-tested on a population (20 persons) outside the sample size and their responses were used to improve on the items.

Reliability of the Instrument

The quality of this research depended on the consistency with which the research was carried. And its consistency in turn is depended on the precision with which description is quantified. Therefore, the strength of the instrument we used in this study was reliable because it elicited the required information on leadership perception towards organizational change, attitudes and application of organizational change in Nigerian universities. However, an accurate measure of reliability was based on the statistical data obtained. To statistically test the reliability of the instrument to provide non-random results, a quantitative measurement to assess the reliability was seen as proper in this study since the respondents were directly affected because the study focused on them with regards to their perception, attitude and application of organizational change. A quantitative analysis of the respondents' answers was performed using the Statistical Package of the Social Sciences (SPSS) version 23 to statistically test the reliability of the instrument because in research when a research instrument's reliability has been secured it builds the foundation for further inquiry (See Ololube, 2006).

The result from the reliability estimates showed a cumulative reliability of .842, which showed a strong reliability of the questionnaire. According to Bryman and Cramer (2012), reliability estimate should be termed to be sufficient if it varied between 0–1, and preferably at 0.8-.

Data Analysis

The first step in the data analysis process was to present the results of the study in its raw form, which is followed by the analyses of the data using SPSS version 23. The analyses involved the use of multiple statistical procedures: Cross tabulation and Regression, cross tabulation was used to answer the research questions, while regression was used to test the hypotheses for relationships. The second step is the discussion of the results from the respondents and making use of evidence from literature to support

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

them. The clear value of this section in the researchers' opinion is that the results are connected to the information in the literature review.

RESULTS AND ANALYSES

Research Question 1

Research question one was aimed at determining the extent to which university leaders perceive change in the university system. The research question states "To what extent does leadership perceptions influence organizational change"? Data were tallied along agree and disagree, and they revealed (see Table 2) that 299(96.1%) agree that employees perceive good and effective communication as great tool for organizational change, as against 12(3.9%) who disagree. On credibility gaps between management and employees, 217(69.9%) are of the opinion that communication barriers stands against organizational change. Likewise, respondents 275(88.4%) against 36(11.6%) agree that employees related issues may result from negative impact because employees are considered the critical factor in the success of organizational change efforts. Overwhelming majority of the respondents: 307(98.7%) equally agree that the quality of lecturers that a university has is used to measure the development and change in the university; and 303(97.4%) are of the opinion that managing change is a huge task besides managing the employees in the processes of initiating change. Same is true when respondents 305(98.1%) against 6(1.9%) agree that employees associate emotions like fear, uncertainty and doubt influences organizational change. And 309(99.4%) contrary 2(0.6%) are of the view that organizations' failure to address the human side of change often results in detrimental psychological impact on employees.

Research Question 2

Research question two was intended to examine the extent to which attitudes influence change in the university systems. Research question two states "To what extent does attitude of principal officers of the universities and faculty members influence change"? The Cross tabulation analysis in Table 3 were matched along agree and disagree, and the responses depicted that 214(68.8%) against 97(31.2%) agree that Nigerian universities are progressively improving their ability to enhance their staff backing and acceptance of their change initiatives. Surprisingly, 224(72.1%) disagree that employee are sincere towards organizational change and are ready for it at all cost. Contrary, 208(66.9%) against 103(33.1%) agree that employees are committed to organizational change, while 236(75.9%) believe that employees are skeptical about organizational change. 212(68.1%) agree, while 99(31.8%) disagree that employees are willing to put considerable efforts on behalf of the university. Correspondingly, 209(67.2%) agree that employees come into organizations with certain needs, skills and expectations, and when these are absent they tend not to support change. 304(97.8%) of the respondents agree that employees attitude towards change consist of an individual's perceptions about change, emotional reactions to change, and behavioral predisposition toward change. Approximately 156(50.1%) agree and almost half 155(49.9%) disagree that employees anger, fear and frustration are determinants of change. 209(67.2%) agree, while 102(32.8%) disagree that organizational change efforts tend to be stressful, as a result, employees tend not to support with all sincerity, and majority, 300(96.5%) of the respondents agree that employee attitudes

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

towards change are influenced by contextual factors such as culture, reward, recognition, incentive and organizational norms and values.

Research Question 3

Research question three was projected to survey respondents' opinion on application of organizational change. The research question states that "To what extent does the applications of change influence change in universities"? To provide answers to the items raised, data from the Cross tabulation analysis conducted (see Table 4) showed that 275(88.4%) of the respondents agree that the application of change is an alteration in production and service processes and the way organizations do business, this is in contrast to 36(26.6%) who disagree. 302(97.1%) agree, against 9(2.9%) who disagree that changes are intended to impact and drive organizations toward success. 300(96.5%) of the respondents were of the view that strategic change in organization by their nature create change that will successfully implement change. 246(79.1%) agree, against 65(20.9%) who disagree that principal officers, deans, heads of departments, readers and professors have requisite knowledge and skills to navigate change. However, 295(98.1%) of the respondents agree that applying change involves preparing organizations for transformation, and ensuring that the sub-system buy into it. In the same vein, 292(93.9%) agree against 19(6.1%) who disagree that engaging administrators is vital in championing and supporting change before, during and after its implementation. Equally, majority of the respondents, 270(86.8%) agree, against 41(13.2%) who disagree that the success or failure of a university in the change process is determined by the relevant skills, abilities and knowledge of its academic staff. Correspondently, 272(87.5%) agree, while 39(12.5%) disagree that university systems should virtually recognize that success is dependent on effective administration and planning of its future staffing needs for organizational change to take place.

Hypotheses Testing

The need to triangulate data was necessary to further verify our analytical information. The regression analysis conducted as depicted in Table 5 showed that most of the relationships were significant and positive with an R square of .638 and an adjusted R square of .630 of the entire variables entered.

The ANOVA analysis depicted the sum of square for the regression to be 34.272 and that of the residual is 19.419, and a degree of freedom (df) = 7, with an F-value of 76.393 and a significance of .000. This implies that perceptions, attitudes and applications have significant relationships between change management practices within the university systems in Nigeria.

The estimated Coefficient analysis for organizational change is positive. This implies that perceptions towards organizational change with a significance level of .000 and a calculated t-value of 4.159; attitudes towards organizational change were significant at .000 with a calculated t-value of 11.052; and application of organizational change were significant at .001 with a calculated t-value of 3.617. Thus, hypotheses 1, 2 and 3 were rejected because there are significant relationships between leadership perceptions and change; there are significant relationships between the attitudes of principal officers of the universities and faculty members towards change; and there are significant relationships between the applications of change and how effective it can be put into practice.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Cross tabulation analysis of respondents demographic information on perceptions towards organizational change

S/N	Perceptions towards Organizational Change	Strongly Disagree	Disagree	Agree	Strongly Agree	Total
1	Employees perceive good and effective communication as great tool for organizational change	4 (1.3%)	8 (2.6%)	112 (36.0%)	187 (60.1%)	311 (100.0%)
2	Credibility gaps between management and employees / communication barriers stands against organizational change	3 (1.0%)	91 (29.3%)	137 (44.1%)	80 (25.7%)	311 (100.0%)
3	Employees related issues may result from negative impact because employees are considered the critical factor in the success of organizational change efforts	5 (1.6%)	31 (10.0%)	169 (54.3%)	106 (34.1%)	311 (100.0%)
4	To what extent do you believe that the quality of lecturers that a university has is used to measure the development and change in the university	4 (1.3%)	- -	228 (73.3%)	79 (25.4%)	311 (100.0%)
5	Managing organizational change is a huge task besides managing the employees in the processes of initiating organizational change	5 (1.6%)	3 (1.0%)	134 (43.1%)	169 (54.3%)	311 (100.0%)
6	Employees associate emotions like fear, uncertainty and doubt influences organizational change	6 (1.9%)	- -	230 (74.0%)	75 (24.1%)	311 (100.0%)
7	Organizations' failure to address the human side of change often results in detrimental psychological impact on employees	- -	2 (0.6%)	161 (51.8%)	148 (47.6%)	311 (100.0%)

Table 3. Cross tabulation analysis of demographic information on attitude towards organizational change

S/N	Attitudes towards Organizational Change	Strongly Disagree	Disagree	Agree	Strongly Agree	Total
8	Universities are progressively improving their ability to enhance their staff backing and acceptance of their change initiatives	5 (1.6%)	92 (29.6%)	183 (58.8%)	31 (10.0%)	311 (100.0%)
9	Employee are sincere towards organizational change and are ready for it at all cost	12 (3.9%)	212 (68.2%)	81 (26.0%)	6 (1.9%)	311 (100.0%)
10	Employees are committed to organizational change	6 (1.9%)	97 (31.2%)	202 (65.0%)	6 (1.9%)	311 (100.0%)
11	Employees are skeptical about organizational change	8 (2.6%)	67 (21.5%)	170 (54.7%)	66 (21.2%)	311 (100.0%)
12	Employees are willing to put considerable efforts on behalf of the university	39 (12.5%)	60 (19.3%)	150 (48.2%)	62 (19.9%)	311 (100.0%)
13	Employees come into organizations with certain needs, skills and expectations, and when these are absent they tend not to support change	11 (3.5%)	91 (29.3%)	41 (13.2%)	168 (54.0%)	311 (100.0%)
14	Attitude towards change consist of an individual's perceptions about change, emotional reactions to change, and behavioral predisposition toward change	7 (2.3%)	- -	190 (61.1%)	114 (36.7%)	311 (100.0%)
15	Employees anger, fear and frustration are determinants of change	31 (10.0%)	124 (39.9%)	132 (42.4%)	24 (7.7%)	311 (100.0%)
16	Organizational change efforts tend to be stressful, as a result, employees tend not to support with all sincerity	4 (1.3%)	98 (31.5%)	147 (47.3%)	62 (19.9%)	311 (100.0%)
17	Attitudes towards change are influenced by contextual factors such as culture, reward, recognition, incentive and organizational norms and values	5 (1.6%)	6 (1.9%)	208 (66.9%)	92 (29.6%)	311 (100.0%)

DISCUSSION OF FINDINGS

The three research questions were answered and the three hypotheses were tested and verified with respect to their significant relationships. The research questions were aimed at determining the influences of the sub-variables of perceptions, attitudes and applications on organizational change as applied to the uni-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Cross tabulation analysis of demographic information on application of organizational change

S/N	Application of Organizational Change	Strongly Disagree	Disagree	Agree	Strongly Agree	Total
18	Application of change is an alteration in production and service processes and the way organizations do business	5 (1.6%)	31 (10.0%)	209 (67.2%)	66 (21.2%)	311 (100.0%)
19	Changes are intended to impact and drive organizations toward success	- -	9 (2.9%)	129 (41.5%)	173 (55.6%)	311 (100.0%)
20	Strategic change in organization by their nature create change that will successfully implement change	11 (3.5%)	- -	156 (50.2%)	144 (46.3%)	311 (100.0%)
21	Principal officers, deans, heads of departments, readers and professors have requisite knowledge and skills to navigate change	34 (10.9%)	31 (10.0%)	68 (21.9%)	178 (57.2%)	311 (100.0%)
22	Applying change involves preparing organizations for transformation, ensuring that the sub-system buy into it.	6 (1.9%)	- -	170 (54.7%)	135 (43.4%)	311 (100.0%)
23	Engaging administrators is vital in championing and supporting change before, during and after its implementation	19 (6.1%)	- -	127 (40.8%)	165 (53.1%)	311 (100.0%)
24	The success or failure of a university in the change process is determined by the relevant skills, abilities and knowledge of its academic staff	14 (4.5%)	27 (8.7%)	161 (51.8%)	109 (35.0%)	311 (100.0%)
25	University systems should virtually recognize that success is dependent on effective administration and planning of its future staffing needs for organizational change to take place	9 (2.9%)	30 (9.6%)	78 (25.1%)	194 (62.4%)	311 (100.0%)

versity environment in Nigeria. The extent to which university leaders perceive change in the university system was determined with respect to good and effective communication as a tool for organizational change, and the role of communication barriers to organizational change. This study's findings support that of Otara (2011), Ololube et al. (2016a), Xie (2013), Atkinson (2005) and Smith (2005). This could be due to the importance of effective communication on the overall good of the university system because poor or good communication constitutes the basic reasons for the failure or success of organizational change efforts. The study revealed that the quality of staff in a university determine its organizational change efforts. This is in line with Akpotu (2000) findings that the type and the quality of lecturers that a university has are used as yardstick to measure the development and changes in the university. The perceptions remain that 99.4% of the respondents agree that an organization failure to tackle the human aspects of change often results to negative psychological influence on employees. This finding is in line with that of van Dijk and van Dick (2009) and Paruk and Singh (2012). Their respective studies revealed that organization change efforts get employees stressed up and confused.

The findings that employee attitudes influence organizational change did not depart from the findings of the studies of Herscovitch and Meyer (2002), Vakola and Nikolaou (2005), Orobor et al. (2006), Eby et al. (2000) and Wittig (2012). Their studies revealed that positive attitude towards organizational changes depict that the desirable changes are essential for organizations to succeed, whereas negative attitudes to organizational changes show that employees do not welcome the intended changes, which they believe might ruin the organization. Surprisingly, 72.1% disagreed that employee are sincere towards organizational change and are ready for it at all cost.

Significant influence was observed in the respondents' answers that the application of change impacts change in the universities. The evidences were strong and they support the study of Oparanma and Zeb-Obipi (2012), Ramakrishnan (2014) and Abiodun-Oyebanji (2012). Their views are that universities are comprised of staff that have abilities, knowledge and skills and if properly directed and managed will

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Regression analysis of the relationships between perceptions, attitudes and application of organizational change

Model Summary						
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error**		
1	.799[a]	.638	.630	.25316		
ANOVA Analysis						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	34.272	7	4.896	76.393	.000[b]
	Residual	19.419	303	.064		
	Total	53.691	310			
Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	-1.118	.189		-5.927	.000
	Perception towards Organizational Change	.107	.026	.158	4.159	.000
	Attitudes towards Organizational Change	.329	.030	.605	11.052	.000
	Application of Organizational Change	.115	.032	.140	3.617	.001

a. Dependent Variable: Organizational change
b. All requested variables entered

determine the success of the university. Applying change involves preparing organizations for transformation, and ensuring that the sub-system embraces such change.

The triangulated analyses for this research investigation, revealed the extent to which significant relationships existed between leadership perceptions, attitudes, and applications of organizational change. These relationships are functions of the principal officers of the universities and faculty members. For the three hypotheses, significant results were present for the regression analysis at .000, .000 and .001 respectively. As such, the results from this empirical investigation were in agreement with previous investigation (e.g., Daysh & Kubler, 2008; Okebukola, 2002). Thus, Nigerian university systems need to practically recognize that success is dependent on effective administration and planning, and the quality of the future staffing requirements necessitates organizational change.

CONCLUSION

This study has clearly shown that relationships exist between leadership perceptions, employees' attitudes, applications and organizational change. The study holds the view that change management are continuous

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

method used in transforming employees and organizations to an anticipated future change. Perceptions, attitudes and effective application of organizational factors act as catalyst for possible changes in organization applicable to the university systems. The drive for change management will eventually make use of initiatives and ensure that employees are willing and ready to embrace the anticipated change. University principal officers, their deputies and faculty members have a lot to do, because change management is often painful and chaotic. The study recommends that Nigerian universities should be proactive in the implementation of changes to improve their employees' perceptions, attitudes and applications towards organizational change.

This study has expanded the scope of the knowledge and practice of organizational change by informing university leadership, professionals, researchers and scholars about the theme of this study, and those who are considering related studies about the needs to integrate other variables to boost the intellectual base of organizational change.

The future research direction of this study should be to facilitate studies that will extend the findings of this study, and the number of variables that equally represent a large proportion of the disagreement in this study.

REFERENCES

Abiodun-Oyebanji, O. (2012). Human resource situation in nigerian universities: A case study of Ekiti State University, Ado-Ekiti. *Journal of Educational and Developmental Psychology*, *2*(2), 152–157. doi:10.5539/jedp.v2n2p152

Adeyemi, B. (2004, November 25). *Banks'* consolidation and the human capital behavior. *The Guardian*, p. 63.

Ahiauzu, L. U., & Ololube, N. P. (2016). The mediating effect of organizational culture, size and structure on the relationship between innovations and resilience in selected Nigerian universities. In N. P. Ololube (Ed.), Handbook of research on organizational justice and culture in higher education institutions (pp. 324–364). Hershey, PA, USA: IGI Global. doi:10.4018/978-1-4666-9850-5.ch013

Akpotu, N. E. (2000). An analysis of academic staff turnover in Nigerian universities (1990-1997) [Unpublished Ph.D. Thesis]. University of Benin.

Armenakis, A., Harris, S., & Feild, H. (2002). Paradigms in organizational change: change agent and change target perspectives. In R. Golembiewski (Ed.), *Handbook of organizational behaviour*. New York: Marcel Dekker.

Barling, J., & Cooper, C. L. (2008). *The SAGE handbook of organizational behavior: volume one: micro approaches*. London: *Sage*.

Belias, D., & Koustelios, A. (2014). The impact of leadership and change management strategy on organizational culture. *European Scientific Journal*, *10*(7), 45–470.

Bryman, A., & Cramer, D. (2012). *Quantitative data analysis with IBM SPSS 17, 18 & 19: a guide for social scientists. London*: Routledge.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Choi, M. (2011). Employees attitudes toward organizational change: A literature review. *Human Resource Management*, *50*(4), 479–500. doi:10.1002/hrm.20434

Daysh, S., & Kubler, J. (2008). *Human resources management common wealth universities*. Trinidad & Tobago: ACU.

Eby, L., Adams, D., Russell, J., & Gaby, S. (2000). Perceptions of organizational readiness for change: Factors related to employees reactions to the implementation of team-based selling. *Human Relations*, *53*(3), 419–428. doi:10.1177/0018726700533006

Ekundayo, J. A. (2014). Occupational stress and employees productivity in the workplace. *International Journal of Scientific Research in Education*, *7*(2), 157–165.

Elrod, D. II, & Tippett, D. (2002). The death valley of change. *Journal of Organizational Change Management*, *15*(3), 273–291. doi:10.1108/09534810210429309

Elsbach, K. D. (2003). Organizational perception management. *Research in Organizational Behavior*, *25*, 297–332. doi:10.1016/S0191-3085(03)25007-3

Emechebe, S. N. (2009). *Human resources management in education. education management: theories and tasks*. Lagos: MacMillan.

Gabriel, J. M. O., Oburu, C. E., & Aduba, O. (2013). Managing change in Nigerian business organizations. *European Journal of Business and Management*, *5*(18), 138–143.

Henkel, M. (2002). Emerging concepts of academic leadership and their implications for intra-institutional roles and relationship in higher education. *European Journal of Education*, *37*(1), 29–41. doi:10.1111/1467-3435.00089

Herscovitch, L., & Meyer, J. P. (2002). Commitment to organizational change: Extension of a three-component model. *The Journal of Applied Psychology*, *87*(3), 474–487. doi:10.1037/0021-9010.87.3.474 PMID:12090605

Julius, A. (2005). *Administration of Nigeria Tertiary Institutions*. Benin City, Nigeria: Ever-Blessed Publishers.

Naylor, J. (1999). *Management*. Harlow: Prentice Hall.

Okafor, E. E., & Bode Okunade, A. S. (2005). *Introduction to industrial and labour relations*. Ibadan, Nigeria: Mubak Press.

Okebukola, P. A. (2002). *Report on the performance of federal university system in 2002*. Abuja: National University Commission.

Ololube, N. P. (2006). *Teacher education, school effectiveness and improvement: a study of academic and professional qualification on teachers' job effectiveness in Nigerian secondary schools* [Doctoral Dissertation]. University of Helsinki.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ololube, N. P., Agbor, C. N., & Agabi, C. O. (2017). Effective leadership and management in universities through quality management models. In N. J. Baporikar (Ed.), *Innovation and Shifting Perspectives in Management Education* (pp. 224–245). Hershey, PA: Information Science Reference; doi:10.4018/978-1-5225-1019-2.ch010

Ololube, N. P., Agbor, C. N., & Kpolovie, P. J. (2016a). Effective communication process: the responsibility of university management for enhanced organizational justice. In N. P. Ololube (Ed.), *Handbook of research on organizational justice and culture in higher education institutions* (pp. 34–56). Hershey, PA, USA: IGI Global. doi:10.4018/978-1-4666-9850-5.ch002

Ololube, N. P., Aiya, F., Uriah, O. A., & Ololube, D. O. (2016b). Strategic planning: A universal remedy for the successful management of 21st century university education (UE). *Management*, *6*(3), 76–88. doi:10.5923/j.mm.20160603.03

Ololube, N. P., Kpolovie, P. J., Egbezor, D. E., & Ekpenyong, N. S. (2009, May 5-8). Universities in Africa cannot wait: faculty perception of leadership, quality management for sustainable development. *Proceedings of 7th International JTEFS/BBCC Conference "Sustainable Development, Culture and Education*, Daugavpils University, Latvia (pp. 132-149).

Oparanma, A. O., & Zeb-Obipi, I. (2012). Organizational development: The management of change in industrial organizations in Nigeria. *International Journal of Asian Social Science*, *2*(5), 577–582.

Orobor, E. M., Ogieva, W., & Abali, O. E. (2006). *Theory and practice of public administration*. Abuja, Nigeria: Adema Communication and Publishers.

Otara, A. (2011). Perception: A guide for managers and leaders. *Journal of Management and Strategy*, *2*(3), 21–24. doi:10.5430/jms.v2n3p21

Oyebanji, O. (2009). Resource situation and academic staff job performance in South-West Nigerian universities [unpublished Ph.D. thesis]. University of Ado-Ekiti, Nigeria.

Oyebode, E. F., Ajayi, M. O., & Oyeyipo, D. O. (2007). *Administration of university education: A Professional Perspective*. Akure, Nigeria: Flocel.

Paruk, N., & Singh, A. M. (2012). Managing bank employee stress in a South African bank. *African Journal of Business Management*, *6*(15), 5369–5375.

Ramakrishnan, S. (2014). Change management models. Retrieved from https://www.scrumalliance.org/community/articles/2014/march/change-management-models

Terry, C. D., & Dinsmore, P. C. (2006). *The right projects, done right*. San Francisco: Jossey Bass.

Vakola, M., & Nikolaou, I. (2005). Attitudes towards organizational change: What is the role of employees stress and commitment? *Employee Relations*, *27*(2), 160–174. doi:10.1108/01425450510572685

van Dijk, R., & van Dick, R. (2009). Navigating organizational change: Change leaders, employee resistance and work-based identities. *Journal of Change Management*, *9*(2), 143–163. doi:10.1080/14697010902879087

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Vishnoo, B., & Vidya, B. (2007). *Public administration: organization and its principles. Ram Nagar*. New Delhi, India: Rajendra Ravindra Printers & S. Chand & Company.

Wittig, C. (2012). Employees' Reactions to Organizational Change. *OD PRACTITIONER*, *44*(2), 23–28.

Wong, A. (2001). Leadership for effective supply chain partnership. *Total Quality Management*, *12*(7 & 8), 913–919. doi:10.1080/09544120100000015

Xie, Y. (2013). Cross-cultural communication barriers between staff in overseas-funded enterprises and management strategies for overcoming them. *Journal of Languages and Culture*, *4*(4), 44–48.

Yaacob, M., & Long, C. S. (2015). Role of occupational stress on job satisfaction. *Mediterranean Journal of Social Sciences*, *6*(2), 81–87. doi:10.5901/mjss.2015.v6n2s1p81

This research was previously published in the International Journal of Applied Management Sciences and Engineering (IJAMSE), 4(1); pages 25-42, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 88
Leading, Managing, and Facilitating Organizational Change

Paul Steven Turner
Paul Turner HR Limited, UK

ABSTRACT

This chapter focuses on organizational change and development and how leadership behavior impacts upon the delivery of the desired change, in terms of implementation, effectiveness, and performance. The reflective perspective seeks to explore learning insights gained via business and academic approaches within transformational change programs in two dimensions: first, the author's PhD research project investigated leadership behavioral approaches designed to deliver organizational change and increased engagement and performance; and second, the author's involvement as a business consultant and executive coach, acting for private sector companies on transformational change programs designed to deliver strategic change to drive increases in efficiency, effectiveness, and performance. The purpose of this chapter is to inform professionals involved in organizational change and development within their own or their client organizations and facilitate learning to help better understand the potential of leadership behavior in delivering successful organizational change strategies.

INTRODUCTION

This chapter provides different perspectives through the multiple lens of academic researcher, HR practitioner and business consultant and supports the argument for evidence-based organizational change and development (EBOCD) practice. The assertion by Hamlin and Stewart (2011) that HRD has the potential to facilitate organizational change supports earlier examples of Human Resource Development (HRD) practitioners, such as training and learning consultants operating as organizational change consultants (Phillips & Shaw, 1989). The author experienced this dual perspective in his role as an internal HR practitioner and later as an external HR consultant supporting HR practitioners undertaking similar multi-perspective roles.

DOI: 10.4018/978-1-7998-7297-9.ch088

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The period covered spans from 2002 to 2018 encompassing the author's career journey as an HR executive/practitioner, PhD researcher and independent business consultant/coach. The insights gained benefitted from internal 'insider' and external 'outsider' reference points which provided both challenge and opportunity. The author has contextualized these findings within two time-based periods. Firstly, a view compiled from the author's PhD research project, conducted as a sole researcher and based on a single company case study over a six year period (2002 to 2008). This case study investigated how strategic leadership approaches impacted upon organizational culture including employee engagement and performance. Secondly, from a broader perspective which considers the author's involvement as an independent business consultant and executive coach from 2008 onwards acting as a change agent for private sector companies, including large multinationals, on transformational programs. In this role the author facilitated the delivery of programs designed to deliver high performance through organizational change, increased efficiency and greater effectiveness.

The central threads from the two perspectives are considered and key insights developed with the aim of informing CEOs, HR practitioners, senior leaders and business consultants involved in EBOCD within their own or their client organizations and, in so doing, help to deliver successful organizational change strategies in the future.

BACKGROUND

The business environment has changed dramatically in recent years. Whilst commercial change drivers are often created by political and economic imperatives, both local and global, this is not always the case. The need for change is often related to more mundane change factors, such as an organization's strategic positioning in its own market sector, the emergence of a 'maverick' business leader into a market place or the failure of internal talent management processes which fail to deliver a 'conveyor belt' of talented individuals. The introduction of a new product or service by a competitor may also require a strategic response whether this be an aggressive or collaborative approach. The strategic types of organizations identified by Miles and Snow (1978), that is *prospector, defender*, *analyzer* and *reactor,* remain broadly relevant in today's marketplace although there appears to be a much more fuzzy view some forty years on from their conception, with many organizations adopting multiple strategic approaches, particularly across inter-group boundaries.

Against a background of political, economic and market forces, organizational leaders are grappling with implementing change strategies designed to realign their business model to continually changing circumstances. Leadership teams now require an outstanding capability for juggling multiple priorities as they strive to continuously update their key strategic focus, the shape of which will be driven by differences in geography, industry sector, market place and corporate strategy. Leadership agility and resilience are *de rigeur* terms in global board rooms (Joiner & Josephs, 2006). Yet, several years after the global recession of 2008, the leading CEOs in financial services remain heavily focused on their last critical strategic challenge of regulation and governance. Will this rear view strategic perspective end in another financial meltdown for different reasons? Across the board, irrespective of industry, the biggest change challenges continue to relate to technology, people and communications (Swaim, 2010). The differentiating factor in recent times is an unrelenting increase in the pace and exponential nature of change.

The fast changing business environment demands that the C-suite team of 2018 cannot behave in the same way as the C-suite team of the early 2000s. The increasing pace of change has overtaken the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

successful strategies of just a decade ago. The pursuit of strategic change solutions has led to change management theory being part of a major academic industry, based on new tenets of groundbreaking principles or short-lived fads, dependent on viewpoint. Re-engineering, total quality, downsizing, management by walking around, centralization and decentralization have all been fashionable as change trailblazers in academic and corporate circles before slipping into midlife obscurity (Micklethwaite & Wooldridge, 1996).

Many change management approaches proposed by business gurus around 'best-in-class' organizations are insubstantial as these rely very little, if at all, on evidence-based research, in addition to a lack of practical and pragmatic business insights. However, based on book sales, many appreciate the knowledge and insight such writers bring to the discussion, irrespective of academic rigor and/or business experience. From an evidence-based perspective Hamlin (2001) describes root failings of managers and HRD practitioners when undertaking organizational change and development; namely a lack of change management expertise, the use of quick fix or simple solutions, a failure to recognize the critical contribution of HRD, trainers and developers lacking internal credibility and most tellingly, a lack of appreciation of the importance of leadership, culture and people aspects of change.

Whilst this chapter relates to all these areas, there is a focus on the leadership, cultural and people management aspects. Insights are offered primarily through the conceptual lens of Evidence-Based Human Resource Development – EBHRD (Hamlin, 2002) and HRD professional partnerships (Hamlin, 2006). This reflective journey commences with an overview of the author's PhD research project, a single company case study which investigated how strategic leadership approaches based on a coaching behavioral paradigm, impacted upon organizational culture including employee engagement and performance (Turner, 2010).

MAIN FOCUS OF THE CHAPTER

This section explores EBOCD from both academic research, HR practitioner and business consultancy perspectives, identifying solutions and recommendations for EBOCD programs before discussing emerging trends and the potential for future research direction.

EBOCD, A Financial Services Case Study History: Academic and Practitioner Perspective – 2002/2008

Background and Context

The organizational context relates to a UK based building society and financial services provider. The early 2000s involved a period of intense change in the financial services sector, created largely by the introduction of the Financial Services and Markets Act which heralded a stronger regulatory regime. These regulatory changes were largely in response to a changing retail banking environment. Over the previous 10 years the old retail banking delivery methods, based on 'bricks and mortar' high street outlets, had begun to succumb to a voracious consumer appetite for more flexible 24/7 service channels starting with postal accounts and progressing to telephone and internet based banking.

The first building society was formed in 1775 and by 1930 their number stood at 1,026 before starting a rapid descent from the 1960s onwards, until in 2002 their number had fallen to 63 (Building Societies

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Association, 2016); to further fall to 51 in 2017 (Building Societies Association, 2017), with the vast majority regionally based organizations. The case study organization was formed in the mid-19th century and consequentially has a rich history of tradition and mutuality responding to the growing aspirations for home ownership of the working classes. In 2002 it had been thriving for 150 years without any merger or takeover and was a leading building society in the UK employing over 800 staff across Head Office and approximately 50 branches. Committed to mutuality, the Society invested approximately £700k annually in local communities. Within the wider financial services market place, the building society movement was under pressure from traditional banking and newly formed competitors, the increasing cost of regulation, new technology and aggressive takeover challenges from bigger market players. Thus the case study organization was trading in a very pressured and competitive marketplace with a host of change-driven challenges.

In 2002 the organization's CEO, a charismatic leader, had led the building society through a series of strategic challenges. During his tenure as CEO he championed visionary and values-driven people strategies to deliver record financial performance and wide ranging industry and HR recognition, evidenced by national and international awards, which eventually totaled over 100 by 2006; at that time a rare if not unique achievement for an organization of this size.

In 1999 the author was appointed to a new and innovative role in the case study organisation, responsible for all aspects of the people agenda across the organization, including culture. In terms of business performance much had already been achieved by 2002 yet the future remained challenging with the introduction of external regulatory measures, the need for new income channels, the growing volatility of markets and the resulting internal organizational changes. These challenges required more flexible, adaptable and innovative approaches to be delivered by highly engaged, committed and empowered employees. This strategic requirement for organizational change identified a leadership skills capability 'gap' revolving around a need to encourage and inspire the workforce. To achieve this it was recognized the leadership and management team throughout the organization needed to realign their leadership style to one based on transformational leadership behaviors described as leadership coaching (Turner, 2015b). A culture-change program was commenced incorporating a leadership development program designed to realign and reskill the organization's managers towards a leadership coaching style and to achieve increased employee engagement and business performance. This program was to be designed within evidence-based parameters and measured by return on investment indicators such as product sales, service levels and cost effectiveness, all linked to the business strategy.

To refine the emerging strategic focus an organizational analysis review was agreed. In parallel, the undertaking of a PhD research case study was approved to support the evidence-based criteria and to critically evaluate leadership coaching as an effective way of facilitating organizational change and development, and enhancing employee engagement and performance. The linking of an academic research study and a 'live' business transformation program created the opportunity to view organizational change through an evidence-based lens, broadly aligned to the collaborative HRD Professional Partnership a joint academic and practitioner partnership approach undertaken by Hamlin and Cooper (2004).

Organizational Analysis and Research Framework

A series of facilitated employee workshops, informed by evidence-based research including the work of Burke and Litwin (1992) reviewed the areas of strategy, leadership, culture, external environment, structure, processes, systems and performance. A range of strategic organizational development models

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

were utilized including a SWOT analysis, a visioning approach and process mapping, together with references to transformational change and related models (Kotter, 1996; Kotter & Cohen, 2002). From the workshop outputs a 'route map' was developed which set out the existing 'current' and desired 'future' states and identified the 'gaps' relating to organizational structure, systems and people. These critical strategic elements were reviewed and driven forward by three sub executive groups reporting to the board with each responsible for an element.

The culture change group (CCG), chaired by the author, was responsible for the desired cultural change and oversaw evidence-based approaches including an informal network of employees from across the formal hierarchical structure (Kotter, 2014). The CCG was informally responsible for developing and implementing people and leadership related change strategies, including the leadership development program, as opposed to the formal responsibility for delivery which lay with the HR division. Through review and discussion of evidence-based research a leadership coaching approach based on a transformational leadership style (Bass, 1985, 1997; Bass & Avolio, 1993) was deemed to represent the most appropriate leadership style to drive the desired cultural change and an aligned leadership behavioral framework was created to facilitate management development.

The development of the leadership coaching program was set against a background of reports of corporate coaching programs not delivering evidenced value with clear measurable outcomes. The development of coaching within organizations was, and still often is, based on 'acts of faith' promoted by internal and external coaching advocates. When the question 'Does organizational coaching work?' is asked, the answer very often excludes the context, constraints and specific, detailed objectives and linked outputs surrounding the coaching activities. What was different about the case study leadership coaching program was the parallel longitudinal action research framework, which enabled continuous learning and ongoing assessment, both in cultural and performance terms.

By its nature this interactive action learning organizational research case study involved complexities and uncertainties and created challenges driven by a range of issues, some research based constraints and others more organizational based. These included internal politics, the singular nature of the case study, qualitative versus quantitative data inputs/outputs, defining the return on investment and, probably the most challenging, the longitudinal approach, which resulted in a backdrop of changing sociological and cultural factors, including employee changes. The key objectives were to (i) explore the view that sustained coaching in the workplace, supported by a strategic coaching framework, is an effective means of enhancing employee engagement and individual/organizational performance; (ii) identify key characteristics and barriers to building a leadership coaching capability able to deliver an improved quality of performance in the workplace and (iii) develop a coaching framework that identifies conducive organizational attributes, initiatives and capabilities that can act to enhance coaching effectiveness.

KEY LEARNING AND FINDINGS

The research study findings indicated that employee engagement and performance will benefit from an organizational coaching program underpinned by a network of factors focused on supporting coaching activity. These evidence-based factors relate to a *culture* built on common shared values, high performance, trust, openness, support, mutual respect and inclusiveness; *leadership* that role models the coaching culture through all levels of a management team that is *skilled* in coaching technique and relationship

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

management; a *learning environment* that provides an appropriate setting for coaching activity, and *HR processes* that develop, monitor, and reward coaching behaviors.

To support this culture change formula a process was developed, the 'Eight Steps of Achieving an Organizational Coaching Culture' (Turner, 2010, p. 351; Turner, 2013), which set out a strategic approach to creating an organizational coaching culture and recognized the importance of both human dynamics and the organizational environment. In developing this model the author recognized the impact of evidence-based transformational leadership behavior and wider organizational change (Kotter, 1996; Kotter, 2008; Kotter & Cohen, 2002). Whilst there may be a benefit in viewing the elements in a linear stage frame to enhance understanding, a flexible phased adaptation should be adopted dependent on the organizational context. The 'eight steps' are listed below.

1. Set out the leadership coaching vision and develop a sense of purpose.
2. Form a coaching coalition of advocates through engaging key stakeholders.
3. Generate a coaching strategy plan, key ROI measures and drive implementation.
4. Integrate and align coaching activity with organizational structure and processes.
5. Communicate the coaching message to 'spread the word' and engage employees.
6. Create a quality process to evaluate and accredit internal coaching activity and measure outcomes.
7. Plan the next wave of coaching activity to ensure the strategy is sustained.
8. Chalk up the coaching outcomes and ROI results via the evaluative process and identify improvements so as to make ongoing refinements. (Adapted from Kotter, 1996)

Within this transformational change framework resided a range of transactional methodologies, including processes and tools, to support the framework and link it practically and pragmatically to the workplace. One such coaching tool was the 9R Model, which set out nine phases of a performance oriented coaching process for line managers; Review – Rationalize – Refine – Reframe – Relate – Remedy – Reflect – Record – Revisit (Turner, 2010, pp. 368-369, Turner, 2013).

This integrated transformational – transactional organizational culture change approach was designed to inspire and motivate through a leadership vision and active role modeling from top-down whilst delivering and implementing via bespoke change management execution processes. Both approaches were designed to be complementary and to create a performance coaching focus which significantly impacted favorably on the organization's bottom line through increased sales, improved customer service and greater productivity, achieving a net annual return of £3.7m. Other non-tangible benefits related to skills, knowledge, behaviors, personal confidence, ideas generation, effectiveness, improved working relationship/atmosphere, career development, self-awareness and motivation which could arguably have had an indirect impact on performance through increased employee engagement. The case study research evidence suggests the combination of a transformational and transactional approach to the organizational cultural change program played a large part in delivering these benefits.

The case study provided evidence of relationship links between organizational culture, leadership behavior, employee engagement and performance. The Cultural Change Levers model (Turner, 2010, pp. 261-263) recognized that a change momentum was created when leaders adopted aligned leadership coaching behaviors, which favorably impacted upon employee performance in a direct manner through a causal relationship to specific role objectives, as well as showing a strong predictor of increased employee engagement. This organizational cultural change 'code breaker' can be expressed as follows:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- *Organizational Culture* is a facilitator of *Leadership Behavior.*
- *Leadership Behavior* drives improved *Employee Performance* and is a predictor of *Employee Engagement.*
- *Employee Engagement* is a predictor of high *Employee Performance.*
- *Employee Performance* sustains and develops the *Organizational Culture.*

As the research study neared its completion a UK government report was published highlighting the importance of employee engagement and its strategic importance in terms of the UK economy (Department for Business Innovation & Skills, 2009). The author's case study research backed up in quantitative terms many of the practitioner based qualitative conclusions presented in the government report. It also offered strong indications that effective coaching in the workplace is a key predictor of employee engagement, with the potential to maximize the benefits of an organization's performance management system and drive improvements in both the 'hard' factors of sales, and the 'soft' factors of employee engagement and commitment, through the development of appropriate skills, knowledge and behaviors (Turner, 2012). By the time these research studies had been published, the author had left the case study organization and was working as an independent business consultant and executive coach, primarily in the UK's private sector and then globally.

Personal Reflective Insights

Some several years on from the completion of the organizational case study the author now has a less intense view of events and, from a more distant stance, new reflective insights. For example, the critical importance of core purpose and values as it is these that drive an organization's mantra and the predominant behavioral characteristics of the organization's leadership (Turner, 2017). In the case study example the strategic purpose and related values helped to create the organizational culture surrounding and impacting upon the coaching activity.

The nature of the case study organization's community purpose and founding values based on the philosophy of mutuality provided a strong platform on which to develop an inclusive and participative culture. How did this authentic purpose-driven legacy impact upon the culture change? It could be argued that the historical values-driven legacy greatly supported the strategic intent, yet in many other organizational examples such traditional legacy cultures create barriers and blockages to desired change. The key practical and pragmatic evidence-based insights taken forward and developed by the author within a consultancy career were the importance of:

- Analytical assessment at the start of the cultural journey to understand the 'As Is' position and enable the development of a focused 'To Be' strategy, together with measurable change indicators.
- Leadership taking ownership and responsibility for the desired change and 'buying-in' to actively role model the appropriate leadership behaviors.
- Organizational change being enabled at two levels, macro via a strategic transformational change process and micro via supporting transactional execution processes.
- An ambietic change philosophy (Turner, 2010) which recognizes the impact of the organizational environment including leadership behavior within a framework of flexible processes which balance empowerment with control.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- The critical role of CEOs (and boards) in facilitating the desired organizational culture so it can act as a catalyst to aligned leadership behavior, which in turn will drive employee engagement and employee performance and create the potential to facilitate change.
- An awareness of the impact of individual and team personality (as well as organizational culture) on leadership behavior and the value of evidence-based 360 degree and psychoanalytic approaches for identifying development areas.

The next section provides the author's reflective views of how, following a change in role from an 'insider' practitioner and change leader to an 'outsider' consultant and change facilitator, the author gained further experience and learning whilst working with 'change leaders' across several organizations, all seeking to achieve organizational cultural change and increased performance.

EBOCD Case Studies: A Consultancy Perspective – 2008 Onwards

The author's consultancy career commenced in 2007, gained pace in 2008 and has continued strongly to the present day. During this time the author has worked in both the commercial and academic sectors, thus enabling practitioner and academic perspectives. Academic appointments by the nature of the author's commercial work commitments have been restricted to visiting roles and one-off short-term associate contracts with six university business schools in the UK and internationally. These have added value to the business consultancy offering the latest evidence-based knowledge through access to the academic community. The potential for learning has encouraged the author to contribute to business management thought leadership via peer reviewed academic papers, business articles, blogs and podcasts for consultancy firms as well as book publications. In the commercial sector, consultancy assignments and projects have involved the author working with over 100 companies, including large national, multinational and SME UK based companies, as well as overseas based companies, including commercial operations in Australia, China, France, India, Spain, Sweden and UAE. These clients spanned several markets and sectors including retail, consumer products and FMCG, aerospace, pharmaceutical, manufacturing, IT, logistics and transport, building products and construction, social housing, mining, education, legal, financial services and professional sport. This extensive, diverse and cross-sector client portfolio has enabled the author to practically test academic theory and develop new evidence-based pragmatic business oriented approaches.

The consultancy work undertaken has involved a range of leadership development strategies including the facilitation of board/senior leadership development, visioning strategy activities and executive coaching, most of which has involved either leadership 360 degree feedback, including the Multilevel Leadership Questionnaire (MLQ) 360 degree assessment survey (Avolio & Bass, 2004; Bass & Avolio, 1993, 1997; Bass & Riggio, 2006) and/or psychometric assessments, including the well-established Hogan Leadership Forecast Assessment (Hogan Assessment Systems, 2015, 2016; Hogan & Kaiser, 2005) to a more recently validated assessment, the Resilience Quotient Inventory™ (Critchlow, 2018).

The duration of assignments has varied from a few hours to several years, with the latter longer term assignments often involving the author as a principal consultant and member of a wider consultancy team in the ongoing facilitation of strategy visioning, organizational analysis, and leadership development including assessment feedback and coaching, and/or HR specialist consultancy.

For the purposes of this reflective contribution the main focus will be on the author's work with larger companies in the private sector as his work in these organizations involved a longer time span, generally

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

between one year and 18 months and therefore a greater degree of consultancy change interventions. These assignments provided the learning space for the original themes from the earlier PhD research to be developed and they often involved organizational cultural change projects sponsored by the client CEO and the executive leadership team. This type of leadership sponsorship is essential to the ongoing delivery of organizational change (Kotter, 1996; Turner, 2010). The common thread across all such change assignments was the focus on transformational leadership behavior in driving organizational change driven by external market forces such as a market movement created by a change in customer behavior. These change challenges included an increase in customers' shopping online; the impact of acquisition and/or merger strategies or internal restructuring driven by competitive forces. In all cases the respective CEOs and, on most occasions, their top teams recognized the need for a new leadership style to drive a culture which enabled their organizations to be flexible, adaptable and responsive to change.

This reflective contribution will focus on how the author's change leader work, in a single organization, has developed over recent years working as a change facilitator for numerous clients in many market sectors. Reflective insights, with reference to two organizational case studies, are set out in the next section and provide an overview of evolved thinking developed when undertaking organizational change assignments. The case studies illustrate how the author's earlier PhD case study research and evidence-based learning has evolved in real business scenarios and organizational challenges. These case studies were chosen to represent real and relevant examples of today's business environment and atypical organizational change and development challenges faced by today's boards, CEOs and senior leadership teams. The first case study is anonymous due to the client preferring to maintain confidentiality at the time of publication. The second case study relates to Peel Ports Group (PPG) one of the largest UK ports companies. In both case study examples the author worked with Jennifer Jones (Parratt), at the time Client Director of an independent search and consultancy company. Jennifer, an experienced consultant and coach, has worked across the globe with C-suite executives, helping them to transform their organizations' leadership and culture.

Case Study 1: Transportation Infrastructure Sector

This case study organization is the UK subsidiary of an international company, present in over 50 countries which in 2017 recorded over €10bn sales worldwide. The UK subsidiary operates across multiple sites and employs circa 3,000 people. The drivers for change were strategic. To take advantage of an expanding market created by a change in government strategy, a transformational realignment of the organization's structure was required. This organizational change created a different risk profile, including technology and cultural profiling, thus increasing operational complexity.

Initial consultancy support was provided to the CEO and the senior leadership team, aimed at building company knowledge and trust in the client – consultancy partnership. As a result, a facilitated process helped the leadership team develop a deeper understanding of the strategic direction of the organization and the evolving strategic leadership role needed to drive through the required changes to ready them for the change journey ahead.

This involved the creation of a one team ethos around a core purpose and vision within a refocused culture and supported by a revised organizational structure, process and procedures which would enable rigorous approaches to accelerate the rate of change. The leadership community explored their new vision and what it meant for them; individually, as a team and as a new business. The 'stake in the ground' reality workshops defined and created the new organizational structure through an organizational analysis

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to establish the 'As Is' position as well as providing a 3 year view via a structural, strategic and cultural lens, before moving on to reviewing the plan of 'what' to do to get there, 'how' to achieve it and identifying key risks along the journey to the 'To Be' vision. This stake in the ground exercise was critical to ensuring the follow up organizational change actions were focused, effective and ultimately successful.

The organizational analysis involved undertaking an effectiveness evaluation which clearly defined the organizational state of play and identified a strategic and operational route map of actions, including leadership capability, to improve organizational performance and profitability. This involved the executive team in analyzing and evaluating quantitative and qualitative data gathered from across the organization. The approach and methodology framework were developed by the author via analysis of the available research literature and the application of adaptive innovation to align and bespoke to the client's need.

The Burke-Litwin performance and change diagnostic framework model was used as a core framework to assess the factors affecting organizational effectiveness (Burke & Litwin, 1992) namely:

- **External Environment:** Reputation and brand image.
- **Mission and Strategy:** Strategic vision in place which is understood and 'lived'.
- **Leadership:** Evidence of transformational leadership behaviors.
- **Organizational Culture:** Positive, motivating and empowering culture.
- **Structure:** Flexible and cross-functional structure rather than functional, silo-driven.
- **Management Practices:** Evidence of transactional management behaviors practices.
- **Systems:** Appropriate strategic and operational policies and procedures.
- **Work Unit Climate:** Based on cross functional teamwork, respect and friendliness.
- **Tasks and Skills/Abilities:** Task requirements matching individual skills and abilities.
- **Needs and Values:** Employee needs/values aligned to organizational needs/values.
- **Motivation:** Motivated, engaged, committed and empowered employees.
- **Individual and Organizational Performance:** High performance management system.

However, the actual organizational analysis and effectiveness review process adopted was adapted from the Burke–Litwin model through investigative research by the author which identified refinements driven by aligning to client need and the bespoke changes required. Refinements to the organizational analysis evaluation process included additional elements relating to Governance and Risk and changes to the Individual and Organizational Performance element, which was refined to also cover three perspectives, namely personal, team and organizational. Empirical research indicates that utilizing an evidence-based organizational diagnostic across an organization within the change process can have a substantial impact on the resulting financial productivity of an organization (Cummings & Worley, 2005). Additionally, a well-executed organizational diagnostic process fosters and promotes a continuous learning environment that not only impacts on the organization's ability to rapidly adapt to change but which also positively affects its bottom-line organizational performance and overall effectiveness (Kontoghiorghes, Awbrey, & Feurig, 2005; Martins & Coetzee, 2009).

Through facilitative inputs the leadership team considered two distinct sets of organizational dynamics. One set was primarily associated with *transactional* behavior, or the everyday interactions and exchanges that manage the process and create the climate of everyday organizational behavior. The second set of dynamics was concerned with *transformational* behavior, which leads and drives change to a desired future state.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The outputs of the organizational analysis provided a platform on which detailed planning of the strategic pillars could be progressed, as well as hardening the key messages and themes for certain stakeholders and reviewing the outline governance structure. The next stage involved the leadership team exploring how to bring the strategy to life, enabling the leaders to understand the importance of their role modeling transformational behaviors so as to drive through the changes needed. Together the series of interventions created an increase in the sense of urgency, a belief that the transformation was achievable and a clear understanding of what was needed to be done to make it happen. There was also an increased sense of 'team' aligned to the new direction and an awareness of individual leadership journeys while together owning the overall future plan.

Further workshops followed which included discussion and activities around transformational change models including the VUCA Prime model (Johansen, 2011) and Kotter's research on change accelerator drivers (Kotter, 2014). These team workshops maintained the momentum of the transformational leadership learning and helped leaders to understand how to transform by embracing core values and linking the three dimensions of a personal, team and organizational (PTO) development focus to deliver an integrated and holistic change plan.

The post program review provided feedback to the effect that everyone entered into the workshops positively and were 'on the pitch.' The sense of trust in the team increased, together with morale, against a background that many individuals would be personally impacted by this change. The team originally gave highly divergent responses to all questionnaires indicating a strong lack of alignment on some key issues and the process helped to resolve these variances in readiness for communicating a consistent message with authenticity and impact across the organization. It was noted that the sense of urgency increased over the duration of the events and that a guiding coalition had been formed by the end of the assignment.

The CEO of the case study organization offered a personal perspective of the value of adopting an external evidence-based consultancy change approach '… the process adopted really helped gel the team around a common purpose and beat rate. This accelerated the change process… and the resulting organization was built to maximize opportunity whilst reflecting on risk – it was expertly facilitated. I truly believe (without external facilitation) the process of defining our Vision, Culture and Organization Structure would have been far more difficult, taken longer, and not have had the same staff engagement and understanding'.

Case Study 2: Peel Ports Group (PPG)

This case study organization is Peel Ports Group (PPG), one of the largest UK ports companies and an ideal example of a business whose whole is more than the sum of its parts. The company works as a strategic network of ports, terminals, hubs, shipping lines and services and is a vital link in an expert logistics chain, at the leading edge of transport and handling facilities. PPG connects major population areas across England, Scotland and Ireland through its Irish Sea hub, and has the only water freight route, delivering cargo right to the heart of the UK via the Manchester Ship Canal.

PPG's vision of transforming industries and regions to foster economic growth came dramatically to life with the decision to invest £400m in the development of Liverpool2, one of the best equipped and connected deep water container terminals in the UK. In line with market driven themes there was an emphasis on market growth, risk management and cost optimization. At the time PPG's Group CEO, Mark Whitworth, cited the vast potential offered by the new capability to handle the world's biggest

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

container ships via a world class port located in the North West of England 'Powerhouse' region. Whitworth was clear that such a transformational innovative strategy and the supporting investment, made sense and said 'It is less expensive to bring a container from China to the UK (via Liverpool) than it is to move it from one of the southern ports to the North of England. When you start to look at the story around critical mass, the market is there, the population is there, the consumers are there. I think the story starts to become quite compelling. That's why we have confidence.' (Mann, 2016).

PPG's bold transformational approach to achieving the strategy of providing 'Port Centric Distribution Solutions' was backed by significant investment, showed a clear exciting vision and a belief in their future marketplace based on innovation, technology, people and a strong client focus. PPG recognized that whilst the £400m investment was focused largely on transforming infrastructure and physical assets, the major challenge concerned cultural change and this, in turn, required transformational leadership.

Jennifer Jones (Parratt) and the author provided consultancy inputs to PPG focused on helping them sustain their sales growth curve and focus on future top line growth so as to realize the returns required from their significant investment in the future. The drivers for organizational development were commercial yet the cultural levers to achieve this required a change in sales leadership behavior. Following the initial engagement a strategic leadership analysis process was undertaken to fully understand the current reality and the desired commercial outcomes and to set working guidelines for the trust in our client – consultancy partnership to develop. In leadership terms the evaluative assessment provided individual and team leadership profiles through psychometric assessment tools and experiential activities facilitated via workshops. Outputs of the strategic leadership evaluation were created in the form of PTO development objectives, designed to integrate and accelerate performance in all three dimensions.

The evidence-based leadership evaluative approach employed incorporated the following five phase consultancy framework developed by Jennifer Jones (Parratt):

1. **Discover:** Gain understanding of the outcomes, objectives, strategy and context of the organizational change program.
2. **Define:** Quantitative evidence-based assessments of the leadership team in the context of the business environment.
3. **Develop:** 1-1 feedback sessions to provide heightened self-awareness of leadership behaviors and opportunities for performance improvement.
4. **Deliver:** Bespoke workshops to review evaluative data feedback and identify ways to improve organizational capability and effectiveness.
5. **Debrief:** Structured report identifying recommendations for accelerating performance and increasing value.

This strategic sales leadership evaluative process developed individual and strategic awareness and focus, identified performance risks and aligned leadership actions to PPG's vision and mission. This process helped facilitate understanding of how the leadership team worked on three levels; in their individual teams with their reports, in the respective Director and senior manager peer leadership teams and as a cross functional team working together in an integrated way.

As a result of this evaluation it was identified that two dovetailed development solutions offered the most appropriate way forward; one for the director/leadership community and the other for those undertaking the sales growth activity on a day to day basis; with integrated development activities between the two dimensions to ensure alignment and cross working. The Port Directors' dimension focused on helping

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

them to develop further their transformational sales leadership behaviors and skills whereas the Sales Managers dimension focused on more transactional processes to deliver the sales plans and outcomes, with the two dimensions overlaid throughout the delivery process. Development insights adapted from the Full Range Leadership model (Avolio, 2011) informed this approach.

This structured and integrated program helped accelerate the performance of the organization and equipped the leadership community with increased change management knowledge and skills to effectively guide the upcoming growth in the business. Those with commercial responsibility undertook personality diagnostics to increase their individual self-awareness of personal preferences, including those behaviors which were naturally, and often unconsciously, avoided. As individuals and as a team these aspects were explored in terms of performance and behavior and what changes were needed to maximize the opportunities created. Skills development was undertaken in sales techniques such as negotiation and closing, as well as behavioral development including interpersonal psychology, questioning and relationship capability. As part of the program there was a clear focus on evaluating and benchmarking sales leadership as well as sales performance, behaviors and cultural markers.

The use of PTO development plans by all participants at the end of each development phase ensured that momentum was maintained and sustained and everyone viewed and progressed their focused development in relation to performance on three levels; the individual, their team and the organization. The impact of the PTO development plans was monitored at strategic level and this enabled return on investment measures to be adopted. All targeted benchmarks increased positively during the project and the program objectives were clearly met, including increases of (i) 40% in the overall commitment to the organization's strategic charter of actions; (ii) 50% in the implementation of improved and refocused individual sales behaviors and (iii) over 100% in team working behaviors and communication effectiveness.

Patrick Waters, Chief Operating Officer and Group Commercial Director of Peel Ports Group, provided this view 'We realized that a project to determine clearer roles between operational and commercial needed complementing with a focused program designed to improve the sales leadership capability within the commercial team. Significant time was taken to develop a true understanding of our needs and developing a program specifically for PPG. The consultants balanced first class knowledge with participative sessions which kept the process fresh and alive. It was clear to us that the expert external view of the consultancy team, in relation to our challenges, could greatly accelerate the pace of the implementation process as well as the change program's level of effectiveness and positive impact'.

Concluding Comments

The author is probably too fond of quoting the saying attributed to Confucius 'Knowledge without practice is useless, practice without knowledge is dangerous'. The two worlds of business and academia are interdependent on each other with coexistence essential to both. It is within this contextual mindset that the author presents learning, distilled from the case studies, in the form of evidence-based solutions and recommendations before discussing emerging trends and the potential for future research. These concluding comments are not framed in a philosophical or intellectual sense, rather, these thoughts are presented in ways that may be interpreted, used and practiced in the business world whether leading, managing and/or facilitating change.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

SOLUTIONS AND RECOMMENDATIONS

When reviewing the three cases studies discussed within this chapter, two significant evidence-based platforms emerge in relation to leading and managing organizational change; that is Organizational Change Evaluation and Leadership Alignment and Development. Several of the key EBOCD solutions referred to in the case studies are considered within these two organizational change phases.

Organizational Change Evaluation

Let's start at the beginning. Organizational culture change journeys often start from the wrong place. Like the story about an American tourist who, lost in rural Ireland, asks a local farmer for directions to Killarney. The farmer humorously responds 'If I was you, I wouldn't start from here'. A scenario, albeit in a business context, that the author has encountered on most consultancy engagements. To create a route map not knowing where the organization is on the map, never mind not knowing what each leader thinks, is at best foolhardy. Very often the CEO and their senior leadership team, having created a strategy, are just keen to get on and action the vision and mission by telling their people all about it and what they need to do! However, at this stage, their view of the organization's current position and situation is often diverse, sometimes to an extreme level. Whilst 'hard' data areas such as financial, sales and productivity measures are generally pinned down, there is a lack of evidence-based clarity and understanding around the 'soft' factors such as the level of skills capability, engagement and commitment. Thus the biggest challenge for a consultant is to slow the process down in the early stages and help the senior leadership team undertake an organizational analysis and effectiveness review. How this is progressed will vary dependent on client context and nature of the change and investment budget yet, whatever the resources, some form of joint quantitative and qualitative approach should be considered.

Rarely is an executive or senior leadership team on the 'same page'. The need for some form of commonality of view requires facilitated discussion to ensure there is a 'one team' view of the 'As Is' position. This phase could also include a way to capture views from a cross range of employees. To better understand different perspectives of a workforce the author often utilizes a broad diagnostic framework based on a Head, Heart and Hand approach to gather benchmark data at the start and throughout the change journey. This threefold approach can be illustrated by asking the following questions:

- **Head:** Do employees understand and agree the rationale and intellectual argument for the change?
- **Heart:** Are employees engaging with, emotionally buying-in to and personally committing to making the changes happen?
- **Hand:** Are employees 'living the values' and actions supporting the changes?

Whilst this interactive experiential evaluative approach is valuable with or without other methods, a more rigorous and robust framework can add greater value by ensuring clarity and providing benchmarks and measures to monitor the change journey. A well-executed organizational diagnostic process fosters and promotes a continuous learning environment that not only impacts on the organization's ability to rapidly adapt to change, but which also positively affects its bottom line organizational performance and overall effectiveness.

Different approaches were adopted within the case study examples described earlier in this chapter including high level and primarily qualitative approaches such as the Head, Heart and Hand framework

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

or the Discover and Define parts of the consultancy framework described within the Peel Ports Group case study (2). In the Financial Services and Transportation Infrastructure case studies more detailed qualitative and quantitative approaches were adopted including bespoke organizational analysis techniques relating to evidence-based methodologies such as the Burke–Litwin model. There are also established proprietary products, which are particularly suited to large organizations with large workforces and these offer value to any interactive and experiential feedback and evaluation analysis. One example is the Holistic Organizational Effectiveness Survey© (HOE) which was primarily designed by Howard Deutsch (2017). The HOE survey and similar surveys may be utilized as an off-the-shelf and/or bespoke approach to provide the opportunity to gain a detailed data-driven 'stake in the ground' and thus a clearer understanding of organizational realities.

Following the organizational evaluation stage and the pinning down of the 'As Is' position, the next step is to define the desired 'To Be' position, including the purpose, vision, mission, delivery channels and outcomes that need to be created, or refined if already existing. There are various approaches to achieving this and multiple facilitative frameworks and approaches dependent upon the organizational scenario. All three organizations described in the case studies had in place a strategic plan, which was used to frame and position the desired future change state. Whatever approach is adopted the process will need to enable the definition of or take into account the existing overarching organizational *purpose* and *vision* benchmarked by a *mission* and key *measures* within a framework of strategic delivery *foundations* and *values.* The task of setting out these strategic dynamics on 'one page' is a valuable organizational change activity, particularly when involving the wider workforce. From this a strategic communications framework can be created, involving a range of 1-1, team and organizational employee events to engage the workforce and stimulate passion. The focus then turns to supporting the leadership team and aligning leadership capability.

Leadership Alignment and Development

Following the evaluation phase and the identification of the gap between the current reality and the future desire change, leadership behaviour can be aligned. Within the case studies emphasis was placed working with the respective leadership teams to develop transformational (leading) and transactional (managing) behaviors and capabilities. The concept of evidence-based transformational leadership and transactional management was a constant development thread throughout the organizational change case studies. The author views transformational leadership (Bass, 1985, 1997; Bass & Avolio, 1993) as a key strategic change driver, being focused on creating step change to achieve a desired future state, whereas transactional management aims to effectively maintain or incrementally progress the current state. For a step change in culture and performance there is a need to encourage employee empowerment. Hence senior leaders need to act in a transformational, motivational and inspirational way, rather than adopt a transactional leadership style through a compliance-driven approach of contingent reward or punishment which is generally more suited to maintaining stable situations. Transformational styles are found to be more effective when connected to a compelling purpose and vision aimed at generating high employee commitment through personal involvement (Turner, 2017). To understand where senior leaders are on the transformational – transactional leadership paradigm, then leadership assessment and evaluation is required.

Leadership evaluation is an area which benefits from specialist evidence-based analysis. There is largescale research evidence relating to pre and post development evaluation for individual leaders,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

such as 360 degree feedback and psychometric assessments, yet there are fewer examples of holistic and validated evaluations of executive teams as a team entity, focusing for example on how they work together and how their behavior aligns to the organization's culture and strategy. Leadership behavior can be evaluated and should be an integrated part of a strategy for managing leadership development. In most areas of business procurement e.g., IT, capital assets or insurance; there is a rigorous evaluation process to assess the organization's current position in the specific area which is then compared to future requirements. Why doesn't this happen more often in procuring a leadership development program? Generic leadership development requirements are generally of critical importance to organizations, hence the value of a rigorous and validated evaluation process before, during and after the program.

A clear understanding of the organization's leadership DNA is becoming critically important in a business environment which is increasingly *volatile, uncertain, complex* and *ambiguous* (VUCA). Personal experience and research evidence suggests that executive strategy and leadership development, with a few notable exceptions, has largely failed to keep in line with these rapid and wide-ranging changes. New thinking is emerging as evidenced by the VUCA Prime model (Johansen, 2011) which flips the original VUCA model to create a leadership 'antidote' to VUCA and, in doing so, proposes that the best leaders in a VUCA environment are characterized by their *vision, understanding, clarity* and *agility*.

By helping organizations focus on these change characteristics an aligned leadership strategy can be created that recognizes a VUCA environment and aligns the skills, attributes and behaviors of the leadership team to steer the organization through the turbulent waters of change and deliver sustainable success. Change scenario planning utilizing a *strategic* and a *leadership VUCA lens* enables organizations to identify challenges and dilemmas that are invisible due to these being of an intangible, indefinable and/or unpredictable nature. Once identified and addressed these strategic risks may provide a competitive advantage and potential benefits. Such strategic dilemmas are an ongoing fact of organizational life and therefore must be continuously addressed and the tension managed. The author found the VUCA Prime model particularly well suited to the case study 1 scenario enabling facilitated discussions designed to align senior leadership development to strategic intent and the major strategic challenges faced (e.g., external environment changes requiring internal realignment and a major restructure).

Based on the author's experience, including the case studies described, the favored delivery combination in senior leadership development consists of formal business education, classroom facilitation, role assignments, coaching and mentoring. These elements are often progressed in a random way without an over-arching development framework. The author has sought to bring the various strands together in a holistic and integrated systemic delivery wrapper so as to build continuous development and reduce the negative impact of leadership overload. The 70-20-10 model is a way of achieving this and offers a proven evidence-based way to facilitate leadership development in an effective and impactful way.

The 70-20-10 leadership development model is a research-based, time-tested guideline for developing leaders and focuses on three types of learning experience (i) practice via on-the-job experiences and challenging assignments (70 percent); (ii) developmental relationships including coaching, mentoring, feedback and networking (20 percent); and (iii) focused knowledge and education-based training and development (10 percent). According to Lombardo and Eichinger (1996) leadership development is best achieved through applied learning and on-the-job learning has three times more impact on individual performance than formal training.

The 70-20-10 model sets out 'where' and 'how' development can be progressed yet equally important is the 'why' or the purpose, setting out the development focus. One way to describe the development focus is via the concept of integrated strategic learning based on PTO development mentioned earlier in this

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

chapter. This has been an emerging developmental theme for many years and is now breaking strongly into the collective corporate and academic consciousness as demonstrated, for example, by the MSc in Organizational Development run by the Metanoia Institute (2018) and validated by the University of Middlesex in the UK. The MSc addresses the challenges of leading, managing, facilitating and consulting in the midst of an increasingly VUCA world and actively explores the systemic interconnections between individuals, teams and organizations.

The author is an avid proponent of a PTO development framework to ensure a systematic results-driven approach and achieve return-on-investment outcomes. This approach involves linking four learning phases in the *development zone* and these are *evaluation*, *action-orientation*, *development facilitation* and *monitoring results* (followed by revisionary continuous improvement actions) to personal, team and organizational areas.

The aligning of the 70-20-10 model to the PTO development framework brings together two evidence-driven approaches within a *best fit* practical and pragmatic framework rather than relying on *best practice* abstractive concepts (Turner, 2016b). By conjoining the developmental approaches of 70-20-10 with a PTO development focus, leadership evaluation and development is aligned to organizational change and is therefore more effective, strategic and positively impactful on the bottom line. The author predicts a surge of interest in the *70-20-10 PTO* development model and similar conjoined strategic development approaches. In the next section other emerging trends and potential areas of research are considered.

EMERGING TRENDS AND FUTURE RESEARCH DIRECTION

The changing environment continues to shape the strategic priorities of organizational leaders with CEOs citing fostering *innovation* (21%) as heading their priority list, followed by achieving a stronger *client focus* (19%); implementing *new wave technology* (18%); better *people and talent management* (18%) and improving *branding/communications* (17%). Innovation is clearly in the sights of C-suite leaders, so much so that 82% are concerned that their existing current products and services will not be relevant in three years' time (KPMG, 2016).

The strategic challenges of technology, innovation and talent are dominating the US CEO agenda with their UK CEO counterparts focusing on similar themes with an emphasis on globalization, growth, automation and the increasing challenge of digital trust, particularly in the area of cyber technology (PwC, 2018). Another leadership survey (CMI & the Conference Board, 2015) offers a broader European perspective which identifies Client/Customer Relationships as the top priority followed by Human Capital, Innovation, Operational Excellence and Corporate Brand/Reputation. In the UK the survey reveals similar findings but also identified UK tactical short-term 'hot button' issues of Social Media, Customer Behavior and Cyber Security. As for high performing organizations the survey indicates that these are focused on achieving a culture of customer centricity and employee engagement. Other trends in global strategic priorities highlight the growing importance of corporate purpose and value-driven direction (Turner, 2015a). The author's experience supports the aforementioned research in terms of alignment to the on-the-ground strategic challenges, with a noticeable organizational desire for leaders to facilitate increased innovation and transformational change (Turner, 2016a).

Yet whatever the priorities the biggest challenge for C-Suite leaders is not *what* needs fixing or changing but *how* it can be fixed or changed. Inevitably, whatever the strategic challenge, the effectiveness of the response will mostly succeed or fail dependent on the leadership bench strength as it is leadership at

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the top and throughout the whole organization that will be required to deliver the desired changes. As the challenge of change continues to multiply and intensify, the leadership development response often remains the same. The author's experience working with UK based multinational companies indicates that spending on the 'soft' area of leadership development rarely receives the same profile or priority, as 'hard' capital investment. The gap between the leadership development need and the actual spend appears to the author to be widening. Therefore how the strategic leadership development budget is spent becomes critical.

The author proposes, and the case studies herein support, that the key characteristics of successful programs are buy-in and role modeling from the board, CEO and executive team; rigorous and robust evaluation and analysis; EBOCD methodologies delivered in a practical and pragmatic manner; engaging delivery facilitation to inspire and engage; beginning to end development; aligned performance action plans; key change and performance indicators related to development interventions; interim checks and balances to review and refine progress and a clear commitment by investment action that the program will be sustained and is not a standalone 'flavor of the month' project.

There is a common view that standalone non-strategic leadership development interventions are cost effective. Organizations adopt these incremental, often non evidence-based approaches, in an attempt to, at best, maintain and, at worst, contain gaps in critical leadership bench strength areas. This is not the case in every organization, as is evidenced by the case studies highlighted. Yet it is clear that many board's and CEOs are still not totally sold on EBOCD practice and delivery as much as they are on IT systems or on 'harder' productivity tools which are backed up by similar statistical evidence. Much of the challenge and pressure in progressing strategic leadership development within an organizational change and effectiveness context falls to HR Directors. Yet very often successful entry into the cultural change space through a strategic leadership development lens is more often via the CEO and/or board level team. This appears to be improving as HR Directors are seen to be an executive first and an HR expert and functional head second, yet there is much more progress to be made from a professional HR perspective.

It falls to strategic organizational change and leadership development consultants to make a much stronger case for integrated, evidence-based approaches which are bespoke designed to provide a practical best fit approach rather than best practice. Change consultants can fall into the trap of offering a 'product' for all seasons, irrespective of the organizational challenge and environment. It is therefore not just the CEOs of this world that should seek for their organizations to be adaptable, flexible and innovative, but those consultancies who seek to help them achieve this.

CONCLUSION

The ideas, principles and suggestions described in this chapter are distilled from the author's 'insider' business experience as a change leader and 'outsider' business consultancy experience as a change facilitator. Both careers have been progressed against an academic backdrop of learning which enabled 'on the ground' practical business experience to be tested and compared with the 'in the classroom' theoretical knowledge, supporting the philosophical perspective that 'There can be no learning without action and no (sober and deliberate) action without learning" (Revans, 1983, 2016; McLoughlin, 2004).

The author has spent most time in the corporate world rather than the academic one and, as such, there may be both conscious and unconscious biases favoring intuition, pragmatism and practicality rather than rigor, idealism and perfection. This perspective recognizes the differences between the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

business practitioner and business academic worlds. Notwithstanding, the author has sought to apply a practitioner approach which is largely evidence-driven rather than over relying on personal experience, gut feel and intuition.

In today's evolving world of business, the quality of executive leadership can make or break the success and sustainability of any organization. Organizations with high quality, highly effective strategic leaders are more likely to outperform their competitors in key metrics such as quality of products and services, employee engagement, customer satisfaction and financial performance. That being the case, the ways in which organizations develop and improve their leaders is critical to effective strategic organizational change.

In concluding, the author proffers that strategic leadership development needs to change to keep pace with the external environment it operates within. Investment is significant yet effectiveness and value is difficult to gauge. There is a need for a more defined focus to ensure content and cultural alignment to organizational purpose, vision, mission and strategic execution. Leadership work overload often gets in the way of sustainable development and the impact of personality in managing pressure is largely ignored.

To overcome these barriers to effectiveness it is recommended that rigorous pre and post evaluation is undertaken; strategy development is aligned more closely with leadership development; development delivery is designed on a continuum learning wave so as to achieve sustainable development and tangible ROI investments, and a framework of a personal, team and organizational development focus is linked to specified outcomes vertically and horizontally throughout the organization. It is proposed this evidence-based approach will create 'best fit' strategic leadership development and achieve successful organizational change and a positive impact on the bottom line.

REFERENCES

Avolio, B. J. (2011). *Full range leadership development* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc. doi:10.4135/9781483349107

Avolio, B. J., & Bass, B. M. (2004). *Technical research manual: The Multifactor Leadership Questionnaire* (3rd ed.). Redwood, CA: Mind Garden, Inc.

Bass, B. M. (1985). *Leadership and performance beyond expectation*. New York, NY: Free Press.

Bass, B. M. (1997). Does the transactional – transformational leadership paradigm transcend organizational and national boundaries? *The American Psychologist*, *52*(2), 130–139. doi:10.1037/0003-066X.52.2.130

Bass, B. M., & Avolio, B. J. (1993). Transformational leadership: A response to critiques. In M. M. Chemers & A. R. Ayman (Eds.), *Leadership theory and research perspectives and directions* (pp. 49–80). San Diego, CA: Academic Press.

Bass, B. M., & Avolio, B. J. (1997). *Full range leadership development: Manual for the Multifactor Leadership Questionnaire*. Palo Alto, CA: Mind Garden Inc.

Bass, B. M., & Riggio, R. E. (2006). *Transformational Leadership* (2nd ed.). Harlow, UK: Taylor & Francis Group.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Building Societies Association. (2016). *Factsheet*. Retrieved February, 2018 from https://www.bsa.org.uk/about-us/members-of-the-bsa?page=5

Building Societies Association. (2017). *List of Building Societies*. Retrieved February, 2018 from https://www.bsa.org.uk/

Burke, W., & Litwin, G. A. (1992). Causal model of organizational performance and change. *Journal of Management*, *18*(3), 523–545. doi:10.1177/014920639201800306

CMI & the Conference Board. (2015). *CEO Challenge.* Retrieved February, 2018 from https://www.conference-board.org/ceo-challenge2015/

Critchlow, M. (2018). *Resilience Quotient Inventory*™ (Short Version). Thrive Training Ltd. Retrieved June, 2018 from https://www.thisisthrive.com/resilience-quotient-inventory-rqi

Cummings, T. G., & Worley, C. G. (2014). *Organization, development and change* (9th ed.). Mason, OH: South Western Cengage Learning.

Department for Business, Innovation, & Skills. (2009). Engaging for success: Enhancing performance through employee engagement. A report to Government by David MacLeod & Nita Clarke. Crown copyright BIS/Pub8859/07/09NP. URN09/1075. London, UK: BIS.

Deutsch, H. (2017). *The Holistic Organizational Effectiveness Survey*. Quantisoft. Retrieved February, 2018 from http://www.quantisoft.com/Industries/OrganizationalEffectiveness.htm

Hamlin, R. G. (2001). A review and synthesis of context and practice. In B. Hamlin, J. Keep, & K. Ash (Eds.), *Organizational change and development: A reflective guide for managers, trainers and developers* (pp. 13–38). Harlow, UK: FT Prentice Hall.

Hamlin, R. G. (2002). In support of evidence-based management and research-informed HRD through HRD professional partnerships: An empirical and comparative study. *Human Resource Development International*, *5*(4), 467–491. doi:10.1080/13678860210122643

Hamlin, R. G. (2006). *HRD professional partnerships: Case study examples of collaborative partnership-research and evidence-based practice.* Working Paper Series 2006. University of Wolverhampton. Retrieved February, 2018 from http://www.wlv.ac.uk/media/wlv/pdf/uwbs-wp004-06-hamlin.pdf

Hamlin, R. G., & Cooper, D. J. (2005). *Identifying the criteria of managerial and leadership effectiveness within the Birmingham Women's Healthcare NHS Trust through HRD professional partnership research.* Working paper series 2005. Number WP010/04. University of Wolverhampton Business School.

Hamlin, R. G., & Stewart, J. D. (2011). What is HRD? A definitional review and synthesis of the HD domain. *Journal of European Industrial Training*, *35*(3), 199–220. doi:10.1108/03090591111120377

Hogan, R., & Kaiser, R. B. (2005). What we know about leadership. *Review of General Psychology*, *9*(2), 169–180. doi:10.1037/1089-2680.9.2.169

Hogan Assessment Systems. (2015). *Validity of the Hogan personality inventory and Hogan development survey for the leader BASIS*. Tulsa, OK: Hogan Assessment Systems.

Hogan Assessment Systems. (2016). *Industry case studies*. Tulsa, OK: Hogan Assessment Systems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Johansen, R. (2011). *Leaders make the future: Ten new leadership skills for an uncertain world*. Oakland, CA: Berrett Koehler Publishers Inc.

Joiner, B., & Josephs, S. (2006). *Leadership agility: Five levels of mastery for anticipating and initiating change*. New York, NY: John Wiley & Sons, Inc.

Kontoghiorghes, C., Awbrey, S. M., & Feurig, P. L. (2005). Examining the relationship between learning organization characteristics and change adaption, innovation, and organizational performance. *Human Resource Development Quarterly, 16*(2), 185-212. doi: 1 doi:10.1002/hrdq.1133

Kotter, J. P. (1996). *Leading change*. Boston, MA: Harvard Business School Press.

Kotter, J. P. (2008). *A sense of urgency*. Boston, MA: Harvard Business Press.

Kotter, J. P. (2014). *Accelerate: Building strategic agility for a fast moving world*. Boston, MA: Harvard Business School Publishing.

Kotter, J. P., & Cohen, D. S. (2002). *The heart of change. Real-life stories of how people change their organizations*. Boston, MA: Harvard Business School Press.

KPMG. (2016). *Now or never. CEOs mobilize for the fourth industrial revolution. US CEO Outlook 2016*. Amstelveen, The Netherlands: KPMG International.

Lombardo, M. M., & Eichinger, R. W. (1996). *The career architect development planner* (1st ed.). Minneapolis, MN: Lominger.

Mann, K. (2016, July 3). The Northern Powerhouse is ship-shaped in Liverpool. *The Telegraph*. Retrieved from https://www.telegraph.co.uk/business/2016/07/03/the-northern-powerhouse-is-ship-shaped-in-liverpool/

Martins, N., & Coetzee, M. (2009). Applying the Burke–Litwin model as a diagnostic framework for assessing organisational effectiveness. *SA Journal of Human Resource Management, 7*(1). doi:10.4102ajhrm.v7i1.177

McLoughlin, D. (2004). There can be no learning without action and no action without learning: A case study. *European Journal of Marketing*, *38*(3/4), 433–445. doi:10.1108/03090560410518639

Metanoia Institute. (2018). *MSc in organisational development: A gestalt perspective (leading and facilitating transformative change in a volatile and complex world).* Retrieved from http://www.metanoia.ac.uk/programmes/special-interest/msc-in-organisational-development-a-gestalt-perspective-leading-and-facilitating-transformative-change-in-a-volatile-world/

Micklethwaite, J., & Wooldridge, A. (1996). *The witch doctors*. New York, NY: Crown Business.

Miles, R. E., & Snow, C. C. (1978). *Organizational Strategy, Structure, and Process*. New York, NY: McGraw-Hill.

Phillips, K., & Shaw, P. (1989). *A consultancy approach for trainers*. Aldershot, UK: Gower.

PwC. (2018). *21st CEO Survey: The anxious optimist in the corner office.* Retrieved from https://www.pwc.com/ee/et/publications/pub/PwC%20Global%20CEO%20Survey%202018.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Revans, R. W. (1983). Action learning: Its terms and character. *Management Decision*, *21*(1), 39–50. doi:10.1108/eb001310

Revans, R. W. (2016). *ABC of action learning*. Abingdon, UK: Routledge.

Swaim, R. W. (2010). The strategic Drucker: Growth strategies and marketing insights from the works of Peter Drucker. Clementi, Singapore: John Wiley and Sons (Asia) Pte. Ltd.

Turner, P. S. (2010). *Aligning organizational coaching with leadership behaviour* (Doctoral dissertation). Retrieved from http://www.paulturnerhr.co.uk/id30.html

Turner, P. S. (2012). A strategic approach to coaching in organisations: A case study. *The International Journal of Mentoring and Coaching*, *10*(1), 10–26.

Turner, P. S. (2015a). Purpose driven leadership. In A. Wilkinson & S. Johnstone (Eds.), *Encyclopedia of Human Resource Management* (pp. 357–358). Northampton, MA: Edward Elgar Publishing, Inc.

Turner, P. S. (2015b). Transformational leadership. In A. Wilkinson & S. Johnstone (Eds.), *Encyclopedia of Human Resource Management* (pp. 453–454). Northampton, MA: Edward Elgar Publishing, Inc.

Turner, P. S. (2016a). *CEO strategic priorities – innovation is top priority*. Retrieved from http://www.collingwoodsearch.co.uk/our-insights/board-insights/ceo-strategic-priorities/

Turner, P. S. (2016b). *Strategic leadership development – evaluation and effectiveness*. Retrieved from http://www.collingwoodsearch.co.uk/strategic-leadership-development-evaluation-effectiveness/

Turner, P. S. (2017). *The power of purpose*. Retrieved from http://www.deltavpartners.com/wp-content/uploads/2017/07/the-power-of-purpose.pdf

Turner, P. S. (n.d.). *The secrets of organisational coaching*. Available from https://www.amazon.co.uk/Secrets-Organisational-Coaching-Paul-Turner-ebook/dp/B00EKQ3GEW

This research was previously published in Evidence-Based Initiatives for Organizational Change and Development; pages 261-282, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 89
Organizational Change and Development:
The Case for Evidence-Based Practice

Robert G. Hamlin
University of Wolverhampton, UK

ABSTRACT

This chapter first discusses the complexities of change in organizations and why so many OCD programs fail and makes the case for change agents to become evidence-based in their change agency practice. The author then offers a definition of evidence-based organizational change and development (EBOCD) and outlines the types of "best evidence" that can be used to inform and shape the formulation and implementation of OCD strategies and to critically evaluate the associated processes and change agency practices. Various distinctive evidence-based initiatives for OCD are discussed and several case examples from the United Kingdom are presented. The chapter closes with a discussion of the specific merits of "design science," "professional partnership" research, and "replication" research.

INTRODUCTION

Since the 1980s, organizations in all organizational sectors have had to react to huge environmental pressures for change, the main drivers of which have been: *Technology*, particularly IT; *Governments*, which in all parts of the globe have until recent times increasingly embraced notions of deregulation, privatization and free trade; and *Globalization*, where private sector companies have had to compete more aggressively, and public sector organizations have had to deliver more value for money services and products (see Barkema, Baum, & Mannix, 2002; Champy & Nohria, 1996; Dess & Picken, 2000; Smith, Lewis & Tushman, 2016; Yukl, 2006). These pressures have resulted in mergers, acquisitions, amalgamations, decentralization, flatter structures, downsizing, multidimensional restructuring, increased flexible work practices, drives on quality and value, greater emphasis on customer/client/consumer orientation and care, and increasing stress levels at work (see, for example, Hamlin, 2001a; Gunnigle, Lavelle & Monaghan,

DOI: 10.4018/978-1-7998-7297-9.ch089

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2013; Shook & Roth, 2011). Furthermore, since the early 2000s most organizations have been operating increasingly in VUCA (volatile, uncertain, complex, ambiguous) environments where: *Volatile* refers to the pace of change which is rapid and unrelenting, and the associated challenges which are unexpected or unstable; *Uncertainty* refers to the difficulty in getting clarity and certainty about what is going on in business contexts through incomplete or insufficient information, which is complicated by opposing views and opinions; *Complexity* refers to the many interconnected parts and variables that can have a 'cause-effect' impact in a given situation, and to the volume or nature of the available information that can be overwhelming to process thus making diagnosis difficult; and *Ambiguity r*efers to causal relationships which are completely unclear because no precedents exist and leaders/managers are faced with 'unknown unknowns' (see Bennett & James Lemoine, 2014; Mack, Khare, Kramer & Burgatz, 2016).

In response to these trends of change, most executives in the 21st century recognize that their respective organizations need to adapt continuously to constantly changing environments. However, they tend to struggle with the transformational changes that are necessary for ensuring the survival of their respective organizations, or they fail to raise their game to the higher levels of performance that are required (Rogers, Shannon, & Gent, 2003). Therefore, when they initiate programs of organizational change and development (OCD) they tend to rely on lower level managers to facilitate and implement the change processes. Thus, in a very real sense, most managers in most organizations are agents of change (Axley, 2000). Furthermore, in some organizations where the modern-day conceptualization of human resource development (HRD) is well embedded into the fabric of managerial thinking and management practice, managers proactively use the services of HRD colleagues possessing strong change agency capabilities to help them formulate and implement OCD plans, strategies and interventions. In so doing they treat them as 'strategic partners', just as they do with external OD specialists and management consultants whose change agency services they use.

However, as I have discussed elsewhere, "one of the major challenges facing contemporary managers and HRD professionals is how best to help people through the transitions of change, and to survive or thrive in working environments that are in a constant state of flux." (Hamlin, 2016a, p.121). Hence, this chapter is concerned with: (a) the challenges that confront managers and the various 'strategic partners' they turn to for help in bringing about effective and beneficial organizational change, and (b) the practical contribution that management research and specific OCD-related research can make toward improving the efficacy of their respective change agency endeavors. The specific purpose can be summarized as follows:

1. To outline the extent to which organizational change programs fail and why they fail.
2. To argue that managers and their strategic partners should adopt an 'evidence-based practice' (EBP) approach to organizational change agency.
3. To highlight certain obstacles to 'evidence-based' OCD, and to describe and illustrate how these may be overcome through 'professional partnership' research and empirical generalization 'replication' research respectively.
4. To highlight and discuss other 'evidence-based' initiatives for facilitating effective and beneficial OCD programs.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

BACKGROUND

Although it may be widely recognized that most managers in most organizations are to a greater or lesser extent agents of change, this cannot be assumed to be the case for most HRD practitioners. However, as Stewart (2015) claims, modern-day HRD professional practitioners are change-agents skilled in advising and helping managers with the facilitation of OCD programs, either in their capacity as a colleague or as an external consultant. Indeed, Stewart and others have argued that HRD is of itself a strategic function which, when fully utilized, can have a significant impact on the survival and long-term business success of organizations (see Fredericks & Stewart, 1996; Stewart & McGoldrick, 1996). This view is reflected in an 'all-embracing', 'catch-all', 'composite' but 'non-definitive' statement of HRD offered by Hamlin and Stewart (2011) which asserts that, in essence, *"HRD encompasses processes, activities or interventions" which "enhance organizational and individual learning, develop human potential, improve or maximize effectiveness and performance at either the individual, group/team and/or organizational level, and/or bring about effective, beneficial personal or organizational behaviour change and improvement"* (p. 213*)* within, across, and/or beyond the boundaries of private, public and third sector organizations, entities, and other types of host system. This understanding of HRD is consistent with Phillips and Shaw's (1989) 'consultancy approach for trainers' which involves HRD practitioners increasingly operating not only as 'training consultants' and 'learning consultants' but also as 'organizational change consultants'. Thus, both in theory and practice, the contribution of appropriate HRD consultancy type practices can be a major influence on the interplay of culture, leadership, and commitment of employees through: a) shaping organizational culture; b) developing current and future leaders; c) building commitment among organization members; and d) anticipating and managing responses to changed conditions (Gold, Holden, Iles, Stewart, & Beardwell, 2009). This view accords with McKenzie, Garavan and Carbery's (2012) observation that "the shift from operational and tactical HRD to *strategic* HRD has witnessed a metamorphosis for HRD practitioners increasingly becoming partners in the business tasked with aligning people, strategy, and performance rather than simply promoting learning and development" (p. 354). It also chimes with Kohut and Roth's (2015) view that "HRD practitioners and scholars need [increasingly] to enter the fray of the discussion on change management" (p. 231).

As happened during the last three decades of the 20th century, the need for managers to initiate and facilitate 'organizational change' (OC) and 'organization development' (OD) programs effectively and beneficially in the 21st century is increasing in frequency, pace, and complexity (see Hamlin, Keep & Ash, 2001). In this context, a major challenge facing modern day managers and HRD professional practitioners is how best to help staff cope effectively within working environments that are in a state of constant flux and with the transitions of major change programs. Unfortunately, many OCD programs fail because managers and their HRD colleagues, as well as many external professional change-agents (e.g. OD specialists, management consultants, executive coaches, etc.) whose services are used in support roles, find themselves unable to rise to the challenge. However, for those organizations that do facilitate OCD programs effectively and beneficially, change initiatives become welcomed as opportunities for increasing efficiency and for building new organizational success.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

MAIN FOCUS OF THE CHAPTER

This section explores the reasons for the failure of so many OCD programs, and then discusses the case for EBP approaches to OCD change agency.

Past and Current Failure Rates of OCD Programs

It is of crucial importance to all those who have a stake in the success of an organization that OCD processes are managed effectively and beneficially. Sadly, the success rates of planned OC strategies have been poor with over two thirds or more of OC and OD programs having failed to achieve their intended aims (Beer & Nohria, 2000; Burnes, 2004; Choi & Ruona, 2011; Stanford, 2016; Szabla, 2007). As I have claimed elsewhere, based on a comprehensive review and synthesis of OCD context and practice that I conducted in 2001, "the majority of 'downsizing' and 'delayering' initiatives were unsuccessful, with few ever reaching the aimed for goals of increased competitiveness and profitability, and with many ending up with lower profit margins and poorer returns on assets and equity than achieved by equivalent firms that had not downsized" (Hamlin, 2016a, p.122). Furthermore, based on a review of more recent literature "downsizing (now more frequently referred to as 'right sizing') brings with it largely negative outcomes that adversely affect the entire workforce in a profound manner" which include, for example, "the destruction of morale and organizational commitment; decreased levels of productivity, efficiency, job performance, innovation, employee effort and quality of work, and increased levels of staff absenteeism, staff turnover, sabotage, fraud, embezzlement and theft (see Fong & Kleiner, 2004; Gandolfi, 2006; Nutt, 2004; Thornhill, Lewis, Millmore, & Saunders, 2000)" (In Hamlin, 2016a, p. 122). Similarly, during the 1980s and 1990s, over 50% of Business Process Re-engineering (BPR) and Total Quality Management (TQM) programs were reported as having failed, with a further 20% or more failing to produce the full benefits (Hamlin, 2001a). As will be discussed later, there is little contemporary evidence to indicate there has been any substantial increase in the success rate of OCD programs during the first two decades of the 21st century. However, although the historical success rate of IT-related change programs has been dismal with less than 30% of new project investments succeeding in meeting their performance goals (see Hamlin, 2001a; Sirkin, Keenan, & Jackson, 2005), in the USA the success rates have increased somewhat over time-from 27% in 1996 to 39% in 2012 (Standish Group, 2013).

According to Pfeffer and Sutton (2006), most organizational mergers fail to deliver the expected benefits; instead, the ways they are facilitated tend toward a destruction of the combined economic value of the merged businesses. Walker and Price (2000) had earlier suggested that such failures are caused not so much by financial issues but rather by the incompatibility of the merging cultures, the clashing of management styles, and the lack of skill of those managers implementing the change. Furthermore, they argue that these problematic issues are not addressed early enough or effectively enough in the merger process.

Recent literature also reports that overall 70% or more of rightsizing, mergers acquisitions, and other types of organizational change programs, either fail or are just partially successful, and that the workplace challenges posed by OCD initiatives typically have a negative impact on employees (Carnall & Todnem By, 2014; Shook & Roth, 2011; ten Have, ten Have, Huijsmans, & Otto, 2017). However, the volume of empirical evidence supporting such reports has been questioned by Hughes (2011) who claims that the 70% OC failure rate rhetoric has been informed more by magazine articles and practitioner books than by academic studies. Indeed, as Candido and Santos (2015) revealed from their comprehensive

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

review of the literature, recorded failure rates of OC programs have spanned from as low as 7% to one as high as 90%, with some rates having been derived from outdated or fragmentary empirical evidence lacking in scientific rigor, or based solely on subjective opinion. Nevertheless, they argue that strategy implementation failure is a persistent problem which remains an important and ongoing concern for researchers and practitioners.

However, as Stanford (2016) observes, although leaders, talent management professionals and others within organizations may realize that change is needed, they often fail to grasp the complexity of what change management entails. Furthermore, they tend not to recognize that their expectations are not aligned with what is feasible within the organization, particularly when the change leaders fail to take the time necessary to understand the scope of the change, the involved stakeholders, the environmental complexity, and the impact of the change from a systems perspective. Unfortunately, many OCD programs fail badly with unintended and damaging consequences which increasingly take a psychological toll on both the 'victims' and the 'survivors', not least the surviving managers (see Hamlin, 2001a; Hareli & Tzafrir, 2004; Worrall & Cooper, 1997-2001, 2007).

From the foregoing it is unarguably the case that too many organizational change initiatives fail and/or lead to outcomes that are largely negative. As I have claimed elsewhere, the "weight of evidence suggests that the process issues associated with formulating and implementing organizational change initiatives are far more complex and difficult than is often supposed, and that both managers and HRD practitioners [and those other OCD-related strategic partners] are generally insufficiently skilled in the practice of organizational change agency" (Hamlin, 2016a, p.123).

Reasons for OCD Program Failure

Bearing in mind the plethora of books on 'organizational change management' authored by management consultants and high-profile academics who offer 'how to' advice and guidance, it is surprising that so many OCD programs fail. Some of the books can be criticized for being too pragmatic, prescriptive, or simplistic, whilst others for being too theoretical and philosophical. All can be of some help when change agents are thinking through the issues that need to be considered, and/or when they are developing and implementing an OCD intervention strategy. Many of these books describe 'planned change management' approaches based on Lewin's '*unfreeze-move-refreeze'* model and incorporate a processual 'stage by stage' procedure for managing the change. Drawing upon the various models offered in the 1990s, Hamlin (2001a) created a composite 'generic model for managing planned organizational change' comprised of six phases, adapted versions of which are as follows:

Phase 1: Diagnose/explore the current organizational state and define what the future organizational state should be
Phase 2: Create a strategic vision that gives focus to the intended direction of travel
Phase 3: Plan the change management strategy
Phase 4: Secure ownership, commitment and involvement from all stakeholders affected by the change, and ensure there is support from top management
Phase 5: Project manage the implementation of the strategy and sustain the momentum
Phase 6: Stabilize, integrate and consolidate to prevent regression and perpetuate the change

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The implicit assumption when managers and their strategic partners utilize any change management model is that they have the knowledge and expertise to apply it effectively. However, the rates of OCD program failure discussed in the previous section suggest they do not, and that most managers are perhaps deficient in the requisite change agency skills. Although most if not all offered models are basically sound with high face validity, in many cases their simplified diagrammatic/summary formats can appear overly simplistic and just plain common sense. Regrettably, this can lead to important phases being 'skipped' or to a lax application of the model; and this can be made worse by the manager's and his or her strategic partner's lack of change agency expertise. Based on a review of organizational change management studies from various researchers in the USA, the UK, and from various other European countries I have identified six root 'failings' of managers and HRD practitioners which help explain why OCD programs fail (Hamlin, 2001a). Five of these 'failings' relate to managers and the sixth to HRD practitioners, as follows:

Failing 1: *Managers not knowing the fundamental principles of change management.*

Managerial 'complacency' and 'ignorance' are two of the most significant factors which can contribute to the failure of OCD programs; yet this should not be the case when professionally qualified managers are acting in the role of a change agent. A significant reason for their failings can be attributed to insufficient attention having been given during their professional education and training to the 'soft stuff' of management, to the 'behavioral aspects' of change management, to the training and development of their people, and to the interpersonal communication skills required for managing change effectively. As various writers have claimed, much of what is taught and delivered in university business schools is not perceived to be part of the manager's real world, or of practical relevance (Bones, 2007; Mintzberg, 2004).

Failing 2: *Managers succumbing to the temptations of the 'quick fix' or 'simple solution'.*

Going through all six phases of the change process normally requires a substantial amount of time if the change strategy is to be implemented successfully. However, driven by 'short termism', many managers are tempted to adopt 'simple' or 'quick-fix' solutions that skip through the phases. Such approaches rarely deliver the results required, but instead lead to failure. As Kotter (1996) argues, although the skipping of phases can create the illusion of speed it never produces satisfying results; and omissions or critical mistakes in any of the phases can devastatingly impede or even negate further progress.

Failing 3: *Managers not fully appreciating the significance of the leadership and cultural aspects of change.*

The three factors that many expert commentators regard as most important in a fully functioning organization are 'the leadership', 'the culture' and 'the management of change'. In the absence of strong strategic/organizational leadership, and managers who lead effectively using the right style of supervisory leadership, OCD related initiatives and interventions designed to change and improve the organization will underachieve the desired outcomes and will most likely make things worse. To bring about significant organizational change requires the commitment of top management; but this needs to be clearly in evidence, consistent, and sustained throughout the change process. Additionally, managers need to recognize that if they pay insufficient attention to the cultural issues of change, the organization

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

could risk suffering from 'cultural lag'- a term coined by Bate (1996) to describe the condition when a culture becomes 'out-of-fit' with the needs of the changing organization and thus impedes the change process. For OCD programs to succeed, adequate attention must be given to the 'cultural' issues and to the style and quality of the 'leadership' manifested by managers.

Failing 4: *Managers not appreciating sufficiently the significance of the people issues.*

In many OCD programs insufficient attention to the associated people issues is given by those who develop the change strategy and those who implement it. These issues include the psychological processes that employees experience in dealing with change and in coping with the change transition. Employees need to be enabled: a) to let go of the past ways of working and their memories of the old culture (*endings)* whilst holding on to certain still relevant aspects; b) to engage with the required new ways of working (*in-between time*), and c) to fully embrace the new direction and organizational culture (*new beginning*). This means managers need to understand the distinction between 'change' and 'transition' and recognize the critical importance of paying sufficient attention to the 'soft' human aspects in the change management process.

Failing 5: *Managers not knowing the critical contribution that the HRD function can make to the management of change.*

When managers strive to address the 'soft' human aspects of change management they tend not to use to best effect the services of HRD practitioners. This is despite the acknowledged critical importance of preparing employees adequately for change by giving sufficient time to training them (Cornell HR Review, 2013). The reason for the omission is because too many managers and HR professionals view HRD as one of many sub-sets of administrative activities that constitute the HR function, with the training specialism responsive only to immediate knowledge and skill deficits. Indeed, for many if not most organizational leaders, HRD does not register very much on their radar screens and is very much a third or fourth order consideration (Gold, Rogers, & Smith, 2003). Furthermore, this is exacerbated by the fact that although HR has long been claimed to be strategic in focus, evidence suggests it remains more rhetoric than reality (Hamlin, 2001a; Power, 2011). As Power observes, it is hard to find leaders of the HR function who are active in helping their organization improve the way it works, and this is because: a) top management often view HR as an expense with a transaction focus rather than an adding value contribution with a strategic focus; b) historically HR has been mainly engaged in personnel, compliance, and transactions, and c) HR professionals without operational experience have less credibility and are not comfortable giving operational advice.

However, as discussed briefly above, and in considerable depth elsewhere (Hamlin, 2001a, 2002), it has long been the case that various HRD professional practitioners have practiced at a strategic level, have made pivotal contributions towards the achievement of organizational effectiveness and success, and have helped create the critical capabilities and competencies required for the organization to change and develop. Unfortunately, "many managers have 'blind spots' regarding HRD, seeing it only in terms of high-cost external training courses, or long-term development/qualification programmes for young and new employees" (Hamlin, 2001a, p. 27). Furthermore, managers remain largely ignorant of modern day conceptualizations of *strategic* HRD. Yet there are HRD implications implicit in all organizational change whether at the individual, group, or organization level. As Hamlin also argues:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

For every change, both large and small, either 'new' knowledge, attitudes, skills and habits (KASH) have to be acquired, as in the case, for example, when new products, services, technologies, structures or systems are introduced; or alternatively 'existing' knowledge, attitudes, skills and habits must be re-distributed, as in the case of downsizing or when mergers or acquisitions take place. Unless the KASH gaps flowing inevitably from organizational change initiatives are bridged efficiently and effectively, whether at the organizational, group or individual level, the organization will not develop the critical capabilities [and competencies] required to make a successful transition from an [undesired] present state to the new [desired] future state. (Hamlin, 2001a, p. 27)

The extent to which appropriate HRD effort is incorporated into OCD programs will critically determine whether a planned change program succeeds or fails. Hence, for managers to be in control of OCD initiatives they must be 'learning focused', which means being in control of the KASH issues associated with change itself. Thus, sufficient time and attention needs to be given to the 'soft' HRD aspects of managing the change process (Hamlin, 2001a, 2002; Ning & Jing, 2012; Thornhill et al., 2000). For managers to manage change effectively and beneficially they need consciously to incorporate HRD into the very 'fabric' of their everyday management practice, and to use it as a tool for managing change. However, if they have not already done so, they need to stop thinking of HRD merely as traditional 'training and development', and instead recognize the 21st century understanding of the whole HRD domain of study and practice, as reflected in the following definition:

Contemporary HRD is: the study or practice concerned with the diagnosis of performance-related behaviour change requirements at the individual, group and organizational level within any host entity, and the design, delivery and evaluation of formal and/or informal learning activities to meet the identified needs. (Copyright © r.g.hamlin, 2017)

The sixth failing relates to HRD practitioners in general:

Failing 6: *Trainers and developers lacking credibility in the eyes of line managers.*

Historically, many if not most HRD practitioners have lacked high 'credibility' in the eyes of line managers. For some, this has not been helped by being part of HR departments which have also lacked status due to: a) the dominant focus on personnel administration, and b) line managers being frustrated with their experience of HR staff who are too rigid, do not understand the business, and who seem always about to say 'no' when they need them to figure out how to make things work (Hamlin, 2001a; Cardillo, 2012). Thus, managers have placed uniformly low role expectations on the HR function (Thornhill et al., 2000; Ulrich, 1997), and by association also on the HRD function. Additionally, this lack of credibility has been exacerbated in countries such as the USA where HRD-related postgraduate professional qualifications offered by universities are predominantly delivered by Schools of Education rather than by Schools of Business or Management as in the UK. In those countries, HRD practitioners are often perceived more as 'adult educationalists' or 'specialized teachers/instructors' rather than as 'people and organization development specialists'. Furthermore, as Gubbins, Harney, van der Werff and Rousseau (2018) suggest, the HRD function has not yet made sufficient inroads in demonstrating its ability, competence and value from a business and management perspective, and the perception of many if not most executives and managers is that the costs of HRD outweigh the benefits. Consequently, it behoves all

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

HRD professionals, both practitioners and scholars, to become concerned with the mainstream business and management of organizations if they are to maximize their contribution to organizational effectiveness and sustainable business success (see Stewart & Hamlin, 1990).

One of the most significant ways of achieving this is to engage in the change management process of: a) initiating and conducting organization wide performance diagnostic 'health' checks to identify required changes and the concomitant learning and development needs at the individual, group, and organizational level, b) providing 'expert' advice on how best these needs should be met; c) taking or recommending appropriate action to meet these needs, and/or to needs relating to 'top down' organizational change initiatives; and d) developing the ability and skills of managers and others to facilitate the associated change processes, and to handle effectively the intended and unintended consequences of the planned changes. But to do so, much depends upon how successful they can be at improving their 'credibility' in the eyes of line managers. Hence, it is incumbent upon HRD professional practitioners to 'sell' themselves as worthy strategic business partners of managers in the formulation and implementation of OCD programs.

Unfortunately, traditional approaches to the education, training and development of managers have not addressed adequately the five manager-related OCD 'failings' outlined above. Although some in-house and commercial management and leadership development (MLD) programs are effective, many others are not and result in little or no noticeable change or improvement in managerial effectiveness and performance (see Alimo Metcalfe & Alban Metcalfe, 2003; Collins & Holton, 2004; Gurdjian, Halbeisen, & Lane, 2014; Hamlin, 2010). Furthermore, as previously mentioned, much of what is delivered on management and leadership in business schools is not perceived to be part of the manager's 'real world' or of practical relevance (Bones, 2007; Mintzberg, 2004). Hence, the 'leadership' and 'culture' manifested in many organizations are not conducive for HRD professional practitioners to operate strategically as change agents.

More recently, informed by their empirical research, Burnes and Jackson (2011) have argued that a significant reason for the failure of so many change [OCD related] initiatives is the lack of alignment between the values held by those organizational members undergoing the change, the values that underpin the objectives and content of the change intervention, and the value system of the selected approach and processes by which the OCD is facilitated and managed. As these writers have claimed, the difference between the values may explain many of the problems that can arise during an OCD initiative, and "the value system alignment may be an important factor in the success of organizational change initiatives." (Burnes & Jackson, 2011, p.133) (See also Chapter 11 of this book).

The Case for Evidence-Based Organizational Change and Development

Drawing upon the views of numerous well-respected writers, I have argued in the past that for managers, trainers, and developers (including other 'people and organization developers' such as OD specialists and executive coaches) to become truly expert, they need to use the findings of high quality 'management' and 'HRD-related' research to inform, shape, and evaluate the effectiveness of their change agency practice (Hamlin, 2001b). More recently, I and other authors have argued that HRD professional practitioners should strive to become more critically reflective and truly evidence-based so as to improve their effectiveness and credibility in the eyes of senior executives and managers (Gubbins, Harney, van der Werff & Rousseau, 2018; Hamlin, 2007; Holton, 2004; Kearns, 2014). Similarly, Rousseau and Barends (2011) have argued the case for HR [HRM] practitioners in general to become evidence-based, and Grant

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(2003) has called for evidence-based approaches to practice in the field (and business) of professional coaching. Subsequently, Grant coined the term *evidence-based coaching* to 'distinguish between professional coaching that is explicitly grounded in the broader empirical and theoretical knowledge base, and coaching developed from the "pop psychology" personal development genre' (see Stober & Grant, 2006). According to the latter writers, applying evidence to coaching practice allows for improved practice; and understanding is a valuable aim in the development of coaching as a discipline.

Similar calls have been made for managers and leaders to advance their professional practice using high quality research to become evidence-based practitioners, and there are many advocates of evidence-based management (EBMgt) including Axelsson (1998), Brewerton and Millward (2001), Briner, Denyer and Rousseau (2009), Latham (2009), Pfeffer and Sutton (2006), Rousseau (2006, 2012), and Stewart (1998). Bearing in mind the various understandings of the term 'evidence-based practice' (EBP) within different occupational fields, including medicine, nursing, healthcare, and management, I offered in 2002 a working definition for *'evidence-based HRD'* as follows:

Evidence-based HRD is the conscientious, explicit and judicious use of current best evidence in making decisions about the development of individuals, groups, and organizations, integrating individual HRD practitioner expertise with the best available external evidence derived from systematic research. (Hamlin, 2002, p. 97-98)

Now, based on my past and current on-going personal experience of using research to inform, shape and evaluate HRD, as well as my understanding of what is currently happening in other fields, I have concluded that 'best evidence' in support of evidence-based human resource development (EBHRD) could and should include: a) Mode 1 research which is concerned with *conceptual knowledge* production and the testing of theory, b) Mode 2 research which is concerned with *instrumental knowledge* production to solve real-life problems, and in some cases contribute to theory development, and c) individual descriptive studies or the consensus of experts in the field. Thus, as in the field of medicine, the concept of EBP in the HRD domain including OCD does not need to be predicated on bodies of 'best evidence' derived solely from 'normal science' (Kuhn, 1996) based on positivist philosophical/paradigmatic assumptions. Instead, lesser strengths of 'best evidence' can be used including the findings of any good/high quality research that has been based either a) on the ontological and epistemological assumptions and methodologies/methods privileged by any one of the four main research paradigms, namely: '*Positivism/Functionalist'*; '*Post positivism/Radical structuralist'*; '*Critical-idealogical/Radical humanist'* and '*Constructivism-interpretivism',* or b), on the philosophical choices of particular researchers who are guided by pragmatism and the 'pragmatic approach' (Morgan, 2007) which allows the nature of the particular research purpose and the posited research questions to determine the particular paradigmatic assumptions to be adopted, whether for 'mono-method' or 'mixed-method' research designs (see also Hamlin, 2015). Furthermore, following the example of what applies in the field of EBM, other types of lower strength 'best evidence' can be used including: a) 'descriptive studies and/or self-report stories' and 'the opinion of respected authorities or expert committees without additional data', which are regarded as the weakest types of evidence in EBMgt (Reay, Berta, & Kohn, 2009), and b) 'situated expertise' based on the proficiency and judgment that individual managers acquire through experience and practice (Morell, 2008). These various understandings of what can constitute the differing strengths of *best evidence* are consistent with Tourish's (2013) view that evidence-based managers should "make use of a wide range of evidence types-including qualitative and quantitative research, case studies, journalistic

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

accounts and anecdotes" (p.13); and with the opinions of various other experts as reported in Rynes and Bartunek (2017) who argue that "a much broader view of evidence must be taken for many of the problems confronted in EBMgt if advocates hope for a positive reception by practitioners and non-positivist researchers" (p. 251).

Thus, in the absence of large and significant extant bodies of relevant Mode 1 and Mode 2 research in the field of 'evidence-based' OCD practice, there is a strong need for gathering from nationally and internationally renowned OCD practitioners such as the contributors to Section 2 and Section 3 of this book who offer and critically reflect upon examples of *situated expertise* regarding what works and does not work in practice. From such evidence 'new' generic insights and common lessons about effective and ineffective change agency practice can often be identified.

Coupled with the insights gained and lessons learned in 2001 from the 'reflections on practice' of eighteen research informed managers, trainers, and developers who had facilitated significant OCD programs within a diverse range of private, public and third sector organizations in the UK, Ireland and the Netherlands, as reported in Hamlin, Keep and Ash (2001), I concluded that *critical reflection* is a very important feature of evidence-based change agency. However, to give recognition to the fact that *action research* had been an integral and essential part of the change management process of some of the afore-mentioned 'reflections on practice' case histories of OCD programs, I offered subsequently a working definition of what I termed *'research-informed HRD',* as follows:

Research-informed HRD is the conscientious and explicit use of research findings and the research process to inform, shape, measure and evaluate professional practice. (Hamlin, 2002, p. 98)

This conceptualization of 'research-informed HRD' can be regarded as an aspect of Hamlin's (2002) working definition of 'evidence-based HRD', and is also reflected in the definition of evidence-based management (EBMgt) as offered by Briner, Denyer and Rousseau (2009):

Evidence-based management is about making decisions through the conscientious, explicit, and judicious use of four sources of information: practitioner expertise and judgment, evidence from the local context, a critical evaluation of the best available research evidence, and the perspectives of those people who might be affected by the decision. (p. 19)

The argument that managers and HRD professional practitioners should be critically reflective and evidence-based in their professional practice is compelling bearing in mind the increasing complexities, contradictions and paradoxes of organizations which make the tasks of facilitating OCD complicated (Hatton, 2001; Vince, 2014). These tasks invariably include the taking of action to: a) understand and make sense of the organization and what is going on; b) formulate appropriate well-informed change strategies; c) implement these strategies effectively and efficiently; d) critically evaluate the effectiveness of the change process; and e) reflect critically upon their own professional practice to draw lessons for the future. Some commentators have argued that there is nothing difficult or intellectually demanding about managing and facilitating major change, and that what needs to be done is usually obvious (Rogers et al., 2003). However, organizations and the people employed within them are far more complex than can often be inferred from much of the change management literature. Furthermore, the proffered 'solutions' to OC 'problems' are also more difficult to grasp than many practitioner 'experts' imply.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To meet the challenge of implementing complicated change agency tasks caused by the potential complexities, contradictions and paradoxes of OC settings, evidence-based managers and evidence-based HRD practitioners (including OD consultants and executive coaches) need increasingly to consider: a) adopting *action research* approaches to OCD, and b) using not only the findings of extant Mode 1 'scientific research' but also conducting (or instigating) internal Mode 2 'applied research' for the purpose of better informing, shaping, and evaluating their change agency practice. Furthermore, regardless of the approach they adopt to facilitate an OCD program, they need in general to build into their planned change agency activities sufficient time for review and critical reflection. From such reflection new theoretical insights can be gained as to why particular aspects of OCD programs succeed or fail. Furthermore, new ways of approaching the problems of change may emerge through the development of 'lay theories' informed by their own professional practice. These are the types of key lessons that resulted from the practitioner 'reflections on practice' reported by Hamlin (2001b) in Hamlin, Keep and Ash (2001). The practical importance of internal/in-company Mode 2 research, and in particular 'design science' research as defined by van Aken (2005, 2007) and advocated by this and various other writers (Hamlin, 2007; Kuchinke, 2013; Sadler-Smith, 2014) to generate *instrumental knowledge* to better understand the change context and help solve context-specific real-life problems, cannot be over stated.

The case for evidence-based approaches to OCD practice is supported by the recent research of ten Have et al. (2017). These researchers examined the extent to which the assumptions underlying modern 'best practice' prescriptions and dominant beliefs about OC management practice are based on solid and convergent [scientific] evidence, and thus hold true in all or most change circumstances. Their research involved critically reviewing 23 of the top 100 bestselling 'popular press' books on change management, plus 31 other relevant books from which they identified 18 common assumptions that influence professional change consultants' approaches to change management practice. They found that 6 of these claims are not supported by any scientific evidence at all, which suggests these assumptions do not hold true; and the evidence supporting 7 of the other claims appear weak, limited, or conditional upon the described circumstances, which suggests these assumptions are only somewhat likely to be true. More details of ten Have et al.'s (2017) research will be found in Chapter 3 of this book. Their findings indicate that 'best practice' approaches to managing change are based mostly on assumptions that are either untrue or unlikely to be true. This brings into question the change agency effectiveness of many if not most managers and change consultants who rely on 'bestselling' books to inform and guide them on what works and does not work for managing change. Adopting change management prescriptions and beliefs based largely on invalid or only partially valid assumptions might explain why so many OCD interventions fail; and this provides a further argument for adopting 'evidence-based' approaches when facilitating OCD programs.

In summary, as I have asserted elsewhere (Hamlin, 2016a/b), if managers, HRD practitioners, and other professional 'people and organization' developers consciously use good/high quality Mode 1 and Mode 2 research, whether conducted from the philosophical perspective of a particular research paradigm or the pragmatic approach, or if they use other forms of lower strength 'best evidence' to help inform, shape, and evaluate their change agency practice, then it is more likely that their resulting 'evidence-based OCD' interventions will be more effective in bringing about beneficial change that leads to the intended desired state, rather than to an undesired and unintended state (see Figure 1). In support of this assertion, I have offered a working definition of 'evidence-based OCD' as follows:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

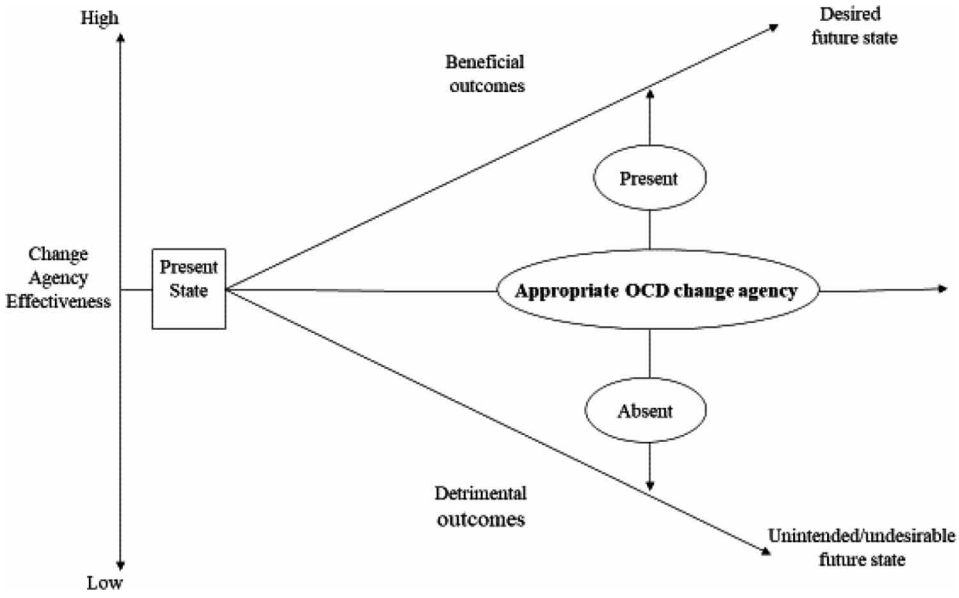
Evidence-based OCD is the conscientious, explicit and judicious use of current best evidence and/or of action research to inform, shape, critically reflect upon, and iteratively revise decisions made in relation to the formulation and implementation of OCD interventions and the associated change management processes. (Hamlin, 2016, p.129)

This definition, in which 'current best evidence' implicitly refers to both Mode1 and Mode 2 research, individual descriptive studies and the consensus of OCD experts, is consistent with the most recent and most comprehensive definition of EBMgt as offered by the Center for Evidence-Based Management:

Evidence-based practice is about making decisions through the conscientious, explicit and judicious use of the best available evidence from multiple sources by: asking an answerable question; acquiring research evidence; appraising the quality of the evidence; aggregating the evidence; applying the evidence in decision-making, and assessing the outcomes of the previous steps. (see Rynes & Bartunek, 2017, p. 239)

However, a major obstacle to implementing evidence-based OCD is the continuing paucity of relevant and usable management and OCD related research. How this obstacle to EBP in the field of OCD might be overcome is discussed in the following section.

Figure 1. Critical contribution of EBOCD related change agency
Adapted from: Hamlin (2001a & 2016b)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Evidence-Based Organizational Change and Development Practice

Attempting to overcome the afore-mentioned obstacle begs the question as to what research topics and what types of research are most likely to be of greatest relevance to managers in performing their respective evidence-based change agency roles, and also to those OCD-related professionals who advise and support them.

Relevant Research Topics

Of primary importance in this regard is the need to better understand the factors within specific organizational contexts, including those aspects of the prevailing *organizational culture*, *management culture* and *leadership* that have the potential either to help or hinder the OCD process (see Chapter 2). Extant OCD-related 'best evidence', albeit limited in range and scale, can provide valuable *context-general* knowledge to inform OCD strategy formulation regardless of an organization's context specificities. For example, there are small bodies of literature that have explored 'employee resistance to change' (see Garcia-Cabrera & Hernandez, 2014; Szabla, 2007), 'employee readiness for change' (Choi & Ruona, 2011), 'coping with the stress of transformational change' (Robinson & Griffiths, 2005), 'the use of social support to cope during organizational change' (Lawrence & Callan, 2011), and 'how employees perceive the emotional intelligence (EI) of change leaders' (Smollan & Parry, 2011). And there are larger bodies of literature that have explored the related issue of *organizational dynamics* in general, and other research on the specific issue of *emotion*, *power relations* and *political dynamics* in the context of HRD which can either enhance or inhibit the learning and development that needs to take place, and thus either support or undermine the possibility of planned OCD transformations arising effectively (see Vince, 2014).

However, such generalized knowledge can only go so far in helping to identify and better understand the many specific complexities, contradictions, and paradoxes that tend to limit the successful implementation of an OCD program within particular organizational settings. Hence, what is called for is *context-specific/case-specific* internal research that is instigated as part of the design of an OCD initiative and conducted either by managers and/or those HRD colleagues who are 'scholar-practitioners' with sufficient research expertise, or in partnership with qualified academic researchers or by commissioned outside professional researchers. Such research can help make change occur; and when conducted with appropriate academic rigor it can lead to deep seated fundamental issues concerning the effective functioning of the organization being brought to the surface and being confronted. Surfaced issues can be those ineffective aspects of organization and management culture and of managerial and/or employee behavior which impede or block organizational change and innovation. Sponsored in-company research that is recognized and accepted by employees and other managers within the organization as being relevant, rigorous and of a high ethical standard is most likely to 'strike a chord'. And in research designs where strict anonymity rules are applied, managers and employees are more likely to admit in public their own individual performance or behavioral deficiencies contributing to identified generic ineffective features of organizational life that impact or are likely to impact negatively on the OCD process; this is because there is no possibility of direct personal attribution. Furthermore, employees are more likely to advance personal theories, reactions, and opinions which otherwise would not be revealed. Such research gives managers and evidence-based HRD practitioners the empirical evidence (the 'hard facts') required to hold a mirror up to the organization that will reflect accurately the truth and realities of organizational life, and thus help surface organizational taboos or latent and un-discussed sensitive

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

issues that need to be addressed (Bruce & Wyman, 1998). Becoming 'evidence-based' with the ability to think and act like an academic researcher can give managers, HRD professional practitioners, OD consultants, executive coaches and other OCD practitioners the additional skills and expertise required to be fully effective as change agents.

Types of Empirical Research

Most of the management and OCD-related empirical research that is currently available as 'best evidence' has been derived from Mode 1 "normal science" studies (Kuhn, 1996, p. 5) that generate bodies of context-general *conceptual knowledge* which Pelz (1978) defines as 'knowledge for understanding'. Most of this research has been conducted in the USA and other Western countries. Of the few studies that have been conducted in non-Western countries, most have been imposed-etic deductive inquiries using extant Western theories, constructs and methods (see Leung, 2007; Tsui, 2006; White, 2002). This has been a cause of concern because, as various writers claim, researchers risk making discoveries that only fall within the domain covered by the applied theories, and these may have very limited applicability in non-Western economies and cultures (Tsui, 2009; Zhang et al., 2012). Indeed, various writers have argued that management and leadership are culture-specific/context-specific (Brodbeck et al., 2000; Wendt, Euwema, & Emmerik, 2009). However, other writers have argued that logic suggesting the cultural and context universality of management and leadership is compelling (Bass & Riggio, 2006; House & Aditya, 1997; Robie, Johnson, Nilsen, & Hazucha, 2001), though empirical evidence demonstrating the reality of this is quite sparse. Consequently, there is a paucity of extant OCD-related generalized 'best evidence' that can unreservedly be translated and transferred to nations and societies other than those where it has been generated. This means that, for several years to come, evidence-based managers and OCD practitioners will need to instigate and/or conduct Mode 2 studies within their own (or host) organizations to generate 'best evidence' for informing their change agency practice. Unlike Mode 1 research, Mode 2 studies generate bodies of context-specific *instrumental knowledge* which Pelz (1978) defines as 'knowledge for action'. Besides *action research* involving *critical action learning* as advocated by Vince (2008) and *collaborative management research* (CMR) as a modality within the broad family of action research approaches (Canterino, Shani, Coghlan, & Brunelli, 2016), this author strongly commends *design science* as advocated by van Aken (2005). And from his personal experience he advocates the merits of *professional partnership research* and *replication research* as discussed below. These approaches are wholly consistent with the recent thinking of Brown and Latham (2018) on 'how we bridge the practitioner-scholar divide within human resource development', which by definition includes OCD as one of its core components.

Design Science Research

Design science research is primarily aimed at developing 'general substantive and procedural design science' to solve common field problems within a particular discipline/field of study and practice, but can also be used in the explanatory sciences to develop 'general solution concepts' and field 'tests' (van Aken, 2007). van Aken provides a compelling case for using design science research in the field of organization and management to generate *general knowledge* that can be used in organizational contexts other than the ones in which it has been produced, as happens in medicine and engineering. He explains that Mode 2 *prescription-driven* research based on the paradigm of the *design sciences* can produce

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

solution-oriented knowledge comprised of *technological rules.* These rules are *general statements* based on stable patterns of human conduct observed in one or more specific contexts; and through a process of redesign from the general to the specific they can be translated and transferred to other specific contexts (van Aken, 2005). He defines a *technological rule* as "a chunk of general knowledge linking an intervention or artifact with a desired outcome or performance in a certain field of application" (van Aken, 2004, p. 228). This means it is not a specific prescription or solution to a specific problem in a specific organizational setting, but rather a general prescription or solution for a class of field problems manifested in multiple organizational settings. Thus, a *technological rule*-which van Aken and Romme (2009) alternatively refer to as a *design proposition*-is a mid-range theory, the validity of which is limited to a certain field or domain of practice.

The significance and viability of design science concepts in relation to HRD in general [and by inference to OCD] have been well articulated by Kuchinke (2013) and Sadler-Smith (2014). Indeed, van Aken (2007) argues design science is highly relevant to OD because of its interest in applying behavioral science to solve [field] problems, and because there is far greater interaction between researchers and practitioners than found in most other subfields of management. And according to Rynes and Bartunek (2017), drawing upon the work of various essayists, design science research "might work harmoniously with EBMgt to improve the relevance of management research for practice" (p. 244) including, it is suggested, evidence-based initiatives for OCD. In Chapter 5 of this book Joan Ernst van Aken elaborates further on the relevance of EBP and 'design science research' within the context of OCD.

Based on the experience of the author of this chapter, another Mode 2 research approach well suited for exploring OCD related problems within specific single organization settings is collaborative *professional partnership-research* as conceptualized by Jacobs (1997). Should the problems be occurring also in other organizations, then conducting *empirical generalization* replication studies (Tsang & Kwan,1999) in those organizations and subjecting the results to *multiple cross-case comparative analysis* (Eisenhardt, 1989) in search of commonalities can lead to the emergence of mid-range theories, which can then be further developed into bodies of OCD related generalized 'best evidence'.

Professional Partnership Research

In this type of partnership-research arrangement which is different from a research service agreement, a university and an organization engages in a collaborative partnership within which individual scholars and practitioners jointly conduct programs of pragmatic research focused on issues of concern to management. However, they do so with their own mutually exclusive yet complimentary goals. Maintaining the integrity of both sets of goals for the common good is considered important. Thus, there is a dual goal to change and improve the organization through the application of academically rigorous but timely applied Mode 2 research. Depending upon the focus of such research, the results can be used either to inform the initial design of an OCD program or inform the subsequent critical evaluation and redesign that should take place at each iterative stage of the OCD process until the planned desired future state has been reached. If the research focus is not uniquely context-specific, then the scholar partner can adopt a *design science* orientation with an expectation to test the validity of any emergent technological rules/design propositions in different but comparable specific contexts.

The author has been involved as the scholar partner in several professional partnership research studies carried out in various UK public, private, and third (non-profit) sector organizations, all of which have been reported in the academic literature. Each study generated *instrumental knowledge* that was used by

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the respective practitioner partner to inform directly or indirectly an OCD initiative, and/or some other aspect of management or HRD policy and practice within his/her respective organization. To illustrate the nature and impact of professional partnership research, four of these collaborative studies, which are referred to here as cases, are presented below. For each case the research focus, goals, and process are briefly described including where the study has been published. To illustrate the practical relevance and impact of the research within the respective collaborating organizations, each case also includes 'testimonial evidence' from the respective practitioner partner(s).

Table 1. Case testimonial

Case Testimonial
HM Customs and Excise: Anglia Region This was primarily a collaborative study of perceived managerial and leadership effectiveness commissioned by Dick Shepherd, the Head of the Executive Unit of HM Customs and Excise (Anglia Region)-a major department of the British Civil Service-which I carried out in partnership with his Research Officer (*and OD Consultant*)- Margaret Reidy from 1994 to 1998. During this same period Margaret Reidy was undertaking a parallel program of doctoral ethnographic longitudinal qualitative research into cultural change. The application and practical impact of the results of the replicated managerial behaviour research have been published in several academic journals and conference proceedings (see Hamlin, & Reidy, 1997; Hamlin, Reidy, & Stewart, 1998; Hamlin & Reidy, 2005).
Extract from Personal Testimonial of Dick Shepherd "I was accountable to the Board of Customs and Excise for achieving operational targets within the region. To cope with the demands for ever-increasing outputs and for more openness in our dealings with the public I needed to change the culture of the organization. I used seminars, walking the floor, publishing my *Expectations* document and was making progress and lifting outputs. But I felt that I did not really know how deep the changes were penetrating- there was always an element of telling me what I wanted to hear in the feedback I was receiving. I commissioned the Critical Incident/Factor Analytic Research [on managerial and leadership effectiveness] from Bob Hamlin at Wolverhampton University, [and it was] my initial hope to find the patterns of strengths and weaknesses among the managers and team leaders. The results exceeded my expectations for I felt I was getting the real behaviors and attitudes prevalent in all the various parts of the organization for the first time. I was able to use the emerging results very quickly at my annual management conference where it made a big impact. This was no consultant's abstract interpretation using the latest business management technique. This was real. This was us. I had a profile of the attitudes and behaviors in the organization for the first time based on fact rather than intuition. A key factor right through this whole process was the close partnership between me and the research team. The clear understanding was that the research should be carried out independently with rigour and integrity to as high an academic quality as was necessary to provide provable results. My part was to commission it, facilitate its freedom in operation and ensure that the [research process and] results were directly related to the working life of the Department. In fact the research team went on to develop a set of (*management*) competencies that we were able to use in our local appraisal system to improve managerial effectiveness. They also developed specifically targeted team building and managerial effectiveness workshops". **R. C. Shepherd** Date 21st May 2002
Extract from Personal Testimonial of the Practitioner Partner- Margaret Reidy The data that resulted from the professional partnership-research "was so rich that it's preliminary findings were immediately and effectively used by Dick Shepherd and Margaret Reidy to inform and shape a number of OCD/HRD interventions for managing the (*organizational*) change, including workshops and local initiatives"…… "The preliminary findings helped people to assess their behaviors and attitudes in newer and more in-depth ways. This was invaluable to the everyday work of the organization as managers could effectively identify and curtail or harness those behaviors (*associated with effective or ineffective management respectively*). This was achieved with the support of [OD/HRD] tools developed from the research findings to improve the rapidly transforming organization. The finalized data took this further. As a direct result of the managerial [and leadership] effectiveness research, a new set of behavioral management competencies were developed exclusively for the organization"……. "The findings of the overall research [i.e. the ethnographic 'cultural change' study and replication 'managerial behavior' study], that were both positive and negative in terms of people's attitudes and behaviors, were accepted in a highly positive manner by the (*Anglia*) people. The reason for acceptance was because the research had been conducted in an impartial and objective manner, and names were never used. This created, on the whole, trust between the interviewers and the interviewees and elicited interest and co-operation in the research on a wide scale"…… Over the four years of study and practical application "the research found that the culture was adapting and changing in a very real and measurable sense. This was reassuring for the management *(in particular for Dick Shepherd*) who had doubted that cultural change could be effectively measured. The research also helped to prove to management that an in depth knowledge of their organizational culture was one of the most effective tools in organizational change. It became understood that cultural change was not a 'soft issue', but an integral practical issue with very real rewards in bringing about successful organizational change". **Margaret Reidy** Date June, 2002
Note: Full details of these testimonials can be found in Hamlin (2009, pp 125-131)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Case testimonial

Case Testimonial
Wolverhampton City Council This local government example of collaborative partnership research, which was a managerial behavior study carried out within the Social Care Department of the Wolverhampton City Council in the UK, had two aims. The first was to explore what behaviorally differentiates effective managers from least effective/ ineffective managers as perceived and judged both by managers and non-managerial employees of the organization. The second aim was to compare and contrast the findings against those obtained from the near equivalent study carried out within the Anglia Region of HM Customs and Excise in search of commonalities and relative generalizations across the two cases (see Hamlin & Serventi, 2008)
Personal Testimonial of the Practitioner Partner-Susan Serventi By undertaking the partnership–research study I was able to validate the credibility of the 'Leadership and Management' framework within the social care service area within Wolverhampton City Council. The evidence-based practice approach underpinned by robust collaborative research methods served to help me gain the confidence and commitment of managers and employees within all social care disciplines to the framework and the development activities that followed. This was evidenced in the feedback from contributors and participants who felt the framework offered them reassurance that they were clear about organizational expectations and culture. They were also able to recognize the transferability of the behavioral expectations into their generic rather than service specific role as a manager. As an HRD practitioner I was confident that I could evidence that on the whole the identified effective and least effective/ineffective managerial behaviors were not unique to the social care setting, and could be transferred across the wider council. It was difficult to influence the corporate center as the senior managers in post at the time were reluctant to believe that a framework developed within a service group could have validity across the wider council despite the evidence of underpinning research. Although disappointing, it did prompt me to reflect upon the reasons why it was difficult to engage senior council leaders at the time. I was able to recognize that the senior leadership was not ready to engage and therefore not receptive to the concept. Timing is important. In more recent times in my current role [within the council] I have been able to use my earlier partnership research experience to confidently negotiate and develop the procurement of a leadership program intended to support the council to reinforce the transformation agenda. The learning from the previous partnership-research experience has allowed me to plan, evidence, and present my case with confidence and clarity. This has helped me to secure buy-in from current senior leaders in the council to embark on a program that will build on previous learning and experience in developing the organizational behaviors and culture for the future. It is already recognized that many of these behaviors will be generic and that the program will be transferable and deliverable across all service sectors. Timing is everything! **Susan Serventi**, ***Strategic Workforce Development Manager, WCC*** Date 18th October 2013

As will be appreciated, the focus of all four cases was on the topic of perceived *managerial and leadership effectiveness,* and the respective researchers adopted the same methodology and methods which had also been used for previous single organization replication explorations of the same topic. However, because the research focus is not organization-specific but common to many other private, public, and third sector organizations interested in and concerned with understanding better what behaviorally distinguishes 'good/effective' managers from 'bad/ineffective' managers, the phenomenon explored could be described in van Aken's terms as a 'management and HRD' field problem. *Professional partnership research* of the kind illustrated here is consistent with recent "encouraging developments in EBMgt and A-P gap research" which sees an "increase in field studies examining the co-creation of evidence by academics and practitioners" (Rynes & Bartunek, 2017, p.252)

Replication Research

Being the respective scholar partner in the four cases outlined above, the author's long-term goal has been to search for evidence of the existence of generic or universalistic *behavioral criteria of perceived managerial and leadership effectiveness* through a process of derived etic research (Berry, 1989) based on replication logic and *multiple cross case comparative analysis* (Eisenhardt, 1989). Consequently, each new and cumulative study has replicated as closely as possible an earlier equivalent replication study

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 3. Case testimonial

Case Testimonial
TLFN Group plc This collaborative professional-partnership research was conducted within a large UK-based multi-national retail telecommunications company which, for purposes of anonymity, is referred to as the TLFN Group PLC. The primary goal of the study was to gain a better understanding of the managerial culture at the executive leader level of the company, and the results have been published in the academic literature (see Hamlin & Sawyer, 2007)
Personal Testimonial of the Practitioner Partner-Jenni Sawyer The trigger for this research was the need to conduct a research project as part of the MSc in HRD and Organizational Change study program that I was undertaking at the University of Wolverhampton Business School. At the time I was employed within the HR department of TLFN Group PLC. I chose to conduct a replication study of 'managerial and leadership effectiveness', and I found the extensive experience and knowledge gained through the process of selecting this research topic and methods of great benefit when it came to building a business case for conducting the research within my organization. This was a highly commercial environment, so it was important that I was able to demonstrate a projected return on that investment in time and resource. Following the identified need for a 'one-company' organizational and management approach, we needed to acquire a better understanding of the evolving culture within our UK business, as reflected by the behavior of senior people. The key aim was to identify a set of behavioral criteria of managerial and leadership effectiveness that reflected 'best practice' within the company. The findings of the research challenged various aspects of the existing company-wide competency framework and raised a number of important questions to be explored. Most significantly 'customer focus' was found to be so core to the culture and values that the associated behaviors had become inherent and were therefore no longer recognized by senior people as indicators of managerial and leadership effectiveness. The findings were used to inform and shape the ongoing development of the company's Executive Leader Development Programme. This research-informed program was then planned to be applied across Europe. **Jenni Sawyer,** ***Senior HR Manager: TLFN Group plc*** (when the research took place) Date 25 October 2013

Table 4. Case testimonial

Case Testimonial
ABC Charity This collaborative professional-partnership research was conducted within a large registered charity in the UK which for purposes of anonymity is referred to as the ABC Charity. The organizational goal was to identify what was seen as effective and least effective/ineffective managerial behavior at the senior levels of management within the organization. The research design replicated as closely as possible the approach and methods adopted by the practitioner research partner for a study which she had conducted in her previous organization-TLFN Group PLC. Full details of this ABC Charity study can be found in Hamlin, Sawyer & Sage (2011)
Personal Testimonial of the Principal Scholar-Practitioner Partner-Jenni Sawyer This research took place when I was employed within the HR department of a large not-for-profit organization providing housing and care for older people (ABC Charity). When it became apparent to our Board that there was a need for more corporate leadership and for de-centralized business units to adopt a more centralized approach, I was well placed to instigate a piece of internal applied management research to help inform the development of a bespoke 'evidence based' management development program for over 400 senior and middle managers. This led to a partnership-research arrangement consisting of Professor Bob Hamlin as the HRD scholar partner, me as the HRD practitioner partner and an assistant co-researcher. Without my practical experience of conducting academically rigorous research within my previous organization in the UK private sector, plus the credibility that an academic research partnership brings, this piece of in-company applied research would have been outsourced at considerable expense. I am currently employed at Centro, the passenger transport executive for the West Midlands in the UK. My previous partnership research experience has shaped and informed our ongoing Operating Board Development Program and Leadership Team development. The research is a constant source of reference in my work as OD Manager, and has given me the confidence to challenge the use of 'off-the-shelf' competency frameworks and management and leadership development in preference for bespoke, tailor-made products. Effective leadership and management within this organization has led to external recognition and accreditation of Centro as a best in class organization. In 2012 we achieved Investors in People Gold status and were recognized as one of The Sunday Times Best Not-for-Profit Companies to Work For in the UK. **Jenni Sawyer,** ***OD Manager, Centro, Birmingham*** (when the research took place) Date 25 October 2013

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

carried out in the same organizational sector, the aim being to maximize the comparability of findings obtained from each study. This type of replication research is consistent with what Tsang and Kwan (1999) refer to as *empirical generalization* replication. This involves studying the same phenomenon in multiple contexts using the same research focus, philosophical perspective, methodology, and methods to develop mid-range theory. It is also consistent in some respects with van Aken's (2009) notion of *design science research* in which emergent design propositions (technological rule) arising from one or more specific contexts are tested and refined in other specific contexts to develop *general design propositions* and mid-range theory.

Based on the author's original study of managerial effectiveness within UK secondary schools (Hamlin, 1988) and 8 subsequent UK replication studies, including the 4 already mentioned, an emergent *British taxonomy of perceived managerial and leadership effectiveness* has been developed by Hamlin and Hatton (2013). In addition, using the findings from 4 of these 8 UK studies plus 2 replication studies carried out in Germany and Romania respectively, an emergent *EU related taxonomy of perceived managerial and leadership effectiveness* has been developed by Patel and Hamlin (2012). These two behavioral taxonomies, plus a previous precursor taxonomic structure offered by Hamlin (2004), can be regarded as sets of technological rules (design propositions) which could be used to support the design and evaluation of management and leadership training interventions in a range of public and private sector contexts (Sadler-Smith, 2014). As design propositions, these taxonomies could also be used either directly or indirectly as 'best evidence' in support of OCD interventions within various organizational contexts. For example, as in the case of the 'Anglia' case testimonial, they could be used by managers and HRD professional practitioners acting as change agents to help challenge and change a management culture associated with the 'traditional bureaucratic management paradigm' of command, control, compliance and coercion, to that associated with the 'new management paradigm' of openness, involvement, participation and delegation. Alternatively, they could be used by management and leadership development (MLD) practitioners to maximize their contribution to improving organizational effectiveness and performance through the formal training of managers and leaders. Such MLD interventions could or should result in the type of 'leadership' and 'culture' that are conducive to learning and effective OCD change agency. In summary, the cumulative series of replication studies outlined above support: a) Barends, Janssen, ten Have and ten Have's (2014) call for 'the production of replication studies' as one means for improving the quality of the 'organizational change management' research base; and b) the notion that cross-case comparative analysis of evidence resulting from multiple replication studies is particularly generative for mid-range theory development (Eisenhardt & Graebner, 2007)

CONCLUSION

A key message for both managers, HRD professional practitioners, OD professionals, executive coaches and other OCD-related change agents is that by being at least 'critically reflective' and 'research informed' but ultimately fully 'evidence-based' in their change agency practice through engagement in professional partnership research as illustrated in this chapter, or through action research, or through design science research, it is likely they will be even more effective in facilitating and bringing about beneficial OCD. Another key message is that the context-specific *instrumental knowledge* resulting from replication research carried out in multiple specific organizational settings, whether through professional partnerships or other approaches, can potentially lead to theory development and the generation

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of *conceptual knowledge*. Hence, by adopting these approaches, OCD practitioners can not only enhance their professional change agency practice but also advance the OCD-related knowledge base and body of 'best evidence'. In addition, by so doing they can make a significant contribution to 'bridging the scholar-practitioner gap' that currently exists in management and HRD related fields. However, this is unlikely to become a reality unless line managers overcome the five OCD 'failings' as outlined earlier in this chapter; and unless HRD practitioners significantly improve their 'credibility in the eyes of line managers' and thereby become accepted as strategic business partners. Herein lies a major challenge for all those involved with the education, training and development of managers and HRD practitioners and other 'people and organization' developers, particularly those in higher education institutions who teach on professional qualification programs including the MBA and other management, leadership and HRD-related Master level degree courses (see Hamlin, 2002). They themselves need also to become evidence-based in their professional practice as management and HRD scholars if they are to act as role models. An important message for business/organizational leaders and other top managers who are change leaders is that they need to: a) become more cognizant of the 'soft' issues of management that should be considered when formulating OCD strategies; b) give those line managers who implement their OCD strategies sufficient time to attend to the 'soft' human side aspects of the change management processes; and c) increasingly recognize the value of evidence-based management and evidence-based HRD for bringing about effective and beneficial strategic organizational change and development. However, it may fall to you, the reader, to ensure that this message gets conveyed to and 'strikes home' with the top management of your own [or host] organization. In conclusion, this author strongly urges line managers, HRD professional practitioners and external HRD/OD professionals, executive coaches and other professional change consultants who wish to maximize their contribution to the effective and beneficial facilitation of evidence-based OCD initiatives, to embrace the concepts of evidence-based management, evidence-based HRD and evidence-based coaching.

ACKNOWLEDGMENT

With permission of the respective publishers this chapter draws heavily upon the previous published work of the author in Hamlin (2016a) and Hamlin (2016b).

REFERENCES

Alimo Metcalfe, B., & Alban Metcalfe, R. J. (2003). Stamp of greatness. *The Health Service Journal*, *113*(5861), 28–32. PMID:12870328

Axelsson, R. (1998). Towards an evidence-based healthcare management. *International Journal of Health Planning and Management, 13*(4), 301-317. doi:<307:AID-HPM525>3.0.CO;2-V doi:10.1002/(SICI)1099-1751(199810/12)13:4

Axley, S. R. (2000). Communicating change: Questions to consider. *Industrial Management (Des Plaines)*, *42*(4), 20–21.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Barends, E., Janssen, B., ten Have, W., & ten Have, S. (2014). Effects of change interventions: What kind of evidence do we really have? *The Journal of Applied Behavioral Science*, *50*(1), 5–27. doi:10.1177/0021886312473152

Barkema, H. G., Baum, J. A., & Mannix, E. A. (2002). Management challenges in a new time. *Academy of Management Journal*, *45*(5), 910–930. doi:10.2307/3069322

Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum.

Bate, S. P. (1996). Towards a strategic framework for changing corporate culture. *Journal of Strategic Change*, *5*(1), 27–42. doi:10.1002/(SICI)1099-1697(199601)5:1<27::AID-JSC198>3.0.CO;2-B

Beer, M., & Nohria, N. (2000). Cracking the code of change. *Harvard Business Review*, *78*, 133–141. PMID:11183975

Bennett, N., & Lemoine, J. (2014). What VUCA really means for you. *Harvard Business Review*, *92,* 1-2. Retrieved from https//ssrn.com/abstract=2389563.

Berry, J. W. (1989). Imposed etics-emics-derived etics: The operationalization of a compelling idea. *International Journal of Psychology*, *24*(2-4), 721–735. doi:10.1080/00207598908246808

Bones, C. (2007, October). What's wrong with business education? MBA and business education guide. *Management Today*, 70-71.

Brewerton, P., & Millward, L. (2001). *Organizational research methods*. London: Sage. doi:10.4135/9781849209533

Briner, R., Denyer, D., & Rousseau, D. (2009). Evidence-based management: Concept clean-up time? *The Academy of Management Perspectives*, *23*(4), 19–32. doi:10.5465/amp.23.4.19

Brodbeck, F. C., Frese, M., Akerblom, S., Audia, G., Bakacsi, G., Bendova, H., & Wunderer, R. (2000). Cultural variation of leadership prototypes across 22 European countries. *Journal of Occupational and Organizational Psychology*, *73*(1), 1–29. doi:10.1348/096317900166859

Brown, T. C., & Latham, G. P. (2018). Editorial. Maintaining relevance and rigor: How we bridge the practitioner-scholar divide within human resource development. *Human Resource Development Quarterly*, *29*(2), 99–105. doi:10.1002/hrdq.21308

Bruce, R., & Wyman, S. (1998). *Changing organizations: Practicing action training and research*. Thousand Oaks, CA: Sage.

Burnes, B. (2004). *Managing change: A Strategic approach to organizational dynamics*. London: Prentice Hall.

Burnes, B., & Jackson, P. (2011). Success and failure in organizational change: An exploration of the role of values. *Journal of Change Management*, *11*(2), 133–162. doi:10.1080/14697017.2010.524655

Candido, C. J. F., & Santos, S. P. (2015). Strategy implementation: What is the failure rate? *Journal of Management & Organization*, *21*(2), 237–262. doi:10.1017/jmo.2014.77

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Canterino, F., Shani, A. B., Coglan, D., & Brunelli, M. S. (2016). Collaborative management research as a modality of action research: Learning from a merger-based study. *The Journal of Applied Behavioral Science*, *52*(2), 157–186. doi:10.1177/0021886316641509

Cardillo, S. (2012). *The HR professional's role in building organizational success.* Kingston, Ontario, Canada: Queen's University IRC. Retrieved from http://irc.queensu.ca/articles/hr-professionals-role-building-organizational-success

Carnall, C., & Todnem By, R. (2014). *Managing change in organizations* (6th ed.). Harlow, UK: Pearson.

Champy, J., & Nohria, N. (1996). *Fast forward: The best ideas on managing business change*. Boston, MA: Harvard Business Press.

Choi, M., & Ruona, W. (2011). Individual readiness for organizational change and its implications for human resource and organization development. *Human Resource Development Review*, *10*(1), 46–73. doi:10.1177/1534484310384957

Collins, D. B., & Holton, E. F. (2004). The effectiveness of managerial leadership development programs: A meta-analysis of studies from 1982 to 2001. *Human Resource Development Quarterly*, *15*(2), 217–248. doi:10.1002/hrdq.1099

Cornell HR Review. (2013). Change management and organizational effectiveness for the HR professional. *Cornell HR Review*. Retrieved from www.cornellhrreview.org/change-management-and-organizational-effectiveness-for-the-hr-professional

Dess, G. G., & Picken, J. C. (2000). Changing roles: Leadership in the 21st century. *Organizational Dynamics*, *28*(3), 18–34. doi:10.1016/S0090-2616(00)88447-8

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550. doi:10.5465/amr.1989.4308385

Eisenhardt, K. M., & Graebner, M. E. (2007). Theories from cases: Opportunities and challenges. *Academy of Management Journal*, *50*(1), 25–32. doi:10.5465/amj.2007.24160888

Fong, K., & Kleiner, B. H. (2004). New development concerning the effect of work overload on employees. *Management Research News*, *27*(4/5), 9–16. doi:10.1108/01409170410784419

Fredericks, J., & Stewart, J. (1996). The strategy-HRD connection. In J. Stewart & J. McGoldrick (Eds.), *Human resource development: Perspectives, strategies and practice* (pp. 101–119). Harlow, UK: FT Prentice Hall.

Gandolfi, F. (2006). Personal development and growth in a downsized banking organization: Summary of methodology and findings. *Human Resource Development International*, *9*(2), 207–226. doi:10.1080/13678860600773411

Garcia-Cabrera, A. M., & Hernandez, F. G.-B. (2014). Differentiating the three components of resistance to change: The moderating effect of organization-based self-esteem on the employee involvement-resistance relation. *Human Resource Development Quarterly*, *25*(4), 441–469. doi:10.1002/hrdq.21193

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gold, J., Holden, R., Iles, J., Stewart, J. D., & Beardwell, J. (2009). *Human resource development theory and practice*. Basingstoke, UK: Palgrave-MacMillan.

Gold, J., Rogers, H. M., & Smith, V. (2003). What is the future for the human resource development professional? A UK perspective. *Human Resource Development International*, *6*(4), 437–456. doi:10.1080/1367886022000016046

Grant, A. M. (2003). *What is evidence-based executive, workplace, and life coaching?* Keynote address presented at the First Evidence-Based Coaching Conference, University of Sydney, Australia.

Gubbins, C., Harney, B., van der Werff, L., & Rousseau, D. M. (2018). Editorial: Enhancing the trustworthiness and credibility of human resource development: Evidence-based management to the rescue? *Human Resource Development Quarterly*, *29*(3), 193–202. doi:10.1002/hrdq.21313

Gunnigle, P., Lavelle, J., & Monaghan, S. (2013). Weathering the storm? Multinational companies and human resource management through the global financial crisis. *International Journal of Manpower*, *34*(3), 214–231. doi:10.1108/IJM-04-2013-0078

Gurdjian, P., Halbeisen, T., & Lane, K. (2014, January). Why leadership-development programs fail, *McKinsey Quarterly,* 1-9. Retrieved 11/09/2016 from http://www.mckinsey.com/global-themes/leadership/why-leadership-development-programs

Hamlin, R. G. (2009). Universalistic models of managerial and leadership effectiveness: A cumulative and multiple cross-case empirical study of effective and ineffective managerial behaviour. VDM Verlag Dr Mulder.

Hamlin, R. G. (1988). The criteria of managerial effectiveness in secondary schools. *CORE: Collected and Original Resources in Education, The International Journal of Educational Research in Mircofiche, 12*(1), 1-221.

Hamlin, R. G. (2001a). A review and synthesis of context and practice. In B. Hamlin, J. Keep, & K. Ash (Eds.), *Organizational change and development: A reflective guide for managers, trainers and developers* (pp. 13–38). Harlow, UK: FT Prentice Hall.

Hamlin, R. G. (2001b). Towards research-based organizational change and development. In B. Hamlin, J. Keep, & K. Ash (Eds.), *Organizational change and development: A reflective guide for managers, trainers and developers* (pp. 283–296). Harlow, UK: FT Prentice Hall.

Hamlin, R. G. (2002). Towards evidence-based HRD practice. In J. McGoldrick, J. Stewart, & S. Watson (Eds.), *Understanding human resource development: A research-based approach* (pp. 93–121). London: Routledge.

Hamlin, R. G. (2004). In support of universalistic models of managerial and leadership effectiveness. *Human Resource Development Quarterly*, *15*(2), 189–215. doi:10.1002/hrdq.1098

Hamlin, R. G. (2007). Generating HRD related 'general knowledge' from Mode 2 'design science' research: A cumulative study of manager and managerial leader effectiveness. In F. M. Nafukho, T. J. Chermack, & C. M. Graham (Eds.), *AHRD International Research Conference*. Academic Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hamlin, R. G. (2010). Evidence-based leadership and management development. In J. Gold, R. Thorpe, & A. Mumford (Eds.), *Gower Handbook of Leadership and Management Development* (5th ed.; pp. 197–220). Farnham, UK: Gower.

Hamlin, R. G. (2015). Paradigms, philosophical prisms and pragmatism in HRD research. In M. N. K. Saunders & P. Tosey (Eds.), *Handbook of Research Methods on Human Resource Development* (pp. 13–31). Northampton, MA: Edward Elgar Publishing, Inc.; doi:10.4337/9781781009246.00009

Hamlin, R. G. (2016a). Evidence-based organizational change and development: Role of professional partnership and replication research. In C. Hughes & M. W. Gosney (Eds.), *Bridging the Scholar Practitioner Gap in Human Resources Development* (pp. 120–142). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9998-4.ch007

Hamlin, R. G. (2016b). HRD and organizational change: Evidence-based practice. *Human Resource Development Practice, Policy & Research, 1*(1).

Hamlin, R. G. (2017). *Human resource development: Quo vadis? Challenges past, present and future*. Key note address at the UFHRD/AHRD 18th International Conference on HRD Research and Practice Across Europe held at Universidade Europeia, Lisbon, Portugal.

Hamlin, R. G., & Hatton, A. (2013). Toward a British taxonomy of perceived managerial and leadership effectiveness. *Human Resource Development Quarterly*, *24*(3), 365–406. doi:10.1002/hrdq.21163

Hamlin, R. G., Keep, J., & Ash, K. (2001). *Organizational change and development: A reflective guide for managers, trainers and developers*. Harlow, UK: FT Prentice Hall.

Hamlin, R. G., & Sawyer, J. (2007). *Developing effective leadership behaviours: The value of evidence-based management. Business Leadership Review, 4(4)*. doi:10.1080/13678868.2011.558318

Hamlin, R. G., Sawyer, J., & Sage, L. (2011). Perceived managerial and leadership effectiveness in a non-profit organization: An exploratory and cross-sector comparative study. *Human Resource Development International*, *14*(2), 217–234. doi:10.1080/13678868.2011.558318

Hamlin, R. G., & Serventi, S. A. (2008). Generic behavioural criteria of managerial effectiveness: An empirical and comparative case study of UK local government. *Journal of European Industrial Training*, *32*(4), 285–302. doi:10.1108/03090590810871388

Hamlin, R. G., & Stewart, J. D. (2011). What is HRD? A definitional review and synthesis of the HD domain. *Journal of European Industrial Training*, *35*(3), 199–220. doi:10.1108/03090591111120377

Hareli, S., & Tzafrir, S. S. (2006). The role of causal attribution in survivor's emotional reactions to downsizing. *Human Resource Development Review*, *5*(4), 400–421. doi:10.1177/1534484306293386

Hatton, A. (2001). The complexity-clarity paradox. In B. Hamlin, J. Keep, & K. Ash (Eds.), *Organizational change and development: A reflective guide for managers, trainers and developers* (pp. 101–134). Harlow, UK: FT Prentice Hall.

Holton, E. F. III. (2004). Implementing evidence-based practice: Time for a national movement? *Human Resource Development Review*, *3*(3), 187–188. doi:10.1177/1534484304269055

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

House, R. J., & Aditya, R. N. (1997). The social scientific study of leadership: Quo vadis? *Journal of Management*, *23*(3), 409–473. doi:10.1177/014920639702300306

Hughes, M. (2011). Do 70 per cent of all organizational change initiatives really fail? *Journal of Change Management*, *11*(4), 451–464. doi:10.1080/14697017.2011.630506

Jacobs, R. L. (1997). HRD partnerships for integrating HRD research and practice. In R. A. Swanson & E. F. Holton III, (Eds.), *Human resource development research handbook: Linking research and practice* (pp. 47–61). San Francisco, CA: Berrett- Koehler.

Kearns, P. (2014). *Organizational learning & development-From an evidence base*. Abingdon, UK: Routledge. doi:10.4324/9781315777320

Kohut, A., & Roth, G. L. (2015). Change management. In R. F. Poell, T. S. Rocco, & G. L. Roth (Eds.), *The Routledge companion to human resource development* (pp. 225–235). Abingdon, UK: Routledge.

Kotter, J. P. (1996). Leading change: Why transformation efforts fail. In J. Champy & N. Nohria (Eds.), *Fast forward: The best ideas on managing business change*. Boston: Harvard Business School Press.

Kuchinke, P. (2013). Editorial: HRD as design science. *Human Resource Development International*, *16*(4), 369–373. doi:10.1080/13678868.2013.820525

Kuhn, T. (1996). *The structure of scientific revolution* (3rd ed.). Chicago: University of Chicago Press. doi:10.7208/chicago/9780226458106.001.0001

Latham, G. P. (2009). *Becoming an evidence-based manager: Making the science of management work for you*. Boston, MA: Davies-Black.

Lawrence, S. A., & Callan, V. J. (2011). The role of social support in coping during the anticipatory stage of organizational change: A test of an integrative model. *British Journal of Management*, *22*(4), 567–585. doi:10.1111/j.1467-8551.2010.00692.x

Leung, K. (2007). The glory and tyranny of citation impact: As East Asian perspective. *Academy of Management Journal*, *50*(3), 510–513. doi:10.5465/amj.2007.25525592

Mack, O., Khare, A., Kramer, A., & Burgatz, Th. (2016). *Managing in a VUCA world*. Dordrecht, The Netherlands: Springer. doi:10.1007/978-3-319-16889-0

McKenzie, C., Garavan, T., & Carbery, R. (2012). Through the looking glass: Challenges human resource development (HRD) post the global financial crisis-business as usual? *Human Resource Development International*, *15*(3), 353–364. doi:10.1080/13678868.2012.669236

Mintzberg, H. (2004). *Managers not MBAs: A hard look at the soft practice of managing and management development*. San Francisco, CA: Berrett Koehler.

Morgan, B. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, *1*(1), 48–76. doi:10.1177/2345678906292462

Morrell, K. (2008). The narrative of 'evidence-based' management: A polemic. *Journal of Management Studies*, *45*(3), 613–635. doi:10.1111/j.1467-6486.2007.00755.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ning, J., & Jing, R. (2012). Commitment to change: Its role in the relationship between expectation of change outcome and emotional exhaustion. *Human Resource Development Quarterly*, *23*(4), 461–485. doi:10.1002/hrdq.21149

Nutt, P. C. (2004). Organizational de-development. *Journal of Management Studies*, *11*(7), 1083–1103. doi:10.1111/j.1467-6486.2004.00467.x

Patel, T., & Hamlin, R. G. (2012). Deducing a taxonomy of perceived managerial and leadership effectiveness: A comparative study of effective and ineffective behaviour across 3 EU countries. *Human Resource Development International*, *15*(5), 571–587. doi:10.1080/13678868.2012.726539

Pelz, D. S. (1978). Some expanded perspectives on the use of social science in public policy. In M. Yinger & S. J. Cutler (Eds.), *Major Social Issues: A multidisciplinary view* (pp. 346–357). New York: Free Press.

Pfeffer, J., & Sutton, R. I. (2006). *Hard facts, dangerous half-truths & total nonsense: Profiting from evidence-based management*. Boston: Harvard Business School Press.

Phillips, K., & Shaw, P. (1989). *A consultancy approach for trainers*. Aldershot, UK: Gower.

Power, B. (2011). *Why doesn't HR lead change?* Boston, MS: Harvard Business Review. Retrieved from https://hbr.org/2011/11/iys-hard-to-find-leader

Reay, T., Berta, W., & Kohn, M. K. (2009). What's the evidence on evidence-based management? *The Academy of Management Perspectives*, *23*(November), 5–18. doi:10.5465/amp.23.4.5

Robie, C., Johnson, K., Nilsen, D., & Hazucha, J. (2001). The right stuff: Understanding cultural differences in leadership performance. *Journal of Management Development*, *20*(7), 639–650. doi:10.1108/EUM0000000005637

Robinson, O., & Griffiths, A. (2005). Coping with the stress of transformational change in a government department. *The Journal of Applied Behavioral Science*, *41*(2), 204–221. doi:10.1177/0021886304270336

Rogers, P., Shannon, T., & Gent, S. (2003). Leading successful change. *European Business Journal*, *15*, 104–111.

Rouseau, D. M., & Barends, E. G. R. (2011). Becoming an evidence-based HR practitioner. *Human Resource Management Journal*, *21*(3), 221–235. doi:10.1111/j.1748-8583.2011.00173.x

Rousseau, D. M. (2006). Is there such a thing as evidence-based management? *Academy of Management Review*, *31*(2), 256–269. doi:10.5465/amr.2006.20208679

Rousseau, D. M. (2012). Envisioning evidence-based management. In D. M. Rousseau (Ed.), *Handbook of evidence-based management*. New York: Oxford University Press; doi:10.1093/oxfordhb/9780199763986.001.0001

Rynes, S. L., & Bartunek, J. M. (2017). Evidence-based management: Foundations, development, controversies and future. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*(1), 235–261. doi:10.1146/annurev-orgpsych-032516-113306

Sadler-Smith, E. (2014). HRD research and design science: Recasting interventions as artefacts. *Human Resource Development International*, *17*(2), 129–144. doi:10.1080/13678868.2013.875355

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Shook, L.-V., & Roth, G. (2011). Downsizing, mergers, and acquisitions: Perspectives of human resource development practitioners. *Journal of European Industrial Training*, *35*(2), 135–153. doi:10.1108/03090591111109343

Sirkin, H. L., Keenan, P., & Jackson, H. (2005). The hard side if change management. *Harvard Business Review*, *83*(10), 109–118. PMID:16250629

Smith, W. K., Lewis, M. W., & Tushman, M. (2016). "Both/And" leadership. *Harvard Business Review*, (May): 62–70.

Smollan, R., & Parry, K. (2011). Follower perceptions of the emotional intelligence of change leaders: A qualitative study. *Leadership*, *7*(4), 435–462. doi:10.1177/1742715011416890

Standish Group. (2013). *Chaos manifesto 2013: Think big, act small.* West Yarmouth, MA: The Standish Group International. Retrieved from http://www.version.com/..../CHAOS Manifesto2013.pdf

Stanford, J. (2016). Breaking the cycle of failed change management. *ATD at Work*, (1611).

Stewart, J. (2015). Strategic HRD. In R. F. Poell, T. S. Rocco, & G. L. Roth (Eds.), *The Routledge Companion to Human Resource Development* (pp. 203–211). Abingdon, UK: Routledge.

Stewart, J., & Hamlin, R. G. (1990). The management of change: What contribution can training make? *Training & Development*, (August): 11–13.

Stewart, J., & McGoldrick, J. (1996). *Human resource development: Perspectives, strategies and practice*. Harlow, UK: FT Prentice Hall.

Stewart, R. (1998). More art than science? *The Health Service Journal*, *26*(March), 28–29. PMID:10177610

Stober, D. R., & Grant, A. M. (2006). *Evidence Based Coaching Handbook*. Hoboken, NJ: Wiley.

Szabla, D. B. (2007). A multidimensional view of resistance to organizational change: Exploring cognitive, emotional, and intentional responses to planned change across perceived change leadership strategies. *Human Resource Development Quarterly*, *18*(4), 525–558. doi:10.1002/hrdq.1218

ten Have, S., ten Have, W., Huijsmans, A.-B., & Otto, M. (2017). *Reconsidering change management: Applying evidence-based insights in change management practice*. Abingdon, UK: Routledge.

Thornhill, A., Lewis, P., Millmore, M., & Saunders, M. (2000). *Managing change*. Harlow, UK: FT Prentice Hall.

Tourish, D. (2013). 'Evidence based management', or 'Evidence oriented organizing'? A critical realist perspective. *Organization*, *20*(2), 1–20. doi:10.1177/1350508411435281

Tsang, E. K. K., & Kwan, K.-M. (1999). Replication and theory development in organizational science: A critical realist perspective. *Academy of Management Review*, *24*(4), 759–780. doi:10.5465/amr.1999.2553252

Tsui, A. S. (2006). Contextualization in Chinese management research. *Management and Organization Review*, *2*(1), 1–13. doi:10.1111/j.1740-8784.2006.00033.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Tsui, A. S. (2009). Editor's Introduction-autonomy of inquiry: Shaping the future of emerging scientific communities. *Management and Organization Review*, *5*(1), 1–14. doi:10.1111/j.1740-8784.2009.00143.x

Ulrich, D. (1997). *Human resource champions*. Boston, MA: Harvard Business School Press.

van Aken, J. E. (2004). Management research based on the paradigm of the design sciences: The quest for field-tested and grounded technological rules. *Journal of Management Studies*, *41*(2), 219–246. doi:10.1111/j.1467-6486.2004.00430.x

van Aken, J. E. (2005). Management research as a design science: Articulating the research products of Mode 2 knowledge production in management. *British Journal of Management*, *16*(1), 19–36. doi:10.1111/j.1467-8551.2005.00437.x

van Aken, J. E. (2007). Design science and organization development interventions: Aligning business and humanistic values. *The Journal of Applied Behavioral Science*, *43*(1), 67–88. doi:10.1177/0021886306297761

van Aken, J. E., & Romme, G. (2009). Reinventing the future: Adding design science to the repertoire of organization and management studies. *Organizational Management Journal*, *6*(1), 5–12. doi:10.1057/omj.2009.1

Vince, R. (2008). "Learning-in-action" and "learning inaction": Advancing the theory and practice of critical action learning. *Action Learning Research and Practice*, *5*(2), 93–104. doi:10.1080/14767330802185582

Vince, R. (2014). What do HRD scholars and practitioners need to know about power, emotion and HRD? *Human Resource Development Quarterly*, *25*(4), 409–420. doi:10.1002/hrdq.21191

Walker, J. W., & Price, K. F. (2000). Perspectives: Why do mergers go right? *Human Resources Planning, 23*(2), 6-8.

Wendt, H., Euwema, M., & Emmerik, I. (2009). Leadership and team cohesiveness across cultures. *The Leadership Quarterly*, *20*(3), 358–370. doi:10.1016/j.leaqua.2009.03.005

White, S. (2002). Rigor and relevance in Asian management research: Where are we and where can we go? *Asia Pacific Journal of Management*, *19*(2/3), 287–352. doi:10.1023/A:1016295803623

Worrall, L., & Cooper, G. (2007). *The quality of working life 2007: Managers' health, motivation and productivity*. London: Chartered Management Institute.

Worrall, L., & Cooper, G. (1997-2001). *The quality of working life: (Annual) Survey of managers' changing experiences*. London: Institute of Management.

Yukl, G. A. (2006). *Leadership in organizations* (6th ed.). Upper Saddle River, NJ: Pearson/Prentice Hall.

Zhang, X., Fu, P., Xi, Y., Li, L., Xu, L., Cao, C., & Ge, J. (2012). Understanding indigenous leadership research: Explication and Chinese examples. *The Leadership Quarterly*, *23*(6), 1063–1079. doi:10.1016/j.leaqua.2012.10.009

This research was previously published in Evidence-Based Initiatives for Organizational Change and Development; pages 1-29, copyright year 2019 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 90
Are Managers Making the Right Choice?
IT Investment for Smart Work

Hyojeong Kim
Department of Hospitality Management, Kyung Hee University, Seoul, South Korea

Chang Juck Suh
Department of Management, Sogang University, Seoul, South Korea

ABSTRACT

Smart work has been credited with providing flexible supply capabilities to meet customer demands in service businesses operations. Effective operations of smart work need huge investment of technologies implementations. The authors use Delphi techniques and survey method to identify implementation factors of importance of home-based work which is a representative type of smart work. Seven technologies were identified to be important (Knowledge Management, Real-time monitoring, Remote IT assist, Online testing, Online training, Workforce management, Agent performance management technologies). Different from general expectations, control-based technologies were found not to have positive effects, but support-based technologies to have positive effects to the performance. Smart work technologies in service business affect employees' job satisfaction, and further retention of remote agents. Careful planning of how to implement technologies for smart work is needed in service business in order to identify the best working environment design.

BACKGROUND

The service industry is the largest and fastest growing sector of the economy (Fitzsimmons & Fitzsimmons, 2010). It is also the basis of global economic growth and employment. However, while the importance of the service sectors is striking, low productivity causes service employees to suffer from low wages and poor quality of work in most service sectors. The low productivity of service sectors makes service jobs unattractive for employees and could result in low productivity of the whole economy (Suh & Kim, 2013).

DOI: 10.4018/978-1-7998-7297-9.ch090

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Smart work has been instrumental in raising productivity in organisations in the service business (Podnar & Golob, 2010). Many authors (e.g. Bloom et al., 2013; Ye, 2012) illustrated the reasons why home-based work which is a representative type of smart work is more productive and efficient than office-based work. More experienced and older employees tend to choose to work remotely. They are usually more skilled at their jobs and can handle the tasks faster than employees in an office. Further, employees who work remotely show less turnover ratio than employees in offices, thereby reducing training and recruitment costs. Companies are also able to reduce costs related to space and equipment in the office.

Still employers are afraid of adopting smart work due to lots of challenges and concerns (Kim, 2013; Suh & Kim, 2012; Pyoria, 2011; Neirotti et al., 2013). Information technology challenges are one of major concern to many employers. Deciding what kind of technologies to purchase, and what kind of functions do they have to have affects the success of a smart work program (Cha & Cha, 2013; Suh & Kim, 2013).

The authors of this study focus on the following issues to find out whether the managers are making the right choice: (1) What kind of system is required to ensure competent home-based work? 2) What kind of system can improve the performance of employees? (3) How well the managers predict the system's effectiveness and impact on the employee's perception and performance?

The authors will review related articles of home-based work about success and failures in the service business context. Section 2 briefly outlines our methodology. Section 3 introduces success factors of implementing and operating home-based work. Section 4 discusses home-based work technologies of importance through Delphi techniques. Section 5 will verify key factors of home-based work technologies from two perspectives- control based and support based. Section 6 will provide conclusions.

RESEARCH METHODOLOGY

The methodology used in this study combined Delphi technique with survey method. Delphi technique is useful for getting consensus from a group of experts on a specific topic, generate ideas, and extract important factors in the professional domain (Hsu & Sandford, 2007; Okoli & Pawlowski, 2004).

Our study used Delphi technique to extract seven technologies of home-based work implementation that is supported by industry experts. And the authors used survey method to verify key factors of home-based work technologies from two perspectives; control-based and support-based technologies.

Our approach included the following steps:

- review refereed cases of home-based work operations from the published literature
- identify success factors of home-based work operations
- make an initial version of Delphi questionnaire
- get a consensus from industry experts about successful home-based work technology
- synthesize industry expert opinions and frontline employee surveys.

SUCCESS FACTORS OF HOME-BASED WORK IMPLEMENTATION

Smart work is a nontraditional working arrangement in which employee makes changes of where to work by using IT and performs the task under an employment contract (Pyöriä, 2011; Baruch, 2001). Smart

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

work includes home-based work, teleworking, telecommuting, home-working, and remote working. These terms are all interchangeable and have similar meanings (Baruch, 2001). Smart work is usually classified into two categories, home-based work and nomadic mobile work (Neirotti et al., 2013). Nomadic mobile workers have little limit in terms of workplace as they can work anywhere using mobile communication technologies, while the major workplace of home-based workers is likely to be their home. In the study, the authors identified implementation factors of importance of home-based work which is a representative type of smart work.

Though Butcher-Powell (2006) illuminated the concerns of ICT network security, information and communication technology (ICT) will help remote work increase (Boell et al., 2016; O'Sullivan, 2013) and is the enabler that would increase employee engagement and meet customer expectations (Beaumont Pate et al., 2009). Belanger et al. (2001) investigated how three constructs – availability of IT, communication technologies, and communication patterns of remote workers – affect the performance of home-based work operations. The results indicate that technology affects productivity, performance, and employee satisfaction positively. Gupta et al. (2000) identified patterns of computer and communication technology usage by studying IT usage levels. They found that highly educated employees are more likely to use computer and communications technologies, and that individual background, employment, residential, and occupational characteristics determine the usage of these technologies. Kylin (2007) found that advances in telecommunication structures and the linkage of IT networks provided opportunities for many individuals to perform work from their homes. She also suggested that organizations need to develop policies that support the combination of work and other life domains.

A supportive organizational culture and role of remote worker managers are also regarded as important organizational characteristics (Poissonet, 2002). Previous researchers also emphasize that managers should care employees emotionally to feel belonging to the organization, support them to use better techniques, and communicate effectively by giving the timely feedback (Guimaraes & Dallow, 1999).

Two types of tasks are fit for home-based work: tasks that require a low level of autonomy and are simple and easy to control remotely, and tasks that require a high level of autonomy and are complex (Poissonet, 2002). The frequency of information exchange relates negatively with home-based work, but positively with the associated management of the work-life balance, lower stress levels from interruptions, and less exposure to self-interested and unjust behaviours (Fonner & Roloff, 2010).

Ye (2012) argue that the persons most suited to the home-based work are those who are professional, able to work alone, resourceful, self-reliant, and knowledgeable about the technologies for home-based work.

GETTING KEY SEVEN TECHNOLOGIES FROM INDUSTRY EXPERTS

The authors performed a three round Delphi study from service industry experts to get consensus of critical technologies for home-based work. The authors delivered and gathered survey questionnaire and responses by email. From initial questionnaire to final round, research was performed for around three months.

The Delphi method was first used at Rand Corporation in the early 1950s to determine the possibility of attacks from Russia (Dewar & Friel, 2013). The method is designed to obtain consensus from a group of experts on a specific topic, generate ideas, and extract important factors in the professional domain (Chiravuri et al., 2011). It uses repeated questionnaire responses and controls feedback in a structured

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

manner. Panel members respond to a series of questionnaires by letter or telephone, and increasingly by e-mail.

The Delphi method is useful when studying new concepts or variables that have not been studied in previous research. Research on the home-based work in non-face-to-face service is in the introductory stages. Therefore, a Delphi study was used to elicit the key factors.

Thirteen call centre service operations managers from eight different firms participated as a panelist in the study. The titles of the respondents ranged from department director or senior manager to vice-president. They worked in industries like telecom, insurance, and home shopping. (Table 1). The combined experience of all the panelists in call centre work totaled one hundred nineteen years, and the combined home-based work experience totaled forty-four years.

Table 1. List of panelists

No.	Gender	Industry	Service dept. experience (years)	
				Home-based work
1	M	Telecom	11	1
2	F	Insurance	5	2
3	M	Telecom	8	2
4	M	Telecom	12	5
5	F	Retail	6	6
6	F	Telecom	12	3
7	F	Telecom	11	5
8	M	Insurance	11	2
9	M	Telecom	7	5
10	M	Insurance	9	5
11	M	Retail	9	6
12	F	Retail	9	1
13	F	Retail	9	1
Total			119	44

By asking same questionnaire repetitively, the authors got consentaneous results from panels. And the content validity ratio (CVR) value, devised by Lawshe (1975), was used to validate the results as shown in Figure 1:

When the Delphi panel is composed of 13 members, a minimum CVR of 0.54 is required to satisfy the five percent significance level.

The overall responses to round 3 are shown in Table 2. Knowledge management, real-time monitoring, remote IT assist, online testing, online training, workforce management (WFM), agent performance systems, these seven technologies were identified to be important by CVR value.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Equation 1: Results from panels

$$CVR = \frac{n_e - N/2}{N/2} \quad (1)$$

where: n_e = number of panellists indicating an item is 'essential' and N = total number of panellists.

Table 2. Final results of Delphi (round 3)

Item	Function	CVR	Remarks
Online training System	enables remote employees to get training course through online.	1	Higher than 0.54
Knowledge Management system	enables the process of capturing, developing, sharing organizational knowledge.	1	
Remote IT assist system	enables IT managers to help agents remotely fix IT related problems.	1	
Agent performance system	provides individual performance information.	1	
Real-time monitoring System	can monitor phone conversations between agents and customers in real-time.	1	
Online testing System	enables remote employees to access the knowledge test.	0.85	
Work Force Management system (WFM)	provides functions for labor management (e.g. attendance, absence, vacation, etc.), forecasting & scheduling and task management.	0.69	
Video conferencing system	uses visual art equipment to conduct a live conference between agent and manager.	0.08	Lower than 0.54
Community system	helps to create a social unit of any size that shares common values.	0.08	

* Values higher than the minimum are in bold

Two Perspectives - Control Based vs. Support Based Technologies

The authors performed multiple regression analysis to find the effect of each technology on the performance. The authors controlled the variables of age, tenure, working time, and response type (inbound/outbound). Service Quality and Work Engagement were used as a measurement of performance/outcome. Service quality and work engagement are critical elements for a service organization. Service quality is a prerequisite element for customer satisfaction (Heskett, 1994), while work engagement is a parameter that influences work satisfaction as well as the intention of turnover (Schaufeli and Bakker, 2004). In

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the same vein, this study examined service quality and work engagement as performance factors. The employees perceive the usefulness of the system as an organizational support which motivates them affecting their performance in a positive way (Salanova & Llorens, 2009). Under the circumstance, this study examined how the perception on the usefulness of the system in a service organization affects the employees' performance.

To measure usefulness of each technology, the authors asked three items about the perceived usefulness, productivity, and increase chances of getting good results based on Van Raaij and Schepers' (2008) study. All items were scored on a seven-point Likert Scale ranging from 1 ('strongly disagree') to 7 ('strongly agree'). To measure employee satisfaction, work engagement was used. Based on Lieke et al.(2012)'s study, work engagement was assessed using four items from the Utrecht Work Engagement Scale (UWES; Schaufeli, Bakker, & Salanova, 2006). To measure service quality, call quality score were used. Companies monitor and evaluate the agent call by their internal quality specialist (Lewig & Dollard, 2003). The participant companies provided the call quality score of home-based and office-based agents who responded the survey.

The respondents were 161 home-based agents from three organizations. The industry association of the respondents was as follows: 50 (31.1%) insurance, 52 (32.3%) retail, and 59 (36.6%) telecom (Table 3).

Table 3. Descriptive statistics

Category		No.	%
Industry (N = 161)	Insurance	50	31.1%
	Retail	52	32.3%
	Telecom	59	36.6%
Tenure at current company (N = 145)	Less than 1 year	52	32.3%
	1 to 2 years	44	27.3%
	More than 2 years	49	30.5%
Age (N = 143)	18 to 29 years	13	9%
	30 to 39 years	91	62.8%
	Older than 40 years	41	28.3%

The mean, standard deviations, and correlations of the research variables are presented in Table 4. All variables were correlated positively significantly with performance.

Cronbach's reliability coefficient was calculated for each construct, as suggested in many studies on operations research (Smith & Reece, 1999). Cronbach's α values over 0.7 is acceptable to have reliability of the internal consistency (Nunally, 1978). All of the values in this study were over 0.8. Factor analysis, which gives evidence of a single latent construct, was used to check the unidimensionality of the scales (Flynnet al., 1990). The exploratory factor analysis with VARIMAX rotation extracted nine factors that explained about 85% of the variance (KMO: 0.895; Bartlett: chi-square: 13426.963; d.f.: 595; significance: 0.000, Table 5).

Regression analysis was conducted to analyse the relationships among the constructs (see Table 6). The remote IT assist, WFM, and agent performance technologies were found to have significant positive effects on work engagement ($p < 0.05$, $p < 0.01$, $p < 0.10$, respectively). The remote IT assist technology was also found to have a significant positive effect on service quality.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Means, standard deviations, and correlation among variables

Variables	M	S.D	1	2	3	4	5	6	7
(1) WFM	4.8	1.2	1						
(2) Online training	4.8	1.2	.600**	1.000					
(3) Online testing system	4.4	1.5	.438**	.454**	1.000				
(4) Real-time monitoring system	4.7	1.3	.429**	.540**	.466**	1			
(5) KMS	4.9	1.3	.483**	.529**	.573**	.710**	1		
(6) Remote IT assist system	5.1	1.3	.589**	.565**	.374**	.558**	.571**	1	
(7) Agent performance system	5.2	1.1	.447**	.444**	.396**	.370**	.522**	.652**	1
(8) Work engagement	4.9	1.2	.310**	.286**	.492**	.358**	.363**	.439**	.404**

**$p < 0.01$

Table 5. Results of reliability and exploratory factor analysis

	WFM	Online training	Online testing	Work engagement	Real-time monitoring	KMS	Agent performance	Remote IT assist
Standardized Factor Loading	0.742-0.82	0.655-0.817	0.826-0.849	0.738-0.79	0.795-0.867	0.798-0.853	0.759-0.843	0.748-0.806
Eigen Value λi	15.471	3.059	1.871	1.664	1.485	1.296	1.209	1.017
Cum. Variance Explained	44.203	52.944	65.897	70.651	74.893	78.595	82.049	84.955
Cronbach's α	0.945	0.923	0.927	0.931	0.927	0.942	0.945	0.852

KMS, Online testing and Online training technologies showed any significant effects on work engagement and service quality. Different from the general expectations, the real-time monitoring system was found to have a significant negative effect on service quality ($p < 0.05$).

CONCLUSION

This study reveals key factors of technologies for home-based work as a representative of smart work. Using Delphi techniques, the authors identified seven key technologies from industry expert opinion (see Table 7). With those seven technologies, the authors verified the relationship between technologies and performance. The result was very interesting that technologies implemented primarily for company needs, that is, control-based technologies such as the real-time monitoring system, do not affect performance significantly or positively. However, technologies that has basic goal to support agents such as Remote-IT assist, WFM, and the agent performance system, affect performance positively. Remote-IT assist technologies help agents when they are in trouble with the computer, applications, and other equipment for effective working. WFM technologies help agents not to ask routine thing to the manager such

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 6. Results of multiple regression models of IT usage on performance

	Work engagement	Service quality
(constant)	-.352	5.501
Independent		
Knowledge Management System	-.387	.073
Real-time monitoring system	-.989	-3.027*
Remote IT assist system	4.245**	3.518*
Online testing system	.944	.339
Online training system	-1.669	-.654
Work Force Management systems	3.241*	-1.569
Agent performance system	1.973†	1.441
Control		
Response type	.149	6.047**
Working time	-1.282	-5.089**
Tenure (natural logarithm)	-1.552	.796
Age (natural logarithm)	1.692	-.120
Model fit (Adjusted R^2)	.399**	.572*

*p < 0.05, **p<0.01

Table 7. Type of technology and its systems

Type	Systems	counts
Support-based technology	Remote-IT assist, WFM, and the agent performance system	3
Control-based technology	Real-time monitoring system	1
Neutral	Online testing, online training system, and KMS	3

as their break time, off schedule, payroll record, and other HR related information. Agent performance management technologies help agents manage their performance by themselves through providing the performance status information of their own and peer group.

Managers are afraid of losing their control power. So, they are reluctant to adopt the home-based work program and take into account using control-based technology instead in order to lessen their concerns about the limited power to check the performance of the unseen employees. (Morgan, 2004; Pyöriä, 2011).

However, Valsecchi(2006) argued that monitoring practices cannot help to resolve the issues regarding control, suggesting a new management style which is more effective than just controlling home-based workers. The result of this study agrees with Valsecchi's perspectives. The findings of current study add more insights to the previous studies. The authors can conclude that supporting and having trust to remote worker is more important to manage them than controlling. Another contribution of this study relates to scarcity and rigor. To the best of our knowledge, this study is the first to elicit key factors of home-based work operations from industry managers and verify them with frontline employees. Shin et al. (2000) argued that home-based work research has lacked rigor in various ways, including reduction of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

sampling bias, data collection, and so on. They also argued that most empirical studies on home-based work use self-reported surveys to collect data from home-based agents. The gap between perceptions and actual behaviour is very significant. Moreover, self-reported surveys could have many problems, including common method bias (Shin et al., 2000).

This study contributed to provides guideline for managers to make an effective decision for technology implementation. Managers should make it a higher priority to adopt support-based than control-based technologies.

ACKNOWLEDGMENT

This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2012S1A5A2A01018402).

REFERENCES

Beaumont, P., Pate, N., Paton, R. A., & Stewart, S. (2009). Homeworking and Service Delivery: A Win Win Arrangement? *Service Science*, *1*(2), 115–120. doi:10.1287erv.1.2.115

Belanger, F., Collins, R. W., & Cheney, P. H. (2001). Technology Requirements and Work Group Communication for Telecommuters. *Information Systems Research*, *12*(2), 155–176. doi:10.1287/isre.12.2.155.9695

Bloom, N., Liang, J., Roberts, J., & Ying, Z. J. (2013). *Does Working from Home Work?: Evidence from a Chinese Experiment (No. w18871)*. National Bureau of Economic Research. doi:10.3386/w18871

Boell, S. K., Cecez-Kecmanovic, D., & Campbell, J. (2016). Telework paradoxes and practices: The importance of the nature of work. *New Technology, Work and Employment*, *31*(2), 114–131. doi:10.1111/ntwe.12063

Butcher-Powell, L. M. (2006). Better Securing an Infrastructure for Telework. *Journal of Cases on Information Technology*, *8*(4), 71–86. doi:10.4018/jcit.2006100106

Cha, K. J., & Cha, J. S. (2014). The Common Challenges to the Successful Implementation of Smart Work Program. International. *Journal of Multimedia & Ubiquitous Engineering*, *9*(2), 127–132. doi:10.14257/ijmue.2014.9.2.12

Chiravuri, A., Nazareth, D., & Ramamurthy, K. (2011). Cognitive conflict and consensus generation in virtual teams during knowledge capture: Comparative effectiveness of techniques. *Journal of Management Information Systems*, *28*(1), 311–350. doi:10.2753/MIS0742-1222280110

Dewar, J. A., & Friel, J. A. (2013). Delphi method. In Encyclopedia of Operations Research and Management Science (pp. 406-408). Springer US.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Fitzsimmons, J. A., & Fitzsimmons, M. J. (2010). *Service Management: Operations, Strategy, Information Technology*. McGraw-Hill Higher Education.

Flynn, B. B., Sakakibara, S., Schroeder, R. G., Bates, K. A., & Flynn, E. J. (1990). Empirical Research Methods in Operations Management. *Journal of Operations Management*, *9*(2), 250–284. doi:10.1016/0272-6963(90)90098-X

Fonner, K. L., & Roloff, M. E. (2010). Why Teleworkers are More Satisfied with their Jobs than are Office-based Workers: When Less Contact is Beneficial. *Journal of Applied Communication Research*, *38*(4), 336–361. doi:10.1080/00909882.2010.513998

Guimaraes, T., & Dallow, P. (1999). Empirically Testing the Benefits, Problems, and Key Factors for Telecommuting Programmes. *European Journal of Information Systems*, *8*(1), 40–54. doi:10.1057/palgrave.ejis.3000317

Gupta, Y. P., Karimi, J., & Somers, T. M. (2000). A Study on the Usage of Computer and Communication Technologies for Telecommuting. *IEEE Transactions on* Engineering Management, *47*(1), 26–39.

Heskett, J. L., & Schlesinger, L. A. (1994). Putting the service-profit chain to work. *Harvard Business Review*, *72*(2), 164–174.

Hsu, C. C., & Sandford, B. A. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation*, *12*(10), 1–8.

Kim, H. (2013). *Essays on Home-Based Work in the Non-face-to-face Service Operations: Focused on Call Center Service* [Ph.D. Thesis]. Sogang University.

Kylin, C. (2007). *Coping with Boundaries-A Study on the Interaction between Work and Non-work Life in Home-based Telework* [Ph.D. Thesis]. University of Stockholm.

Lawshe, C. H. (1975). A Quantitative Approach to Content Validity. *Personnel Psychology*, *28*(4), 563–575. doi:10.1111/j.1744-6570.1975.tb01393.x

Lewig, K. A., & Dollard, M. F. (2003). Emotional dissonance, emotional exhaustion and job satisfaction in call center workers. *European Journal of Work and Organizational Psychology*, *12*(4), 366–392. doi:10.1080/13594320344000200

Lieke, L., Bakker, A. B., Hetland, J., & Keulemans, L. (2012). Do New Ways of Working Foster Work Engagement? *Psicothema*, *24*(1), 113–120. PMID:22269373

Morgan, R. E. (2004). Teleworking: An Assessment of the Benefits and Challenges. *European Business Review*, *16*(4), 344–357. doi:10.1108/09555340410699613

Neirotti, P., Paolucci, E., & Raguseo, E. (2013). Mapping the Antecedents of Telework Diffusion: Firm-Level Evidence from Italy. *New Technology, Work and Employment*, *28*(1), 16–36. doi:10.1111/ntwe.12001

Nunnally, J. C. (1978). *Psychometric Theory*. New York, NY: McGraw-Hill.

O'Sullivan, G. (2013, February). Literature Review: Teleworking in Human Services. *Southern Area Consortium Of Human Services (SACHS)*.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Okoli, C., & Pawlowski, S. D. (2004). The Delphi Method as a Research Tool: An Example, Design Considerations and Applications. *Information & Management*, *42*(1), 15–29. doi:10.1016/j.im.2003.11.002

Olson, M. H. (1983). Remote Office Work: Changing Work Patterns in Space and Time. *Communications of the ACM*, *26*(3), 182–187. doi:10.1145/358061.358068

Podnar, K., & Golob, U. (2010). Friendly Flexible Working Practices within the Internal Marketing Framework: A Service Perspective. *Service Industries Journal*, *30*(11), 1773–1786. doi:10.1080/02642060802626824

Poissonet, S.P. (2002). *Profiles of Fit for Successful Telework Outcomes* [Ph.D. Thesis]. University of California.

Pyöriä, P. (2011). Managing telework: Risks, fears and rules. *Management Research Review*, *34*(4), 386–399. doi:10.1108/01409171111117843

Salanova, M., & Schaufeli, W. B. (2000). Exposure to information technology and its relation to burnout. *Behaviour & Information Technology*, *19*(5), 385–392. doi:10.1080/014492900750000081

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, *25*(3), 293–315. doi:10.1002/job.248

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire a cross-national study. *Educational and Psychological Measurement*, *66*(4), 701–716. doi:10.1177/0013164405282471

Shin, B., El Sawy, O. A., Sheng, O. R. L., & Higa, K. (2000). Telework: Existing Research and Future Directions. *Journal of Organizational Computing and Electronic Commerce*, *10*(2), 85–101. doi:10.1207/S15327744JOCE1002_2

Smith, T. M., & Reece, J. S. (1999). The Relationship of Strategy, Fit, Productivity and Business Performance in a Services Setting. *Journal of Operations Management*, *17*(2), 145–161. doi:10.1016/S0272-6963(98)00037-0

Suh, C. J., & Kim, H. J. (2012). A Case Study of Utilization of Home-based Call Center as Service Innovation - Focused on Dongbu Insurance Call Center. *Journal of Korea Service Management Society*, *13*(4), 149–174. doi:10.15706/jksms.2012.13.4.007

Suh, C. J., & Kim, H. J. (2013). Delphi Study on Profiles of Fit for Home-based work. *Journal of Korea Service Management Society*, *14*(1), 207–227. doi:10.15706/jksms.2013.14.1.010

Suh, C. J., & Kim, H. J. (2013). Critical Success Factors for Home-based Call Centers: a South Korean Study. *Proceedings of the International Conference on Human Resource Management and Professional Development for the Digital Age(HRM&PD),* Singapore.

Valsecchi, R. (2006). Visible moves and invisible bodies: The case of teleworking in an Italian call centre. *New Technology, Work and Employment*, *21*(2), 123–138. doi:10.1111/j.1468-005X.2006.00168.x

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Van Raaij, E. M., & Schepers, J. J. (2008). The acceptance and use of a virtual learning environment in China. *Computers & Education*, *50*(3), 838–852. doi:10.1016/j.compedu.2006.09.001

Ye, L. R. (2012). Telecommuting: Implementation for success. *International Journal of Business and Social Science*, *3*(15).

This research was previously published in the Journal of Cases on Information Technology (JCIT), 19(2); pages 44-54, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

APPENDIX

Table 8. Section A. Perceived usefulness of each system

		completely disagree completely agree
1	I find 'the system' useful in my work.	(1) -- (2) -- (3) -- (4) -- (5) --(6) --(7)
2	Using 'the system' increases my work productivity	(1) -- (2) -- (3) -- (4) -- (5) --(6) --(7)
3	If I use 'the system', I will increase my chances of getting good study results	(1) -- (2) -- (3) -- (4) -- (5) --(6) --(7)

Table 9. Section B. Work Engagement

		completely disagree completely agree
1	Time flies when I am working.	(1) -- (2) -- (3) -- (4) -- (5) --(6) --(7)
2	When I am working, I forget everything else around me.	(1) -- (2) -- (3) -- (4) -- (5) --(6) --(7)
3	I feel happy when I am working intensely.	(1) -- (2) -- (3) -- (4) -- (5) --(6) --(7)
4	I am immersed in my work.	(1) -- (2) -- (3) -- (4) -- (5) --(6) --(7)

Table 10. Service Quality

No	Acquisition Path	Gathered Data	Period
1	Company internal system	CPH (Calls Per Hour)	3 months/Agent

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 91
The Information and the Strategy Business

George Leal Jamil
https://orcid.org/0000-0003-0989-6600
FUMEC University, Brazil

ABSTRACT

In recent years we have witnessed a major transformation in society. We went from a society based on industry and transport to another based on information and knowledge. A major challenge for managers is to understand what the information is for formulation, definition, implementation, and control the strategy. The strategy for any organization can be set from the outside in. According to the schools of positioning, the offer of products will have to adapt to changes in the environment. Or from the inside out. According to the movement's schools, the organization influences the middle engaging with your innovative product offerings, since it has skills and capabilities that competitors don't have and that are difficult to imitate or buy. This chapter explores information and business strategies.

INTRODUCTION

Managers are people who occupy a large part of their time to make decisions of various nature and dimension. The requirements in relation to the time available for the decision-making always seem to be greater than the total time available. Decisions of great importance mingle with trivial decisions. This diversity of decisions tends to increase with the level of responsibility and becomes particularly pronounced in the case of the highest hierarchical level managers.

The function of Manager involves a very broad set of activities, including analysis, decisions (including the strategic), communication, leadership, motivation, evaluation and control. Of all these activities, we isolated the strategic decision-making process, as it is the "foundation stone" of a Manager. Peter Ducker (1958), States that "decisions and actions are the final product of managers' work".

Strategic decisions made explicitly or implicitly by managers precede any action, regardless the organizational process, by which they are taken, either through the formal hierarchy or through the broad participation of middle managers (managers) or by omission. The strategic decision-making process

DOI: 10.4018/978-1-7998-7297-9.ch091

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is complex, so put some problems to managers, in terms of methodology of approach, to choose the preferred strategy among the various alternatives.

Strategic decisions involve aspects of external and internal problems, that is, involve the choice of the set of products and/or services that companies can offer to their customers, looking to develop and take advantage of their position, vis-à-vis application of resources among possible alternatives, so that they can achieve their objectives.

The companies' employees are concerned with the operational problems, the hierarchies are concerned with finding ways to increase efficiency, reduce costs and sell more. The problems are automatically generated at all levels of the hierarchy and are in addition to the lower levels of this, they become cause for attention of top managers (administrators) and have to do with the future.

The issue relating to the strategy is one of the tasks of the functions of the directors of the companies. This idea is in line with one of the premises on which the *Design* school is based (Andrews et al., 1965), which considers that the responsibility for the definition of the strategy is the Manager (the leader).

The problems are very complex, and it is very difficult for an administrator to resolve the problems of the strategy alone. Consequently, the responsibility for strategic management tasks disperses through the organizational structure. Some companies create very specialized structures to support strategic decision making, such as departments and or agencies of *staff* to draw up strategic analysis.

These support structures are in accordance with the Carnegie school (Ansoff, et al. 1965) when considering that the role of managers is to make decisions, but that they are not responsible for their formulation, but they are the planners. The positioning school (Porter et al., 1980) follows a similar approach methodology, in which analysts formulate the strategy and managers approve it.

The Strategy

The strategy in companies is typically set: at the economic group level; managers and investors are involved in defining / revising the strategy and some of them rely on the support of external consultants;

The fact that the strategy is defined / reviewed at the economic group level means that the objectives and the strategy are defined globally by top managers of the Group and that each business unit (company) is limited to implement the strategy to achieve their objectives. These describe what the Group wants to achieve in the long run, in terms of some specific performance indicators, such as market share and return on investment.

The objectives of each business unit (company) translate the medium-and short-term objectives, as a way of measuring the progress to achieve the overall objectives. Each business unit (company) is an element of the *portfolio* of the Group's businesses. There is a hierarchy of objectives, strategies, budgets and plans. This assumes that the "trick" is to take relevant information up to the managers, "at the top", can be informed about the consequences of the details, "down there", without having to engage in them.

The operationalization of the strategy gives rise to a set of hierarchies, at different levels and with different temporal perspectives. At the top are the "strategic plans" and include the long term (economic group), followed by the medium-term plans which in its time give rise to short-term operational plans (companies). The group chooses a market positioning and strategies coming out of this process to be articulated and implemented. The strategy is divided into sub-strategies (companies) for success in implementation, giving rise to a whole set of hierarchies with different levels of duties and responsibilities and with different temporal perspectives.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In Portuguese companies there is a clear separation between the formulation of the strategy and its implementation. The formulation of the strategy (design) is a divergent and open process; some companies involve administrators, the middle managers (managers) and shareholders, in which the imagination can flourish, while the implementation is closed and convergent, to subject the new strategy to the problems of operationalization.

The objectives drive the formulation of the strategy, which in turn evokes the programs, the results of which influence the budgets for control purposes. Top managers remain as the architects of the strategy, but they are not who conceive the strategic plans, but rather who approve them. Strategic plans often are reduced to a "game of numbers" of performance control that has little to do with strategy.

A metaphor can be defined for the multiple businesses: "there are different roles within the family, the father (Group) and the children (companies-business units). The father needs to recognize that the children (business) change and mature with time and that a relationship in the early years works fine, but it probably need to be changed, as they grow. The children (business) like to know, as they are in relation to parents and what will be a good or bad behavior. The father has an important behavior in the creation of the family environment, "(Goold, Campbell and Alexander, 1994).

The fact that some of the managers participate in the definition of the strategy means that the process of formulation of the strategy is seen as an analytical and planning process, in which analysts (internal and/or consultants) play an important role in the process, passing the result of the analysis for top managers to formally make the decisions. This concept conforms to the Carnegie schools (Ansoff et al., 1965) and positioning (Porter, et al 1980) in which the planners or analysts are those that formulate the strategic alternatives (design) and top managers take the decision (approve them).

Some companies also tend to consider the strategic, as a collective learning process over time, through the involvement of the top managers manage men in addition to other resources, so collective action goes through the human brain of factors definition, as there are in the collective system many potential contributions. These initiatives aim to develop and exploit existing skills difficult to imitate. This concept is in line with the school of resources in which the role of the leader (s) is to manage learning (Prahalad and Hamel, 1990).

Top managers manage men in addition to other resources, so collective action goes through the human brain of actors (top managers, intermediate and shareholders). This action is subject to the filter of the cognitive capacities and to the "game" of influences, alliances and maneuvers, and the process of strategy formulation can also be seen as a process of negotiation and concession between managers, and investors. The strategy emerges from the "wars", negotiations and maneuvering in pursuit of power, between the parties concerned. The middle managers and managers conceive the strategy and shareholders approve it. This concept conforms to the power school that emphasizes the use of power and politics to negotiate strategies in favor of certain interest groups (Pettigrew, 1977 and Bower and Davis, 1979).

Enterprises are organizations with a set of representations, symbols, values, beliefs and rules lived in common by the members of the group that enable the convergence of interests of the various parties and to facilitate the harmonious evolution of social group to achieve their objectives, we can call the company's culture. The definition of the strategy can also be seen as a process that takes the form of a perspective rooted in the collective intentions and reflecting the patterns of use of resources and capacities as a competitive advantage, such as the school of culture (perspective Prahalad and Betis, 1986).

Some companies adopt two types of strategies: the deliberate that takes the form of plans or patterns, positions or perspectives as a way of adaptation to the surroundings and the emerging answer to the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

surroundings at the time and appropriate context. This concept is identified with the school of model configuration (Mintzberg et al, 1985, 1994).

The fact that the strategy in some companies be defined based on regular intervals and with annual reviews means that the process of strategy formulation is scheduled, with a schedule by which all process steps are performed. The strategy is deliberate and follows a planning that every year is repeated (Steiner, 1979).

Information Surveillance for Strategic Decision-Making

The process of "surveillance" of information is essentially a process of observing the behavior of the market and competitors and is intended to monitor the development of the surroundings and of the private sector. That "surveillance" is ensured in most cases, by an organic unit (organ of *Staff*- the "analysts" or the planners) that conforms to the model of the Carnegie schools (Ansoff, 1965 et al), and positioning (Porter, 1980 et al).

The process of "surveillance" on economic activity of many Portuguese companies focuses essentially on the monitoring of the evolution and economic predictions about the European Union and Portugal, in particular the countries with highest expression in the European economy (Germany, France and United Kingdom), as well as on the countries with which there is a greater affinity, such as Italy, Ireland and Greece, and their evolution is accompanied by the internal structures of the companies (the "analysts").

This information is collected, selected, processed and analyzed by the "analysts". These in their treatment use techniques of forecasting by extrapolation and analysis of problems, as a way to understand the structure of domestic, European and international economy as well as the interdependence between the various sectors of the economy as a way to identify possible future scenarios. Information about the foreseeable development of the European economy and of Portugal thus becomes critical in defining the strategy of each economic group or of the company.

The process of "surveillance " about socio-cultural and demographic changes in some companies is an irregular process of, temporary and periodic evaluation, mainly on social and demographic changes in Portugal and includes the demographic patterns, lifestyles, the social structure, social trends and is intended to determine the changes in this time interval, such as the birth rate, the level of education, debt capacity, being assured by the "analysts" of each company (internal and/or consultants).

However, the importance given to this information is less when compared with the information on the economic aspects, but it is important in the implementation of the strategy of each company, as a way to identify which customers to target for each product and or service, to the extent that allows them to understand local needs, available resources, legal requirements and funding adjustments. For the treatment of this information, the "analysts" use simple techniques of analysis.

The process of "surveillance" related to policy issues is a permanent process that is intended to "continuously "monitor, the Government's policy decisions with an impact on the sector, such as the unemployment policy, employment policy, taxation policy, so as the Community directives which may have impact on the sector and society in General (e.g. Basel II agreement), is ensured by the "analysts" and or consultants.

The information collected, selection, processing and analysis is the legislation on various aspects, such as economic, fiscal policy, education, employment, health, tourism, as a way of identifying potential opportunities and threats to the sector. In the treatment of this information the companies resort to simple techniques of analysis to understand the political influence in the business.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Information in Support of Strategic Decision-Making

There is a significant difference between the quality and quantity of information in which managers rely on strategic decision making. The fact that the value of qualitative information is recognized, is however the quantitative information that has more meaning to the "analysts" and to the managers of the companies. It is easier to get and allows them to make comparisons of performance and also because the "analysts" and managers want to know to what extent their organization is performing well, as this will help them decide more easily what to do about the future.

Information in support for strategic decision-making by the managers of the companies is a very important subject in this globalised world, to the extent that strategic decisions are taken based on that information. The quantified information is collected, selected, treated and analyzed by internal and / or external "analysts" (consultants) and presented in the most favorable way to managers, since they make the decisions according to the numbers presented in each alternative. Business managers want to know how their organization is likely to have a superior performance, as this will help them better understand the current situation and to decide the future, namely to define the positioning.

There are various dimensions of quantitative information that are collected, selection, processing and analysis. Managers are much more satisfied with the amount of information about the economic and financial context than with the information about the other contexts, as this is qualitative information and that is quantitative information that determines the current performance in the scope of objectives such as customer satisfaction with greater or lesser efficiency and effectiveness than their competitors

The managers believe they can be informed of a formal way by the "analysts" internal (*Staff* or agencies of planning) and or by consultants. They believe that the turbulence of the environment needs to be reduced to quantified and firm information, aggregated in such a manner that they can be provided regularly and in a digestible format (Mintzberg, 1995, pp. 257-266). However, the factual information (quantitative) has some shortcomings:

- Are mainly historical, lacking in wealth and often do not cover important non-economic information;
- Are concrete and accurate however.
- Are used in the formulation of deliberate strategies;

Some qualitative information is worthy of little credibility and confidence. Intangible (qualitative) information is subject to all kinds of interpretations and emphasizes the individual perspective of the "analyst and / or decision maker" in the "reading" of the environment and the sector as well as its the trends.

The intangible information analyzed by the "analysts" and companies or by internal consultants is speculative and may be distorted. The informal (qualitative) information, for example about the dissatisfaction of one or more customers, can be worth a lot more, because it can suggest a solution, against for example, information about a market survey (quantitative) that just might identify a problem. The factual information (quantitative) informs the intellect, but is the intangible information that builds the wisdom (Mintzberg, 1998).

The "analysts" internal companies, in extreme case, may in about 1 hour, assessing the environment, identify distinctive skills, generate alternative strategies and discuss which of them should be selected on the basis of the information collected on the day before or on the same day, through a formal and analyti-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

cal exercise that focuses attention on the selection of factual information (quantitative) considered most relevant and sorted according to its degree of importance. This concept is approaching the case studies in the classroom (Christensen et al., 1982). This process conforms to *Design* schools (Andrews et al., 1982) (the leader), Carnegie (Ansoff et al., 1965) (planners) and positioning (analysts) (Porter et al., 1980).

The consultants (external analysts) that some companies resort to, come to a company without any knowledge of the business, conduct a SWOT analysis in several ways, which allows them in a few days of work (discussion), formulate the strategy, over a period of two or three months (analysis and design), ie two or three days are sufficient for the review and annual update of the strategy (Tregoe and Zimmerman, 1980).

This means that gathers, select, treat and analyze factual information (quantitative), "play" with a set of generic strategies from participation and growth matrices of experience, write the report, send the invoice and leave (BCG, 1974-79, ADL, 1974-79, Mckinsey, 1976-79, PIMS, 1972).

There are a number of variables on which the managers of the companies have special attention in the process of formulating the strategy, such as the position on the market, the quality of products and services, the intensity of the investment, the return of investment and profit. This set of strategic variables is according to the PIMS model (1972), in: (Schoeffer et al., 1974, 1980, Buzzell et al., 1975). "All situations of the companies are basically similar, in obedience to the same market laws, so that a quarterback trained can operate profitably, in any business" (Schoeffer, 1980, pp. 2-5).

The strategic plan adopted by some firms requires not only the predictability to formulate the strategy, but also stability, during its formulation. Although certain repetitive patterns can be predictable (e.g. seasonality), the estimate of the discontinuities are virtually impossible to predict (Spiro Makridakis, 1990, p. 115). Strategic planning adopted by some companies is the extrapolation of the past, based on the recent past or historical information (quantitative) as a way to anticipate future trends and hope for the best. Long-term forecasts (two or more years) are notoriously inaccurate (Hogarth and Makridakis, 1981, p. 122).

In military strategy, this approach is also very common, "we need to determine what will be our foreign policy, formulating a *strategy* to implement this policy and then form the military forces to conduct successfully the strategy" (Robert McNamara, in: Smalter and Ruggles, 1966, p. 70).

The traditional military art emphasizes the importance of being informed of the enemy and the location of the battle and identifies a set of relevant information such as the location of the army against the mountains and rivers, fight downhill and occupy horizontal or tall lands, anticipating the advantage of the first man who moves and who occupies the battlefield and who awaits his enemy, is an advantage, for whoever arrives after the scene and hastens to fight is tired (Sun Tzu, 1971).

Information on the art of warfare are firstly the measurement of space, secondly the estimation of quantities, thirdly the calculations, fourth comparisons and fifth the odds. With many calculations can win; with a few do not. There's much less likelihood of victory that it doesn't make any calculation (Sun Tzu, 1971). Comparatively few companies also measure their position by market share, and make performance simulation exercises (calculations) to determine the most favorable scenario. This concept is in line with the positioning school (Porter et al., 1980) which makes emphasis on the study of industry in which the company operates.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The Importance of Strategic Surveillance Process

The idea of the existence of a surveillance process in companies is in accordance with *Design* schools, Carnegie and Positioning. At the school of *Design* the surveillance process is ensured by the leader, once the strategy is the result of a *design* process for the identification of threats and opportunities, externally and the strengths and weaknesses in internal terms, through the preparation of tables/matrices with the concept of SWOT analysis (Learned, Cristensen, Andrews and Guth, 1965).

The managers are the architects of the strategy, but in practice they do not conceive the strategy, but they approve it. The design of alternative strategies is the responsibility of the planning team or "analysts" (internal and or consultants). The strategy is the result of a controlled process and conscious (deliberate), formal, broken down into distinct steps and supported by a comprehensive list of variables (information) and quantitative forecasting techniques. This concept conforms to the Carnegie school (Ansoff et al., 1965).

The study of competition is done by the "analysts" (internal and or consultants) to determine a set of competitive forces that influence or may influence the sector and identify the competitive advantages and thus be possible to determine the generic strategies: cost leadership, differentiation and the niche or focus. This concept is in line with the school's positioning, (Porter et al., 1980).

Some companies, especially the most recent are resulting from the entrepreneurship (s) their (s) leader (s), by which the process of formulation of the strategy focuses on the leader (s), by which the process of "surveillance" is ensured by the mind of the leader (s) and is associated with his intuition, to his knowledge (the information feeds the knowledge) and his experience in the construction of strategic vision, which will guide them in future terms (Schumpeter, 1947, Drucker, 1970).

The Change in the Face of Turbulence and the Complexity of the Environment

The continuity of change happens at the level of science, to the extent that innovation depends on the existing accumulated knowledge about that fact. The speed of innovation is more common at the level of the particular technologies of information and communication technologies, to the extent that today practically it is possible to have access to some information about facts or events that occur anywhere in the world. The speed of the changes at the level of political and economic market is a result of policy decisions of the Governments of the developed countries and is related to the ongoing globalization process.

For managers, changes that are easier to predict are demographic, economic, and policy changes. This "predictability" is associated with the government policies of the different countries that are driving economic development, as demographic movements are the result of labor shortages in certain regions and the economic, social and defense policies of the governments of these countries.

The fact that consider themselves as predictable economic changes, those are associated to the Government economic policies of the countries of market economy boosters, such as the United States and the European Union and the econometric models (provisional) of industrial economy, which no longer correspond to the current situation, since such models are no longer able to predict how once the global economic development and the respective countries, since its predictability has become unreliable, so it will be necessary to take into account other variables (information) in the current models.

The predictability of change depends on the magnitude of the impact and the time required for a company affected answer the change. If the impact is small and the response is fast, predictability is of no

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

importance. An enterprise can react after having felt the full impact. However, a company well in advance can prepare for change when it is sequential. Response time is a function of the knowledge in which the company initiates the response of change.

This concept is in accordance with the models of *Design* schools (Andrews et al., 1965), Carnegie (Ansoff, et al., 1978) and Positioning (Porter et al., 1980), through the definition of deliberate strategies in which the focus is the control of the implementation of the strategy that is, making sure that their intentions are carried out in action. This is contrary to the emerging strategies of the school of learning, in which the focus is on learning, i.e. come to understand the changes through the implementation of actions governed by the intent (Mintzberg, 1972, 1978).

The predictability of the changes in the surroundings in perspective by managers is contradicted by the schools and learning resources in the "early signs for strategic change rarely provide formal information systems of horizon scanning or reports of companies (quantitative information) "(Quinn, 1982). Instead, the initial signs of the need for major strategic changes are "something that people do not feel well", "inconsistencies" or "anomalies" (Normann, 1977).

There is a strong relationship between the concept of organizational culture and strategy of organizations. That culture acts as a perceptive filter, which sets forth the assumptions of decision-making. Culture gives life to the interpretative wing of the collective world that is an organization. As a result organizations develop a "dominant logic" that acts as a filter of information, leading to a focus on certain information (the economic and technological in nature) for the creation of the strategy, to the detriment of other information (Prahalad and Betis, 1986).

The characterization of the policy changes as unpredictable and discontinuous by managers is in accordance with the school of power in the formulation of the strategy depends on individual or group interests, sometimes antagonistic and decisions emerge from "wars", negotiations and maneuvers in search of positions between the different interested (Zald and Berger, 1978). This characterization distances us from the idea that the formulation of the strategy is the product of a single "architect" of the school of *Design,* or a team of "homogeneous" Carnegie school strategy and positioning.

Companies are partially dependent on the behavior of their competitors, so the selection of the correct competitive movement involves the discovery of a result that is rapidly "inclined" to the interests of the same, overcoming and surviving retaliation (Porter, 1980).

With the rapid rise of the cooperative relationships, the formation of the strategy leaves the exclusive limits of businesses and becomes a joint process, to be developed with partners. Companies do business through a network of relationships and they formulate a collective strategy. There are clearly part of planning and positioning in this formulation, but the power, negotiated aspects of the strategy are many (e.g., alliances, partnerships) as defined by the school of power (Elfring and Volberda, 1998).

It can be said that the process of formulation of the strategy of companies is based on models of schools whose strategy is based on concept suitability/adaptation of the internal capabilities of organizations with external possibilities (outside to inside), as described by the schools of *Design*, Carnegie and positioning. The "rational strategy (economic)" is seen as the Union between the skills and opportunities to position companies in the surroundings.

The process of formulation of the strategy in some companies is a process of designing, not learning. The organizational structure follows the strategy and is determined for her (Chandler, 1962). The key variables (exhaustive list) most influential in the process of formulation of the strategy of the companies are mainly external macroeconomic and financial variables as opposed to socio-cultural variables, not

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

political and economic quantifiable. The objectives to be achieved are quantitative in nature, so the formal information (quantitative) is privileged to respond to the organization structure and their relationships, that is, companies use as approach methodology, models in which the strategy is deliberate, as described by the schools of *Design,* Carnegie and of positioning.

Models of Strategic Adjustment vs. Models of Strategic Intent

Some managers in the definition of the strategy chosen by the models of strategic adjustment to the detriment of strategic intent, that is, the function of which is to approve one of the deliberate alternative strategies that "analysts" (internal and or consultants) formulate, in the expense of the emerging strategies. Managers continue to remain as the architects of the strategy and they orchestrate the resources at their disposal and have an overview.

The process of strategy formulation follows a sequence of steps that are repeated periodically, although with different periodicity and the definition of new strategies, or for the annual review of the same and is associated with the principles of adaptation and the positioning, this is the strategy assumes an adaptation to surroundings that allow acquiring a dominant position and then to their defense. There is a clear tendency to be based on the place of supply over demand, in the definition of the strategy.

Some managers, in addition to the "analysts", tend to involve also the intermediate managers (middle managers or executives), in the process of formulation, thus approaching the model of the resource and learning schools (models of strategic intention) that assume that the process of formulating the strategy is a moment of transformation and renewal (rupture with the past) and aim essentially at the permanent transformation of competition and organization.

Some managers develop or acquire premium features or a combination thereof to obtain competitive advantages, once a feature is "any jealousy that can be thought of as strength or a weakness of a given company," (1985, Wernerfelt in., Antonio, Nelson, 2003). The "specific assets of a company are difficult to acquire and to imitate, if not impossible. Such assets are difficult to transfer from one company to another, due to transaction costs and transfer these assets contain some tacit knowledge ", (Teece, Pisano and Shuen, 1997 in: Antonio, Nelson, 2003).

The fact that some companies involved the managers (intermediate managers) in the definition of the strategy seek to create a "nuclear competence" through collective learning, especially on how to coordinate different competences (knowledge) and integrate multiple chains of opinion (Prahalad and Hamel, 1990, Antonio, Nelson, 2003).

Some managers regard the information as a "*substance*" which can be acquired, stored and possessed by an "analyst" or jointly by a group of "analysts" and that can be transmitted from person to person or from group to group, having for such created formal structures of *Staff* or planning to take the process of strategy formulation. The information gives them a certain stability and comfort. The "analysts" to internalize the information to the point that they can use in new situations acquire knowledge about the industry and about the surroundings (Davenport and Prusak, 1998).

The "*warehouses*" of knowledge of the "analysts" are the information that was selected and structured. The information that the "analysts" have is not knowledge, but there is no knowledge without information. Knowledge is the mix of information, experience and understanding which provide a structure that can be applied in the evaluation of new information or new situations (William Zikmund, 2000).

The most relevant information currently used by the "analysts" of the companies are mainly the financial and economic. The information is historical, but allows them to compare the level of performance (e.g.,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

growth rate, results, market share) and serve as well as a basis for the definition of future positioning (products/markets), through supply rather than demand. The macroeconomic forecasts are the prime source of the "analysts" to the formal construction of the alternative strategies (deliberate), through the use of simulation techniques, in order to serve as a basis for defining the overall objectives and specific to each business or organizational unit. We can thus conclude that the non-quantifiable information of the surroundings (e.g., weak and / or strong signals) are not yet considered in the strategy formulation process. We can also conclude that this information shall not be regarded as a strategic resource for managers, as defined by Wernerfelt (1985).

The formal forecast of alternative scenarios of the banks is subject to the limitations of prediction filter of the "analysts", i.e. the methodology, techniques and technologies adopted. If the "analysts" have an attitude and a conservative behavior relies on experience and probably do not realize any formal forecasting. If the attitude is reactive extrapolate the future on the basis of information about the past, even if booked. If the attitude is characterized by the anticipation, then incorporate the extrapolation of past performance to predict the future.

"Analysts" adopt increasingly elaborate methodologies and are based on the assumption that the future tends to be a natural extension of the past and not to incorporate significant changes in trends as well as possible discontinuities, which is in line with the models of schools of strategic adequacy (*Design,* Carnegie and positioning) to use in the process of strategy formulation.

There are other limitations beyond forecasts and lagging awareness of bank managers regarding to major changes that occur in cycles (economic, technological, etc.), such as the limitation of non-quantifiable information, the "signs" of the changes that develop quickly in the environment. The "analysts" and managers are used to analyze only the results of past performance and have some difficulties in understanding and interpreting the new information (ex: weak and strong signals of the surroundings) and therefore their challenges. So, as a result of a change in turbulence and on the complexity of the environment, the expectations of managers change suddenly, and the perception of expectations suffers a gap (Ansoff, 1980).

Some "analysts" in the process of strategy formulation tend to give greater emphasis to the analysis and insufficient emphasis to the real strategic criteria, since even the strategic thinking to strategic planning that is; the process focuses on the Middle engaging in detriment of competences and of the internal capabilities, what becomes critical to the implementation of the strategy.

In the process of formulating the strategy, some managers give little emphasis to social and cognitive processes, since they use all kinds of informational inputs, many of which are not quantifiable and accessible only to the strategists who have their feet on the ground, since they do not follow predetermined schedules, or fixed routes. The process requires *insigth*, creativity and synthesis, exactly what the formalization of planning discourages.

Some of the managers are not happy with the quality of information to support strategic decision making, reflecting the contradictions in the process alternative strategies formulation, in which the information about the economic and financial aspects is quantified and can be compared and serve as a basis for simulations about the future scenarios, while the social and cognitive information (qualitative) is difficult to quantify, as such cannot be compared or object of simulation, and so managers are satisfied with the quantity and dissatisfied with the quality.

To improve the quality of information to support strategic decision-making is fundamental the existence of a strategic information monitoring process that includes not only the factual information, but

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

also the qualitative information (cognitive and social), which assumes the need to include some variables (information) not covered in the formulation of the current strategy used by some of the managers.

About the characterization of the environment change profile related to the speed, predictability and continuity there is a tendency to consider economic issues first and political issues secondly, once the sector traditionally has been driven more by supply than by demand. For such economic forecasts (quantitative information) has been instrumental in defining the strategy, over the inclusion of qualitative information in its models.

So the "analysts" resort to the techniques of analysis and simulation to predict the alternative scenarios, based on the most credible economic forecasts in world terms, such as the World Bank, the European Union, the OECD and the Bank of Portugal. Yet some companies use the "analysts" (consultants) their national and / or global experience.

Strategic decisions of some enterprises have a sequential nature, namely decisions are influenced by business opportunities identified by the "analysts". These opportunities are identified in the context of uncertainty and are a function of knowledge (the information feeds the knowledge) of the "analysts" to formulate the strategic alternatives after present managers. Through this information managers may agree or not with the alternatives.

STRATEGIC INFORMATION

In economic theory taking account of perception by the managers of the surroundings was successively ruled by the function of the information leading to corresponding anticipations and underlying beliefs. On the theory of managing these same concepts were gradually introduced and acquired around the strategy, because the environment is composed of other "actors" acting similarly.

The belief of managers is increasingly formalized on help from cognitive science, as well as on epistemic logic (hierarchical beliefs) and in cognitive psychology (review of beliefs). The exchanges of information between the managers are also studied in conjunction with the cognitive sciences, regarding the coordination that allow (distributed cognition) and how the dynamics that they induce (learning process).

After having recalled the relevant typologies of information in management theory, some issues linked to the believers are progressively discussed and illustrated. The structure of individual believers which translates a uniform probabilistic uncertainty finds its explanation on the information value.

The Imperfections of Information

Although there are types of market imperfections (Yao, 1988), the strategic information theory focuses only on the competition of the imperfections of information. The theory focuses and elaborates the principles of basic features of neoclassical assumption of complete and perfect information. These imperfections of information create opportunities for the called return of information that companies can explore and take advantage of the meaning of strategic information. The theory immediately gives emphasis to the information resource and the capabilities to:

- Identify the imperfections of information on product and market factors;
- Maintain or change the perceived information imperfections.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In order to be possible to identify the imperfections of information and its origins it is necessary to first understand them. The imperfections of information are derived from the behavior of the assumptions of rationality and opportunism and two types are distinguished: the incomplete information and asymmetric information.

Incomplete Information

Incomplete information is associated with the bounds of rationality that explain the limits of rationality of human behavior information. Asked to complete the survey to all relevant information, the only decision-maker tries to reach the subjectivity of incomplete information level satisfaction (Wigand, *et al.,* 1997, p. 75).

This type of behavior is known as satisfactory. Satisfactory behavior and incomplete information are part of strategic decision making in both product and market factors. About market factors, for example about the incomplete information from suppliers that offer private resources, whose search for the competitors is, what price they are willing to practice and that there are quality differences between the capabilities of different suppliers.

About products for example, incomplete information about what customers should be interested to buy the products, what competitors are competing for, what is the demand for a particular product, what price are customers willing to pay and how do they differ from the competitors' products. Not only companies, but also all or part of the market, including competitors, customers and suppliers face imperfections of incomplete information.

The Asymmetric Information

Due to incomplete information and fragmentation of knowledge in society as described by (Hayek, 1945), information can be asymmetrically distributed through parts of the market. Asymmetries of information have been reviewed extensively in all the risks of economic transactions (Nobel Foundation, 2001); however, according to Nayyar (1990), rarely information asymmetries have been looked at as a strategic opportunity. This assumes that the asymmetries of information provide opportunities under two conditions:

- High costs to obtain equality of information;
- The trend for opportunistic behavior (Williamson, 1975, p. 31).

Asymmetries of information may result from a situation favorable to the supplier or to the client, depending on the one that has the advantage of the information and which explores this advantage opportunistically.

Keep or Change the Imperfections of Information

Strategic information focuses attention on the way the companies do business with incomplete information and or with asymmetric information. Companies that identify the moments of incomplete information and market factors or product, decide what their strategic information is and what is desirable:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Right now there is incomplete information;
- At this point develops information asymmetries, meaning both, advantages or disadvantages vis-à-vis competitors, suppliers or customers. Companies decide on dedicated resources and informational capabilities for:
  - Keep or change the incomplete information in product and market factors, influencing the positive or negative transparency;
  - Keep or change information asymmetries and create advantages or disadvantages of information or of information equality.

Having taken the decision to change a particular asymmetry of information in relation to competitors, suppliers or customers, managers must understand that these economic actors are also characterized by having rational and opportunistic behaviors. That is why organizations must use their resources and their capacity to identify the imperfections of information, creating equal information and should take advantage of their expertise in the information asymmetry and the differences of interpretation (Williamson, 1975, pp. 32).

The theoretical contribution of this study is to be based on the empirical basis of the recent development of the concepts of strategic information and information profitability. The theory was available to examine and analyze the contribution of strategic information.

The concept developed in this research is based on current economic theory and based on contemporary theories about the functioning of the market. The capabilities of organizations appear to provide a basic approach to examine how organizations expect realize the economic return based on the market imperfections. By adding the informational perspective, the role of information and information imperfections in business strategy can be explained through the base capabilities of organizations according to Barney (1986) and Itami (1987).

Identification of Information Imperfections

To understand how the economic profitability can be identified and suitable for strategic intelligence is through the knowledge of the origin of information imperfections. The costs of economic transactions (CTE) describe these origins and three types of information imperfections result of them (Williamson, 1975).

The transaction costs theory assigns two behavioral appropriations to the man: the limits of rationality and opportunism. We assume that men are intentionally rational, but are limited by this. The limits of rationality are out of the inability of the human brain. "This involves neuron-psychological boundaries of a skill, on the one hand, and on the other, the limits of language. Physical limits take the form of value and the storage limits of the power of individuals to receive, store and process the information without errors "(Williamson 1975, p. 21).

"The human cognitive capacities are as a rule insufficient, to understand particularly complex tasks, to recognize the need for relevant information and to render completely all relevant information" (Wigand, Picot et al., 1997, p. 75). It explains the limited rationality of rational information behavior (Simon 1955). "Its Instead of a full search of relevant information the only decision-maker attempts to get a subjective satisfaction, incomplete level of information" (Wigand, Picot et al., 1997, p. 75). This type of behavior is known as "satisfactory": looking for a solution which meets the aspirations of the decider level and therefore the acceptable.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Humans are not only rational; they also assume some opportunistic behavior. Williamson (1975) describes how opportunism "for own interests shrewdly" involving "disbelief of the threats and opportunities", in order to perform the individual advantages (Williamson, 1975, p. 26). These advantages are also suitable for "select and distort the information discovery or discredit the opportunities that lead to future" (Williamson 1975, p. 26). The claim is that, although not all humans to behave opportunistically, is difficult to predict in advance whether they will behave as such.

These two types of behaviors reflect the relationship between suppliers and customers in the market. The combination of opportunistic and rational behavior is the main cause for the three types of information imperfections in the market of transactions:

- **Asymmetric Information:** An asymmetric distribution of information from the parties involved in a transaction causes a strategic opportunity. "The critical impact of information on optimal allocation of risk, it is not merely its presence or absence, but its inappropriateness between economic operators" (Arrow 1969, p. 55). Williamson (1975) joins two conditions under which the asymmetry of information provides a strategic opportunity for transactions:
  - High costs to obtain equality of information;
  - Propensity to opportunistic behavior (Williamson 1975, p. 31). In other words, the asymmetric information occurs when one of the parties has information that is unknown by the other and difficult to obtain by the other party and an opportunity to exploit this information advantage through strategic alternatives.

The asymmetric information may result in a favorable situation for suppliers or customers depending on the one that has that information. The opportunity is caused by hidden information for the current transaction. One of the parties in a commercial transaction is better informed about a relevant variable than the other. Is the invisibility of this private information which constitutes the essence of the imperfections of information and introduces the risk for the other party (Douma and Schreuder 1992, p. 54).

Considering the possibility of opportunistic behavior, the part that has the hidden information, has no incentive to reveal information if it is detrimental to her. As a result, some vendor who enters the market with a product or service that is particularly suitable for a specific market segment, with the major benefits of competitors who benefit from this hidden information. The imperfections of information are known as enemies of the selection (Arrow 1984).

- **Ambiguity of the Information:** The ambiguity of the information in a commercial transaction could cause a strategic opportunity. Although in the case of complete information, different interpretations on the same information may occur. As a result of opportunism, these representations can be opportunistic in the sense that they can lead to a single advantage to any supplier or customer.
- The strategic opportunity for one of them is discovered, when such an opportunistic interpretation is not recognized by the other and results in:
  - Customer will pay a high price for a product;
  - The willingness of the supplier to offer a product at a low price.

As a result of this opportunistic behavior, the part with the opportunistic interpretation has no incentive to share this information, if it becomes a disadvantage to it.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- **Incomplete Information:** The strategic opportunity of incomplete information is tightly related to the assumption of rationality. "The limits of rationality are interested certainly in the extension of the limits of rationality are achieved-I mean under conditions of uncertainty and complexity. In the absence of any of these conditions of appropriation of contingent actions can be completely specific of this principle. (Williamson 1975, p. 22).

In an environment characterized by a high degree of complexity and uncertainty, the possibility of certain events occurs quickly, become numerous. Under these circumstances, it is impossible for humans to acquire and analyze complete information relevant to the strategic decision-making. As explained before, this inability leads to "satisfactory" behavior. The opportunity of incomplete information occurs when a client is not fully informed about the range of possibilities of the transaction and the products offered and vice versa.

Therefore, a client that allows an incomplete comparison of suppliers and their mutual differences can start a transaction with the worst supplier. For the supplier this opportunity could be exploited by the establishment of a brand and advertising, in order to become part of the subset of suppliers in incomplete comparison of clients.

Appropriation of the Profitability of Information

After have been identified the imperfections of information in two relevant factors products and markets, organizations decide how to manage your strategic information. Organizations choose to keep or take advantage of these imperfections of information, with the purpose to take ownership of their profitability or to anticipate other forms of ownership. Strategic information helps keep information imperfections in unknown markets on the one hand and on the other, to undo information imperfections and increases the transparency of the market.

The theoretical work of strategic information results in 12 basic choices to maintain or alter the choices. Briefly, these choices are related to three types of information imperfections both to the Organization and to the suppliers in the market factors and to the Organization and to customers in the products/market. The choice for any of them to maintain or alter the existence and identification of information imperfections depends on the volume of the profitability of information which may be held by any of them.

Transaction Costs and the Imperfections of Market Information

The transaction costs theory does not allow information problems to exist. So is the theory that last the objectives to ensure that the most efficient way to coordinate financial transactions, information problems will be solved, because they cause an increase in transaction costs, that is, a lower efficiency (Williamson, 1999).

However, in practice the problems of information are the basis for the competitive advantages for many organizations and form the basis for their strategy and business model. However, the resolution of the problems of the information may result in a decrease of competitiveness.

On the other hand, if the transaction costs theory allows the existence of problems of information as the basis for the strategy, will be needs to work the concept of strategy. This reveals a critique, which according to Williamson, (1999) the theory of transaction costs need to understands the concept of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

strategy. The concept of strategic information can fill this gap and bridge the gap between the theory of transaction costs and the thought of strategic management.

Considering criticism rose above, the theory of the base organizations resources allows information problems that exists and contributes to the concept of strategy. The theory of basic resources is an attempt to explain and predict that some companies are able to establish sustainable competitive advantages position and therefore obtain higher return.

The view base resources understands the companies as a single set of idiosyncratic resources and capabilities where the first task of management is to maximize the value through the great development of existing resources and capacities (Grant, 1996, p. 110). Developing existing resources and capacities are believed to be the rationale of the strategy in the medium and long term, because the built-in features and capabilities provide the basic direction for the company's strategy and are the first source of competitive advantage (Grant, 1991, p. 5).

With respect to the problems of information, that implies you don't solve the problems of information definition of low transaction costs. Instead, the path of the behavior with the problems of information can be inspected as the source of competitive advantage, and so the theme of the formulation of the strategy. The problems of information provide strategic information resource-based opportunities and capabilities of specific organizations.

Strategic Information

Organizations when formulating the strategy of outside to inside tend to be more aggressive and restless. The wording from the inside out is based on the strategic move (sociological) and that is why organizations are less dynamic, that is, they tend to be more passive and inclined to react to events (Mintzberg, 1998). These models represent the two extremes between which there is a range of behaviors. Based on the concept of opening the organizational systems theory, this is determined by the (Ansoff, 1978):

- Perception of strategic information that describes the Futurity (trends);
- Perspective of action that describes the familiarity of an organization, about their past experiences.
- The opening feature and the prospect of action correspond generally to information perspective:
- The retrograde nature managers prefer the successful alternatives in the past and rely on known historical information;
- Managers whose attention is focused on the present are willing to shut down the past, as long as it's not too different from the present, that is, seeking support on information relevant to the environment;
- Managers who seek to predict the threats and opportunities tend to be active in nature, so the search for new paths, based on past information and using forward-looking models, bearing in mind that the future will be an extrapolation of the past;
- The managers Beyond extrapolation of the past, in order to realize new worlds and discontinuities, seek opportunities that are new and unusual, that is, assume that the future is not an extrapolation of the past;
- Entrepreneurs are also the creators of deliberate actions. Looking for markets that have never been explored, human needs that were never met, and their motto is: "inventing in the future".

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The range of possible answers and behavior are determined by the skills and abilities of organizations. There are two factors that determine the capacity of managers:

- The competence (knowledge leading to strategic behavior);
- Capacity (volume of strategic work).

One of the main attributes is the strategic problem solution approach comprising the individual skills, personal knowledge along with group dynamics. The reactive method of solution the problem demands through strategic systematic analysis of the causes, with the use of analytical procedures to identify all the possible alternatives and to establish explicit and quantified relationships between variables, and select the best alternative ("great") (Ansoff, 1978).

Another attribute of the empowerment of managers is the leadership in the definition and implementation of the strategy, requiring dexterity to capture and direct social energy. A fourth element of the competence of the Manager is to support in decision-making, which assumes the existence of a surveillance process of future-oriented strategic information and we can call the *informational skills* of Manager

The information about the future possibilities comes from the surroundings and the company's performance capabilities, and industry or in the field, which means that the company has access to information about your performance and that of its competitors. It also has access to information about the events and forces that determined the performance, as well as what the capabilities and skills that has developed within a specific period of time.

Strategic information this is relevant information that enables organizations to have a better *performance* through active exploration of *information imperfections* of the market and product factors (Truijens, 2001).

Strategic Information Research

The behavior is influenced by external factors, such as the turbulence of the surroundings, the addiction resources, organizational factors, such as the nature of the business and the strategy adopted, informational factors (availability and quality of information) and personal factors, such as knowledge or cognitive style. The study of situational dimensions organizational strategies, information needs and personal characteristics of the behavior.

The situational dimensions are studied for the measurement of perception of uncertainty about the environment, a concept that is strictly related to the perception of the environment analysis of the search template-interpretation. The organizational strategy refers to the positioning or to the attitude of the organization before the surroundings (Ansoff, 1965, Porter, 1980, Andrews, 1965, Grant, 1996, Prahalad and Hamel, 1990, Pfeffer and Salancik, 1978, Miles and Snow, 1978, Mintzberg et al., 1976, Grant, 1996, Daft and Weick, 1984).

The characteristics of managers include the specialties, the level of the hierarchy and the cognitive style. The note as a behavioral form comprises the information needs, information and use of information. In the context of the observation of the surroundings, the information needs are often restricted to the focus and scope of the research, particularly the sectors of the environment where research is more intensive. The research of information is examined in terms of the sources that are used for observing the surroundings, as well as the organizational methods and systems adopted for the note. Finally, the use of information is seen in support of strategic decision making.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

What can be determined from a survey that was completed through observation of the surroundings, as a learning model of organizational strategy? A summary can include the following observations (Choo, 2002):

- **Situational Dimensions:** *The effect of perception of uncertainty of the surroundings*. The managers who understand the uncertainties of the surroundings will tend to search better. The uncertainties are indicated by the complexity, dynamics and importance of the sectors that comprise the surroundings.
- **Strategy:** *The effect of perception of the uncertainties of the surroundings*. The organizational strategy is related to the sophistication and scope of activities. This should provide the information that allows defining the strategic alternatives and the choice of the optimal strategy.
- **Characteristics of Managers:** *Effects of managers' work and the cognitive characteristics of observation.* Top managers seem to observe more than lower level managers. Functional managers observe beyond the limits of their expertise.
- **Information Needs:** *The focus of the observation of the surroundings*. Many studies observe various contexts of the surroundings: customers, competitors, suppliers, technology, social, political and economic conditions. The focus of the note related to the strategy is industry-related markets.
- **Sources of Information:** *Usual and preferred sources*. Although managers use many sources, they prefer the formal personal sources, impersonal sources especially when researching information about the development of potential markets in this sector.
- **Information Search:** *Methods of observation*. Organizations use a variety of methods, depending on their size, dependency and perception of surroundings, observation and experience in the industry in which they are competing.
- **Use of Information:** *Strategy and organizational learning*. The information under observation is used increasingly in the definition of the strategy. The effective observation is related to the improvement of organizational learning and performance.

The Analysis of the Surroundings and the Organizational Intervention

Each change in surroundings passes through a natural evolution that progressively increases the knowledge. In the initial stage, it is possible to identify weak signals of the General State of the changes and the consequences of these signs are still subject to uncertainty, since the signs are based on conjecture and not on performance.

This means, that as the escalation of change and the complexity of the surrounding environment develops, knowledge increases (or decreases the ignorance), associated with all the changes, if explicit through one or more information and whose content is taken into consideration in the elaboration of alternatives to evolution.

Another factor that characterizes the new phenomena related to changes in the environment are the successive States of knowledge whose speed of evolution differs, becoming one of the useful measures of speed, the time that elapses until the full impact on organization, in each successive State of knowledge.

Changes are increasingly coming from sources of information that are outside the historical boundaries of industry and becomes more and more difficult to recognize them and their implications. The predictability of change of surroundings has been decreasing steadily. The importance of predictability

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

depends on the magnitude of the impact and the time required for the affected organization respond to change. If the impact is small and the response quick predictability is of no importance.

However, the detection of a signal of change with enough anticipation, allowing time for strategic decision making, can be important when the change is sequential. If the change is completely new requires additional time to assemble the appropriate resources to change. In any case the response time is always a function of knowledge that organizations have to start their answer.

In the case of change be known all the information is available and the various components of the response can be planned and executed in an efficient sequence. If the answer is initiated in advance, the strategies possible alternatives will be limited by the available information. More and more managers are pressured to shorten response time, by analyzing and interpreting the information available and or of the signs (weak or strong).

By extrapolation forecast techniques and the related decision-making methods used become inadequate, the fact that only work when the results of the responses can be quantified. Non-extrapolation prediction techniques (opportunities and threats analysis) uses new information (signals), but less complete (qualitative).

For changes that occur today, a timely response is only possible if the change is perceived before formulating the strategy, namely, enabling organizations to respond to weak signals (information) produced by a change in the initial state of their development. The appropriate methods for the collection, selection, analysis and interpretation of information (signs) about the evolution of the environment, as well as the necessary skills to deal with this information reveal the State of knowledge that the Organization has to start the reply, the in order to respond effectively to changes in the environment- *awareness* of the need for strategic decision-making or the identification of opportunities (the discovery phase).

Learning in advance enables organizations to prepare to face the changing processes, through the adjustment of its capabilities and competencies to the turbulence and the complexity of the environment, in order to lessen the impact.

One of the key points for effective strategy formulation process is, on the one hand, the use of a filtering process of strategic information about the surroundings and on the other, the establishment of a prospective vision of the set of challenges with which the Organization will be faced in the future, in order to enable the Organization to anticipate the opportunities and threats in new opportunities (Prahalad and Hamel, 1994).

The signs (information) early warning turn into competitive advantages for the organization that earlier can "detect", so it is important to adopt methods that help detect signs of change (weak or strong signs) and to react to the first signs in order to improve their competitiveness.

Strategic information filtration focuses on the set of economic changes, technological, socio-cultural, legal, environmental, political and other affecting global and immediate surroundings of the Organization (competitors, customers, suppliers, products surrogates and other).

The sources of information are two: the surroundings characterized by the level of turbulence and complexity and their own organizations. Companies that do not record the information about their performance (past), nor are they aware of the evolution of the surroundings, there are typically a point of satisfaction, whose threshold is a crisis. They are facing the problems of everyday life and the managers do not have any shared expectations about the future.

The companies that record the historical information, but who are not attentive to the evolution of the environment, have a sense of history, thanks to the records of historical information about the past performance or memory shared by managers. There is a third set of companies that are aware of both the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

history and the future environment and record information about the various events and transactions from the past. Information can be obtained through informal contact with the surroundings, to the sophisticated systems that seek to identify the significant signs, in addition to the immediate perceptions of managers.

Typically, only a part of the available information is collected, analyzed and treated by the companies, since they are filtered through the filters of thorough analysis (research). Organizations that have no formal system for information support in strategic decision making, the filters are personal limitations of dexterity of the "analysts" and or of the managers, in order to observe, analyze and interpret the information. If there are formal systems, filter characteristics are determined by the system support technology.

If the observation capacity of managers or "analysts" is more limited or narrower than the target of turbulence and the complexity of the environment, the research filter deletes important opportunities. As a result the vision of external reality is incomplete and inaccurate. If the organization does not have a strategic information monitoring process, it will go directly to the decision maker, who will interpret and analyze it in detail.

The decision-maker will use the information to form his own personal expectations about the possible future of the company. In doing so, he judges the validity and reliability of the information being researched and thus subjects it to the perception filter. The limits of this filter are established by the personal strategic culture, by personality and previous experience of managers. The cultural filter determines the richness of the information used by managers in making strategic decision.

The perception of changes in the surrounding environment uses both historical information and the conversion of detected signals into information and knowledge of potential future demand. This provides a more reliable basis for predictable performance than a direct extrapolation of the past (Prahalad and Hamel, 1994). If the filtering process of strategic information is not sufficiently adequate to address the full extent of the changes would not be able to realize all the wealth (potential) (Ansoff, 1978, pp. 140-144).

The Quality of Strategic Information

The strategy is concerned with attuning, on the one hand, to what is within the organizations and on the other hand what is outside the organizations. The quality of this tuning is limited by the *quality of strategic information* that is fed, the main function of the strategic is a "*survey*" of the surroundings in order to detect the changes, analyze them and interpret them in terms of performance potential of the Organization (opportunities). This is a complex process, based on information and or signs (weak and strong) both objectives as subjective. The result is the objective perception of the reality of the environment, a set of beliefs (performance expectations) about what is going to happen, that is, the performance that managers believe to be possible (Ansoff, 1990).

There are two sources of *strategic information* that contribute to expectations. One source is the inside information about the abilities and skills (often called strengths and weaknesses) to deal with the aspects not characterized by the perception of the future environment that is, allows:

- The transformation of industry and / or sector;
- Increase the results through new niches beyond market share;
- Provide a *Strategic Architecture* – dreaming about what you can do with the knowledge and with the known resources;
- Designing the strategy as an override, any more than an adaptation of ambitions to the surroundings;
- Make progress on the competitors, in the diffusion and commercialization of the products;

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- Striving for leadership on key skills for business,

The second source is the environment that provides the information (weak and strong signals) about the changes and the complexity. When the changes are significant is "important to be informed about the enemy and the battle, allowing the first advantages that moves, that is, one who occupies first the battlefield and awaits your enemy is at ease; who comes to the scene and rushes to fight are tired "(Sun Tzu, 1971). This information allows the Organization to search for shaping the future; however, the intentions may be frustrated by chance and by ignorance (Clausewitz, c., 1989).

In small organizations, the process is informal, the manager says, and at the same time does not clarify the sequence and interaction between the various elements. The main element is the *strategic culture* of the Manager, which determines both the temporal perspective in which he realizes the surroundings, as the alternatives he accepts as credible. The culture acts as a lens or filter perceptive, which, in its turn, establishes the assumptions of decisions of managers (Snodgrass, 1984).

If the temporal perspective coincides with the time horizon required by the speed of change and the complexity of the environment, the perspective of the Manager is in tune with the turbulence of the surroundings. If the time perspective of the Manager is lower than the speed of change have a myopic perspective, otherwise we have a thoughtful perspective. A myopic perspective is caused by poor quality of strategic information and the Manager will have inaccurate performance expectations. The advantage of a prescient perception allows the Manager to understand the trends of the turbulence of the surroundings and avoid surprises, predict and respond to threats and opportunities (Ansoff, 1990).

There are other factors besides the culture that contributes to the vagueness of the expectations formulated informally, such as the limited power of observation of the surroundings, the limitations of the Organization, of the knowledge and experience of managers. Immersive media stable and reactive intuition and experience are useful, but they become inadequate in environments characterized by anticipation and exploration/creation.

The surveillance of strategic information (collection, sorting, processing and analysis) can be carried out by specialized teams who then submit the alternative decision-makers for strategic decision making and or by their own managers. The formal process is explicit and sequential. The insights are drawn up by the technical teams and or by the managers, being then converted in visions by the managers.

The formal forecast is subject to the same limitations inherent in the informal process, IE is limited by the filter forecasting methodology used to make predictions. Stable competence relies on experience and does not perform any "poll" or formal forecast. Reactive competence goes beyond past performance formally. The competence characterized by anticipation incorporates the extrapolation of formal performance (Ansoff, 1978).

These approaches are based on the assumption that the future will tend to be a natural extension of the past and are unable to understand the significant changes, as well as the possible discontinuities. The skills characterized by inquiry and creation using techniques that make the prediction of likely deviations from the past. However collect some information about the potential future.

So the technology used for the prevention interposes a filter between the decision-makers and the surroundings. A myopic filter that is narrower than the turbulence and the complexity of the environment, will present inaccurate information to the Manager. A filter tuned to reflect adequately the surroundings, since the turbulence level is stable. A thoughtful filter will make a forecast of changes in turbulence (Ansoff, 1978).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The tuning filter with the surroundings is used through the cultural perspective of the decision-makers. If the cultural perception filter is narrower than the prediction, the Manager will restrict further the perception of surroundings future, rejecting as inaccurate or irrelevant information that are inconsistent with your experience.

The accuracy of the performance expectations of an organization is limited or for prediction filter or the filter of perception, depending on which of the two is narrower. When the narrower filter deletes environment important trends and probable events, performance expectations are inaccurate, regardless of the computational and refinement of forecasting methodology.

Knowledge and awareness of expectations whatever their quality, are limited to a small number of participants who are the most knowledgeable about the environment or about the capabilities and distinctive competences of organizations. Usually the most numerous group of managers dealing with internal operations, have little concern about what will happen with the Organization, for which they have little knowledge of what will be its future.

The communication opportunities of important strategic information managers are considerably higher in large organizations than in small and medium-sized. However there are some limitations. One is the limitation of prediction systems, which slows down the organizational awareness with regard to major changes in the environment. Another is the limitation of information to "strong signals", which deprives the Organization of an appropriate notice of changes (weak signals) that develop quickly.

The Problems of Strategic Decision Making

The fact that all organizations are a more or less coherent whole and whose dynamism depends on the people who work in it, that is, make decisions to solve problems, shows clearly the relationship between the concepts of decision and of system. This means that the science of organizations is based on two theoretical foundations: theory and systems theory. However, most of the theorizing in the field of strategic management has evolved from the concept of the Act or decision from open system.

The model of decision of economic theory of the firm, with the linear concept of input-processing-output, always used a mechanical model in which entries are the inputs and the outputs are the products and or services. This template is very far from what might be called a model of open system. This is rather a model of circular nature. Linearity combined with efficiency, that is, profit maximization goal will be the limit.

The model of decision making is too rational and cognitive, insofar as a person or at best a group of homogenous decision can make strategic decisions. The decision model is strongly linked to the rational Manager (s) (s) who know (m) all even when the Act of deciding is considered sophisticated and bad structured. The decision-making model points to the Manager (s) who takes (m) decisions, but at the cost of excessive simplification of the organizational model.

The market structure or in other words, the global environment (affects all or almost all organizations of any industry) and immediately (only affects the industry or sector in which the organization is inserted) is too important to survival and to the autonomy of the organizations, that is, so that they do not lose the relative freedom and flexibility to react appropriately to the needs of society.

The clear separation between the Organization and its surroundings, which fits this half or top placement, maintains through its capacities and skills, give us clues about the role and the place that organizations should occupy in society and on how they should be managed in order to carry out your function properly. However, there is another dilemma that is the exercise of power, that is, the generation

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of changes and acceptance of the influence, i.e. the absorption of change. It is an approach to strategic decision-making in type-out or outside-in.

There are some models of strategic analysis from the analysis of the environment for the adaptation of the Organization to that same media that is, from the outside in, that is, the chosen strategic alternative adapts to the changing and tendencies of the surrounding environment (ex: Andrews, 1965, Ansoff, 1965, Porter, 1980). These models assume that the "*organizational structure follows the strategy*", who means that the internal structure of an organization is dictated mainly by strategy and those priorities, are reoriented in the sense that strategy formulation is the most important task of management, which allows the organization:

- Leave from the situation of the environment as it is for decisions that in fact are based on subjective interpretation and analysis of the situation;
- Keep alive the institutionalization of values, in order to generate certain consensus about what to do;
- Select in advance the portion of the surroundings (segmentation that is important at the moment) (Porter, 1980);
- Differentiate the internal system in order to approach the stability by building different types of boundaries between subsystems;
- Flexibility in changing from one strategy to another.

Other models from the analysis of the capacities and skills of internal resources for the definition of the most appropriate strategic alternative to existing resources, i.e., from the inside to the outside, so as to influence the structure of the industry, namely, seek to build their own future (ex: Barney, 1987, Robert Grant, 1987, Gary Hamel and Prahalad, 1995, Mintzberg, 1976).

Managers need relevant information, but often are victims of abundance of irrelevant information, generated by the macro-economic system and by organizations and the inadequacy and inappropriateness of the necessary information for decision making strategic (Ackoff, 1967, Smith, 1978). The more information the human brain attempts to receive less information gets in reality (Streufert, Driver and 1969).

In this context, the managers are currently with very serious problems relating to information, since it is scattered by the Organization and requires great effort to locate and integrate. The important information, sometimes, are retained exclusively by other managers and usually arrive late and sometimes unreliable.

The power to make decisions does not give anyone, neither the information nor the cognitive capacity necessary for decision-making. The decision-making process consists of a series of steps: the selective collection of information to pass to the decision maker, the treatment of information to advise the decision-maker, the exercise of choice (strategic alternatives), that is, determining what to do (take the strategic decision), the permission to do what you chose and finally the implementation of what has been decided and authorized (implementation of the strategy).

The power related to the decision-making process tends to stay at the level at which the necessary information can be accumulated in an effective way, to various levels of management. Regardless of the model of internal configuration top managers always retain the power of decision related to the strategic management.

Are multiple factors, both internal and external organizations that influence in a way important decision-making. This situation is forcing top managers to a constant analysis of these factors, in order

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to achieve the objectives. To achieve the desired balance, one of the stocks that the managers practice with appropriate diligence is the strategic decision making.

This action requires a process of reasoning by which, from the detection of changes in the environment, collecting information in a selective way that allows to clarify its characteristics, both as exogenous and endogenous impact in your organization and that allows take the strategic decision. The collection of information and the treatment your present no great difficulty. About the internal situation the organizations have today-management information systems, whose usefulness to the operational management and coordination has been widely demonstrated, although to the level of top management is only applicable in some cases.

The final product of strategic decisions is simply misleading, insofar as they choose a combination of products and markets is obtained by the addition of new products and markets, abandonment of old products and markets and the expansion of the current position. The change requires a redistribution of resources of the company – a pattern of disinvestment and investment in acquisition activities of other companies, in the development of new products, distribution channels, advertising, etc.

The solution of any problem of decision making requires an awareness of the need for a decision or opportunity (discovery), the formulation of alternative actions, the evaluation of these alternatives in terms of their respective contributions and the choice of one or more alternatives for the purposes of execution. The perception of needs is an important aspect of strategic decision making, since it is a method that allows conditions to choose between a continued concern with the operational problem and some attention to the strategic problem, leaving a key part to intuition and subjective judgments. A method is needed that creates conditions for a permanent research activity and a diagnosis of the need for strategic decision making.

The search for alternatives is an iterative process which covers the products and the traditional markets of the company, the research and development projects already running, and a list of the companies interested in a merger. Other alternatives may include market opportunities and joint ventures with other organizations.

Partial ignorance conditions pose two problems: a leading the company in an active search of attractive opportunities and the other is the allocation of the limited resources of the company between the opportunities that have been identified and those that are to arise. The evaluation uses the long-term profitability as evaluation standard. However, there are some difficulties to make projections regarding the company's position in terms of products and markets.

CONCLUSION

Although it is recognized for long time, many strategic decisions are made with incomplete information, the tendency is to give more weight to internal information and over competitors, than to information about the environment (surrounding), which can often lead managers ' preferences in making strategic decision.

Decision-making of managers considers only the variables that are less susceptible to influence, by lack of information. The decision on the lack of information can have immediate impact and or in the medium and long term. In decision making, and managers or customers rarely have all the information.

However, when complete information is available for all the alternatives, it is possible to make comparisons between variables and it is much easier to make the decision. The most widespread problem

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is that managers do not have complete information of all variables. Although the importance of this problem has been recognized for a long time, we know very little about the decision-making under incomplete information.

Strategic decision-making under incomplete information has important practical implications. Managers today have greater control over the information they provide or not to customers and how this information is presented. For example, comparing the traditional distribution channels, with those who use the *Internet* or catalog, administrators have more control over the information made available on the *Website* (complete or incomplete).

Given the abundance of information available, the managers can "draw" the information they consider as the most attractive to strategic decision making. Incomplete information can often lead to inadequate alternatives preference, although the effect may not be easily observed, since the managers choose, at the time, one of several alternatives. The lack of information may have systemic effect comparative trials.

The strategic decision is based on scientific principles and lies between the right and the uncertain commitment. The strategic add a hyphen process absorbs the time decision-makers. The effectiveness of the strategic decision is intrinsically based on the use of the highest level of conceptual knowledge, the actions that are deduced fall within the limited scope of the capacity of those who have the responsibility to implement them, ie decision making has its own systematic process and its clearly defined elements.

In a historical perspective, the relationship between the ecosystem of the company its strategy and the organizational structure gave rise to the development of the theory of the company from the point of view of the decision-maker (Chandler, 1962, Sloan, 1964, Cyert and March, 1970). Regardless of differences in point of view and of the concepts, these complement each other because each one is concerned with a different aspect of the general problem of *making decision*.

Rational decision making requires the acquisition of information and the processing thereof, in addition to the capacity of organizations. In practice, organizational add a hiffen part of a rational idea and depends on:

- Clarity of objectives of the organization which run counter to the preferences and choices (objectives ambiguity or conflict).
- Uncertainty or quantity of information about methods and processes by which the objectives are defined (technical or procedural uncertainty).

We can consider four modes: rational decision-making, political, procedural and anarchic. Rational mode, when the objectives and the procedures are clear, the choice is guided by the performance of programs. Makers simplify their representations of the strategic problem, satisfy more than maximize information search and follow routinized procedures or actions programmer.

Procedural mode, when the strategic objectives are clear, but the methods to achieve them are not, policy-makers are divided the process into three phases: the ID that recognizes the needs of information for decision making and develop an understanding of issues of decision. The active development of information research and develops one or more strategic alternatives. The selection it is the phase evaluates the alternatives and chooses the alternative best suited to be implemented. This process is highly dynamic with many internal and external factors stopping and changing the time and the direction of the decision-making process.

Political objectives mode are contested by individual or group interests, but the procedural sequence leaves between the groups: each group believes that your preferred alternative is best for the organiza-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tion. Decision-making and actions are the result of negotiating power between the groups, in pursuit of its interests and in handling the evaluation of instruments of influence.

In the anarchic way, when the objectives and procedures are highly uncertain, decision-making consists of very varied forms, number of participants in decision-making, choice of identified and abandoned opportunities. Decision making happens when the choice and the participants coincide, have the interest, time and energy to do so.

ACKNOWLEDGEMENT

The strategic management and the information is a little science developed, in which the information (in broad sense) is treated as a potential strategic resource. Obviously, you're not thinking in cases where the information is a commodity asset, e.g.. in companies that sell information.

The Profº George Leal Jamil asked for my help in the study and participation in the drafting of this chapter. If we consider realistically that the operation in perfect competition is a utopia so the opacity or asymmetry of information can be sources of competitive advantage. For that market imperfections are managed, the Organization has to provide specific capabilities for the collection and processing of data, selective dissemination of information, and creation of specific knowledge that will have to be carefully managed. After all, the secret is the soul of business.

The emergence of "competitive intelligence", always distinguished by the military and diplomats, must not only enable understand others, including rivals, as the abilities and motivations permitting to anticipate future behaviors, but also regarding the ignorance and the idiosyncrasies of their myopia underlying visions.

Instead of the theme of the chapter is consideration of standardized information management support. In this context, information is the raw material of the decision-making process, whether strategic, operating either. To your collection and treatment procedure are target of numerous scientific disciplines associated with decision theory, information systems, etc. The strategic management encompasses both the strategic decision, concerning the relationship between the Organization and the surroundings, whether the operational decision.

REFERENCES

Andrews, K. R. (1980, November). Directors Responsibility for Corporate Strategy. *Harvard Business Review*, 28–43.

Andrews, K. R. (1981, May). Replacing the Board's Role in Formulating Strategy. *Harvard Business Review*, 18–27.

Andrews, K. R. (1982). Corporate Strategy as a Vital Function of the Board. *Harvard Business Review, 59*(6), 174-184.

Andrews, K. R. (1971). The Concept of Corporate Strategy. Irwin.

Andrews, Learned, Christensen, & Guth. (1965). *Business Policy.* Irwin.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ansoff, H. I. (1965). *Corporate Strategy*. New York: McGraw-Hill.

Ansoff, H. I. (1975). Managing Strategic Surprise by Response to Weak Signals. *California Management Review*, *18*(2), 21–33. doi:10.2307/41164635

Ansoff, H. I. (1978). *Strategic Management*. Macmillan.

Ansoff, H. I. (1984). *Implanting Strategic Management*. Prentice Hall International.

Ansoff, H. I. (1985). Conceptual Underpinnings of Systematic Strategic Management. *European Journal of Operational Research*, *19*(1), 2–19. doi:10.1016/0377-2217(85)90303-0

Ansoff, H. I., & Mc Donnell, E. (1990). *Implanting strategic Management* (2nd ed.). New York: Prentice Hall.

Blanck, M., & Janissek-Muniz, R. (2014). Inteligência estratégica antecipativa coletiva e crowdfunding: Aplicação do método L.E.SCAnning em empresa social de economia peer-to-peer (P2P). *RAUSP*, *49*(1), 1–17. doi:10.5700/rausp1140

Blanco, S. (1998). *Gestion de l'information et intelligence stratégique: cas de la selection des signes d'alerte précoce* (PhD thesis). Univ. de Grenoble 2.

Boyd, B., & Fulk, J. (1996). Executive Scanning and Perceived Uncertainty: A Multidimensional Model. *Journal of Management*, *22*(1), 1–22. doi:10.1177/014920639602200101

Buzzell, R. D., Bradley, T. G., & Sultan, R. G. M. (1975, January). Market Share: A Key to Profitability. *Harvard Business Review*, 97–111.

Chandler, A. D. Jr. (1962). *Strategy and Structure: Chapters in the History of the Industrial Enterprise*. Cambridge: MIT Press.

Choo & Auster. (1993). Environment Scanning: Acquisition and Use of Information by Managers. Annual Review of Information Science and Technology.

Choo, C. W. (1997). *Organizations as Information-use Systems: A process model of information management.* PrimaVera Working Paper 1997-17, University van Amsterdam.

Choo, C. W. (1998), The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge and Make decisions. Oxford University Press.

Choo, C. W. (2002). *Environment Scanning as Information Seeking and Organizational Knowing.* PrimaVera Working Paper 2002-01, University van Amsterdam.

Choo, C. W. (2002). *Information Management for the Intelligent Organization: The Art of Scanning the Environment (3rd ed.)*. Medford, NJ: Information Today, Inc.

Choo, C. W. (2008). *The knowing organization*. Oxford University Press.

Choo, C. W. (2009). Information use and early warnings effectiveness: Perspectives and prospects. *Journal of the American Society for Information Science and Technology*, *60*(5), 1071–1082. doi:10.1002/asi.21038

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Christensen, C. R. (1997). *The Innovator's Dilema: When New Technologies Cause Great Firms to Fail*. Boston: Harvard Business School Press.

Christensen, C. R., Andrews, K. R., Bower, J. L., Hamermesh, G., & Porter, M. E. (1982). *Business Policy: Text and Cases (5th ed.)*. Homewood, IL: Irwin.

Cyert, J. J., & March, J. G. (1963). *A Behavioral Theory of Firm*. Prentice Hall.

Cyert, J. J., & March, J. G. (1970). *Processus de Décision dans L'entreprise, Dunod, d'alerte précoce*. Colloque VSST 2001, Paris, France.

Cyert, J. J., Richard, M., & March, J. G. (1992). *A Behavioral Theory of the Firm (2nd ed.)*. Oxford, UK: Blackwell.

Daft, R. L., Sormunen, J., & Parks, D. (1984). Chief Executive Scanning Environmenal Caracteristics and Company Performance: An Empirical Study. *Strategic Management Journal*, *9*(2), 123–139. doi:10.1002mj.4250090204

Daft, R. L., Sormunen, J., & Parks, D. (1988). Chief Executive Scannning, Environment Characteristics and Company Performance: An Empirical Study. *Strategic Management Journal*, *9*(2), 123–139. doi:10.1002mj.4250090204

Daft, R. L., & Weick, K. E. (1984). Toward a Model of Organization as Interpretation Systems. *Academy of Management Review*, *9*(2), 284–295.

Drucker, P. (1970). Entrepreneurship in Business Enterprise. *Journal of Business Policy,* (1), 3-12.

Duncan, R. B. (1972). Characteristics of Organizational environments and Perceived Environment Uncertaint. *Administrative Science Quarterly*, *17*(3), 313–327. doi:10.2307/2392145

Elfring, T., & Volberda, H. W. (1998). New Directions in Strategy: Beyond Fragmentation. Sage.

Freitas, H., & Janissek-Muniz, R. (2006). Uma proposta de plataforma para Inteligência Estratégica. Texto indicado ao II Prêmio de Inovação em Inteligência Competitiva da ABRAIC, e recebeu Menção Honrosa. III ENA – Encontro Nacional da ABRAIC. *Anais. Congresso Ibero Americano de Gestão do Conhecimento e Inteligência Competitiva*.

Grant, R. (1998). A Resource-Based Approach to Strategy Analysis – A Practical Framework (3rd ed.). Blackwell Business.

Hogart & Makridakis. (1981). Forecasting and Planning: An Evaluation. *Management Science, 27*(2), 115-138.

Holopainen, M., & Toivonen, M. (2012). Weak signals: Ansoff today. *Futures*, *44*(3), 198–205. doi:10.1016/j.futures.2011.10.002

Janissek-Muniz, R., & Blanck, M. R. M. (2014). *Gestão de sinais fracos, empreendedorismo e incerteza: um ensaio teórico relacional sob a ótica da inteligência*. Paper presented at CONTECSI, 11, São Paulo, Brasil.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Janissek-Muniz, R, Freitas, H., & Lesca, H. (2007). *A Inteligência Estratégica Antecipativa e Coletiva como apoio ao desenvolvimento da capacidade de adaptação das organizações*. Paper presented at CONTECSI, 4, São Paulo, Brasil.

Janissek-Muniz, R., Lesca, H., & Freitas, H. (2006). Inteligência Estratégica Antecipativa e Coletiva para Tomada de Decisão. *3rd CONTECSI - International Conference on Information Systems and Technology Management and 11th WCA - World Continuous Auditing Conference*.

Kärkkäinen, H., Piippo, P., Puumalainen, K., & Tuominen, M. (2001). Assessment of hidden and future customer needs in Finnish business-to-business companies. *R & D Management*, *31*(4), 391–406. doi:10.1111/1467-9310.00227

Lesca, H. (1986). *Systèmes d'Information pour le Management Stratégique de l'Enterprise*. Paris: McGraw-Hill.

Lesca, H. (1995). The crucial problem of the strategic probe: The construction of the puzzle. *CERAG, ESA, série Recherche, 95*(2), 24.

Lesca, H. (2001). Veille stratégique: passage de la notion de signal faible à la notion de signe d'alerte précoce. *Actes du colloque VSST,* 1, 98-105.

Lesca, H. (2003). *Veille stratégique: la méthode*. L:E:SCAnning®, Editions EMS.

Lesca, H., & Almeida, F. C. (1994). Administração Estratégica da Informação. *Revista ADM*, *29*(3), 66–75.

Lesca, H., & Blanco, S. (2002). *Contribution à la capacite d'anticipation des entreprises par la sensibilisation aux signaux faibles*. Paper presented at Congrès International Francophone Sur La Pme, Montreal, Canada.

Lesca, H., & Lesca, N. (2011). *Weak signals for strategic intelligence anticipation tool for managers*. Hoboken, NJ: Wiley. doi:10.1002/9781118602775

Leszczynska, D., & Lesca, H. (2004). *Veille Stratégique: utilité des « informations de terrain » pour la PME-PMI à la recherche de nouveaux débouchés produit/marché*. Etude d'un cas. Cahier de Recherche CERAG (Grenoble) – IAE (Nice), CERAG UMR 5820 CNRS.

Mahoney, J., & Pandian, J. R. (1992). The Resource-Based View Within The Conservation of Strategic Management. *Strategic Management Journal*, *13*(5), 363–380. doi:10.1002mj.4250130505

Makridakis, S. (1990). *Forecasting, Planning, and Strategy for the 21st Century.* Free Press.

March & Simon. (1958). *Organizations*. John Wiley.

March & Simon. (1993). *Organizations (2nd ed.)*. Cambridge: Blackwell.

Mayer, J. H., Steinecke, N., Quick, R., & Weitzel, T. (2013). More applicable environmental scanning systems leveraging "modern" information systems. *Information Systems and e-Business Management*, *11*(4), 507–540. doi:10.100710257-012-0207-7

Mendonça, S., Cardoso, G., & Caraça, J. (2012). The strategic strength of weak signal analysis. *Futures*, *44*(3), 218–228. doi:10.1016/j.futures.2011.10.004

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Miles & Snow. (1978). *Organizational Strategy, Structure and Process.* McGraw-Hill.

Mintzberg, H. (1946). *The Rise and Fall of Strategic Planning.* Free Press.

Mintzberg, H. (1972). Research on Strategy-Making. *Proceedings of the 32nd Annual Meeting of the Academy of Management*.

Mintzberg, H. (1977). *Planifier à gauche et gérer à droite.* Harvard-l'Expansion.

Mintzberg, H. (1978). Patterns in Strategy Formation. *Management Science*, *24*(9), 934–948. doi:10.1287/mnsc.24.9.934

Mintzberg, H. (1978). Strategy-making in Three Modes. *California Management Review*, *16*(2), 44–53. doi:10.2307/41164491

Mintzberg, H. (1979). *The Structuring of Organizations: A Synthesis of the Research*. Englewood Cliffs, NJ: Prentice Hall.

Mintzberg, H. (1980). Structure in 5's: A Synthesis of the Research on Organizational Design. *Management Science*, *26*(3), 322–341. doi:10.1287/mnsc.26.3.322

Mintzberg, H. (1981). *Organiser l'entreprise: prêt-à-porter ou sur mesure?* Harvard L'Expansion.

Mintzberg, H. (1982). Structure & Dynamique des Organisations. Les éditions d'Organisations.

Mintzberg, H. (1987a). The Strategy Concept: Five Ps for Strategy. *California Management Review, 30*(1), 11-24.

Mintzberg, H. (1987b, July). *Crafting Strategy*. *Harvard Business Review*.

Mintzberg, H. (1988). *Generic Strategies: Toward a Comprehensive Framework. In Advances in Strategic Management* (Vol. 5, pp. 1–67). Greenwich, CT: Jai Press.

Mintzberg, H. (1989). *Mintzberg on Management: Inside Our Strange World of Organizations*. New York: Free Press.

Mintzberg, H. (1990). Strategy Formation: Schools of Thought. In J. Frederickson (Ed.), *Perspectives on Strategic Management*. Boston: Ballinger.

Mintzberg, H. (1990). The Design School: Reconsidering the Basic Premises of Strategic Management. *Strategic Management Journal*, *11*(3), 171–195. doi:10.1002mj.4250110302

Mintzberg, H. (1991). Strategic Thinking as Seeing. In J. Nasi (Ed.), *Arenas of Strategic Thinking*. Helsinki, Finland: Foundation for Economic Education.

Mintzberg, H. (1994). *The Rise and Fall of Strategic Planning*. New York: Free Press.

Mintzberg, H., & Lampel, J. (1999). Reflexion about the Strategic Process. *Sloan Management Review*, *40*(3).

Mintzberg, H., & McHugh, A. (1985). Strategies Formation in Adhocracy. *Administrative Science Quarterly*, *30*(2), 160–197. doi:10.2307/2393104

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Mintzberg, H., Quinn, J. B., & Ghoshal, S. (1999). *The Strategy Process: Concepts, Contexts e Cases* (2nd ed.). Prentice Hall Europe.

Mintzberg, H., Raisinghani, D., & Thêorét, A. (1976). The Structure of Unstructured Decision Processes. *Administrative Science Quarterly*, *21*(2), 246–275. doi:10.2307/2392045

Mintzberg, H., & Waters, J. A. (1982). Tracking Strategy in an Entrepreneurial Firm. *Academy of Management Journal*, *25*(3), 465–499. doi:10.2307/256075

Mintzberg, H., & Waters, J. A. (1983). The Mind of the Strategist. In The Executive Mind. Jossey Bass.

Mintzberg, H., & Waters, J. A. (1984). R*esearching the Formation of Strategies: The History of Canadian Lady 1939-1976*. Englewood Cliffs, NJ: Prentice-Hall.

Mintzberg, H., & Waters, J. A. (1999). Of Strategies, Deliberate and Emergent. *Strategic Management Journal*, *6*(257), 252–272.

Mintzberg & Quinn. (1991). *The Strategy Process: Concepts, Contexts & Cases*. Prentice Hall.

Mintzberg, H., Ahlstre, B., & Lampel, J. (1998). *Strategic Safary: A Guide Tour Througth the Wilds of Strategic Management.* Prentice-Hall.

Nonaka & Takeuchi. (1995). The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation. New York: Oxford University Press.

Normann, R. (1977). *Management for Growth.* Wiley.

Pfeffer, J., & Salancik, G. R. (1978). *The External Control of Organizations: A resource Dependence Perspective*. Harper & Row, Nova Iorque.

Porter, M. (1979, March). *How Competitive Forces Shape Strategy*. *Harvard Business Review*.

Porter, M. (1980). *Competitive Strategy: Techniques for Analysing Industries and Competitors.* Free Press.

Porter, M. (1981). The Contributions of Industrial Organizations to Strategic Management. *Academy of Management Review*, *6*(4), 609–620.

Porter, M. (1982). *Choix stratégique et concurrence*. Paris: Economica.

Porter, M. (1984). *Vantagem Competitiva (5th ed.)*. Editora Campos.

Porter, M. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: The Free Press.

Porter, M. (1986). Changing Patterns of International Competition. *California Management Review*.

Porter, M. (1987). *From Competitive Advantage to Corporate Strategy*. Harvard Business Review, Maio-Junho.

Porter, M. (1990). *The Competitive Advantage of Nations*. New York: Free Press. doi:10.1007/978-1-349-11336-1

Porter, M. (1996, November). What Is Strategy? *Harvard Business Review*, 61–64. PMID:10158475

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Porter, M. (1999). *Competição: Estratégias Competitivas Essenciais (2nd ed.)*. Editora Campos.

Porter, M., & Millar, V. (1985, July). How Information Gives You Competitive Advantage. *Harvard Business Review*, 149–160.

Prahalad & Hamel. (1990). The Core Competence of the Corporation. *Harvard Business Review*, *68*(3), 79–91.

Prahalad & Hamel. (1994). *Competing for the Future, Breakthrough Strategies for Seizing Control of Yor Industry and Creating the Markets of Tomorrow*. Harvard Business School.

Prahalad, Barlett, Hamel, Stalk Jr., Mintzberg, Ohmae … Levit. (1999). *Estratégia - A Busca da Vantagem Competitiva* (6th ed.). Harvard Business Review.

Prahalad, C., & Betis, R. A. (1986). The Dominant Logic: A New Linkage Between Diver sity and Performance. *Strategic Management Journal*, *7*(6), 485–501. doi:10.1002mj.4250070602

Quinn, J. B. (1982). Managing Strategic Incrementally. *Omega, The International Journal of Management Science, 10*(6), 613-627.

Rossel, P. (2011). Beyond the obvious: Examining ways of consolidating early detection schemes. *Technological Forecasting and Social Change*, *78*(3), 375–385. doi:10.1016/j.techfore.2010.06.016

Rossel, P. (2012). Early detection, warnings, weak signals and seeds of change: A turbulent domain of futures studies. *Futures*, *44*(3), 229–239. doi:10.1016/j.futures.2011.10.005

Schoeffler, S. (1980). *Nine Basic Findings on Business Strategy*. Cambridge: The Strategic Planning Institute.

Schoeffler, S., Buzzell, R. D., & Heany, D. E. (1974, March). Impact of Strategic Planning on Profit Performance. *Harvard Business Review*, 137–145.

Schoemaker, P. J. H., & Day, G. S. (2009). How to make sense of weak signals. *MIT Sloan Management Review*, *50*(30), 81–89.

Schumpeter, J. (1934). *The Theory of Economic Performance*. Cambridge, MA: Harvard University Press.

Schumpeter, J. (1942), *Capitalisme, Socialisme et Démocratie*. Reedição, Payot.

Schumpeter, J. (1947). The Creative Response in Economic History. *The Journal of Economic History*, *7*, 149–159. doi:10.1017/S0022050700054279

Schumpeter, J. (1950). *Capitalisme, Socialisme et Démocratie* (3rd ed.). Harper & Row.

Schumpeter, J. (1959). History of Economic Analysis. Oxford University Press.

Schumpeter, J. (1963). *Teoria del desenvolvimiento económico*. Academic Press.

Shannaon, C. E., & Weaver, W. (1948). The Mathematical Theory of Communication. *Bell System Technical Journal, 27*, 379-423, 623-656.

Shannaon, C. E., & Weaver, W. (1949). *The Mathematical Theory of Communication*. Chicago: University of Illinois Press.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Shannaon, C. E., & Weaver, W. (1972). *The Mathematical Theory of Communication*. Urbana, IL: University of Illinois Press.

Smalter, D. J., & Ruggles, R. L. (1966, March). Six Business Lessons from the Pentagon. *Harvard Business Review*, 64–75.

Snodgrass, C. R. (1984). *Cultural Influences on Strategic Control System Requirements* (Ph.D. dissertation). University of Pittsburg.

Strauss, J. D., & Radnor, M. (2004). Roadmapping for Dynamic and Uncertain Environments. *Research Technology Management*, *47*(2), 51–58. doi:10.1080/08956308.2004.11671620

Tregoe & Zimmerman. (1980). *Top Management Survey.* Simon & Schuster.

Truijens, O. (2001). *Aspects of Information Strategy Formulation for Customer Orientationt.* PrimaVera Working Paper 2001-06, University van Amsterdam.

Truijens, O. (2001). *Information Strategy at TravelCom: searching for InfoRent in the Dutch travel industry.* PrimaVera Working Paper 2001-12, University van Amsterdam.

Truijens, O. (2001). Aspects of Information Strategy Formulation for Customer Orientation. *Proceedings Resource Management Association International Conference*.

Truijens, O. (2002). *Towards* a Resource-based Theory of Information Strategy. British Academy of Management Annual Conference 2002, Hammersmith, UK.

Tzu, S. (1978). *L'Art de la Guerre*. Paris: L'Impensé Radical.

Tzu, S. (1971). The Art of War. Oxford University Press.

Von Clausewitz, C. (1989). *On War*. Princeton, NJ: Princeton University Press.

Weick & Daft. (1983). The Effectiviness of Interpretation Systems. In Organizational Effectiviness: A Comparison of Multiple Models. Academic Press.

Weick, K. E. (1979). *The Social Psychology of Organizing* (2nd ed.). Random House.

Weick, K. E. (1990). Cartographic Myths in Organizations. In A. S. Huff (Ed.), Mapping Strategic Thought. New York: Academic Press.

Weick, K. E. (1995). *Sensemaking in Organizations*. Thousand Oaks, CA: Sage Publications.

Weick, K. E. (2000). *Making Sense of the Organizations*. Blackwell Publishers.

Wilensky, H. (1967). *Organisational Intelligence: Knowledge and Policy in Government and Industry*. New York: Basic Books.

Zald, M. N., & Berger. (1978). Social Movements in Organizations: Coup d' Etat, Insurgency and Mass Movements. *American Journal of Sociology, 83*(4), 823-861.

This research was previously published in the Handbook of Research on Knowledge Management for Contemporary Business Environments; pages 347-380, copyright year 2018 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 7
Critical Issues and Challenges

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 92
The Use of Software Tools in Linked Data Publication and Consumption:
A Systematic Literature Review

Armando Barbosa
Federal University of Alagoas, Maceió, Brazil

Ig Ibert Bittencourt
Federal University of Alagoas, Maceió, Brazil

Sean Wolfgand Matsui Siqueira
Federal University of the State of Rio de Janeiro (UNIRIO), Rio de Janeiro, Brazil

Rafael de Amorim Silva
Federal University of Alagoas, Maceió, Brazil

Ivo Calado
Federal Institute of Alagoas, Rio Largo, Brazil

ABSTRACT

To reduce the complexity intrinsic to LD manipulation, software tools are used to publish or consume data associated to LD activities. However, few developers have a broad understanding of how software tools may be used in publication or consumption of Linked Data. The goal of this work is to investigate the use of software tools in Linked Data publication and consumption processes. More specifically, understanding how these software tools are related to process of publication or consumption of LD. In order to meet their goal, the authors conducted a Systematic Literature Review (SLR) to identify the studies on the use of software tools in these processes. The SLR gathered 6473 studies, of which only 80 studies remained for final analysis (1.25% of the original sample). The highlights of the study are: (1) initial steps of the publication process are fairly supported by the software tools; (2) Non-RDF serialization is fairly supported in publication and consumptions process by the software tools; and (3) there are non-supported steps in consumption and publication processes by the tools.

DOI: 10.4018/978-1-7998-7297-9.ch092

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1. INTRODUCTION

In last decade, the evolution of the Web has increased the consumption and production of content. This growth implies in several challenges such as a longer time required to perform searches or browsing, data consistency problems, and misinterpretations. The users and machines perceive these challenges, as they are necessary to access a set of web pages to find relevant information. In addition, most of the data available on the Web are unstructured (images, blogs, web content, etc.), which means that machines are not able to automatically understand such data content. Therefore, it is essential to provide alternatives for structuring data in a machine understandable manner.

Linked Data (LD) is an effective option to structure such data, presenting a set of best practices for guiding publishing and connecting these structured data on the Web (Hyland & Wood, 2011). LD adopts a generic abstract data model for describing resources called Resource Description Framework (RDF). This framework is responsible for describing terms and their relationships, by using triples of subjects, predicates and objects. Additionally, ontologies may provide enrichment to Linked Data by adding semantics to their RDF statements (Heath & Bizer, 2011). Moreover, LD brings some benefits which may be applied in multiple research fields, such as data interoperability and terms definition (Bauer & Kaltenböck, 2011). Some applications of LD include Open Government (Ding, Lebo, Erickson, DiFranzo, Williams, Li, & Hendler, 2011; Shadbolt, O'Hara, Berners-Lee, Gibbins, Glaser, & Hall, 2012) (e.g. to improve of transparency and provenance), Education (Dietze, Yu, Giordano, Kaldoudi, Dovrolis, & Taibi, 2012) (e.g. to improve education repositories and content sharing), and Business (Barnes & Martin, 2002) (e.g. to improve business opportunities and business value).

LD is defined by both publication and consumption processes. Recently, W3C (2014) has published a list of 10 steps to fulfill LD publication requirements: (1) to prepare stakeholders; (2) to select dataset for reuse; (3) to model the data to represent data objects and their relationships; (4) to specify a suitable open data license; (5) to define URI for linked data; (6) to describe objects with standard vocabularies; (7) to convert data to a linked data representation; (8) to provide machine access to data; (9) to announce to the public; and (10) to establish a social contract of a linked data publisher. On the other hand, Bauer and Kaltenböck (2011) have published a list of 7 steps related to LD consumption process: (1) to specify concrete use cases for new services or applications; (2) to evaluate relevant data sources and datasets; (3) to check licenses for use and reuse provided by data owners; (4) to create consumption patterns to specify what data are reused from a certain data source; (5) to manage alignment, caching and update mechanisms; (6) to create mashups and applications to provide user-friendly graphical user interfaces (GUIs) and powerful services for end users; and (7) to establish sustainable partnerships.

Both aforementioned processes are essentials to improve data quality, interoperability, and discoverability of data, as well as to support the development of rich applications. Additionally, considering the number of steps and activities, it is important the development of tools for supporting Linked Data publication and consumption processes. Considering the huge number of Linked Data-related tools proposed recently (Bizer, Heath, & Berners-Lee, 2009), it is a time-consuming task, for publishers or consumers, to know the available features of each tool in order to make properly decision about software tools that should be used according to each step. For this reason, a high-level question was raised: Which software tools have been used to support the publication and/or consumption of Linked Data? In this context, our purpose is to identify what tools have been used to perform the aforementioned tasks, providing a broad vision about Linked Data software tools to publish and/or consume linked data. Additionally, we use the categories provided by W3C[1] to classify the software tools according to their features.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

There are some similar works that investigated the use of software tools to publish or consume Linked Data (Corlosquet, Delbru, Clark, Polleres, & Decker, 2009; Bizer et al., 2009). However, these studies do not capture all the aspects and evidences that we are interested, such as support and formats. Moreover, their work is somewhat limited, as they do not systematically review the literature to investigate the works that jointly cover software tools and Linked Data Publication and Consumption Process.

Therefore, in this paper we use the Systematic Literature Review (SLR) method to understand which software tools support publication and consumption of linked data. We utilize the method defined in (Kitchenham & Charters, 2007) to identify, evaluate, interpret and synthesize the available studies in order to answer particular research questions on the symbiosis of software tools for publication and/or consumption of linked data, and to establish the state of evidence with an in-depth analysis. Thought the analysis we generate six questions. These questions may guide new research line, software solutions, and discussion.

The rest of this paper is organized as follows: Section 2 describes the SLR method used in this review and primary results. Section 3 presents the quality assessment. Section 4 presents results. Section 5 presents a discussion about the results. Section 6 presents threats to validity. Finally, in the last section we present the conclusions and future work of this SLR.

2. SYSTEMATIC LITERATURE REVIEW

A systematic literature review (SLR) demonstrates the state of the art in some particular research field, evaluating findings related to a given research issue, a topic area, or even a phenomenon. It is worth to differentiate a SLR from a Systematic Mapping. According to Kitchenham et al. (2007), Systematic Mappings or Scoping Studies provide a wide overview of a research area. The results of a mapping study can identify areas suitable to conducting a SLR and areas where a primary study is more appropriate.

In this work, we adopt the guidelines proposed by Kitchenham et al. (2007) to conduct our SLR. We also adopt the tool called StArt (State of the Art through Systematic Reviews) (LaPES, 2012) to conduct our SLR, reducing errors inherent to the SLR process. This tool is validated in (Hernandes, Zamboni, Fabbri, & Thommazo, 2012), obtaining a high performance on the execution of a SLR.

In this work, we investigate the following research Main Question (MQ):

MQ → Which software tools support the publication and/or consumption of Linked Data?

According to Kitchenham et al. (2007), the main step for any systematic review is the definition of the research questions, since they are responsible for guiding the whole review process. Based on such assumption, and similarly to other systematic reviews (Dermeval, Vilela, Bittencourt, Isotani, & Brito, 2014), we elaborate three research questions in order to enable us to answer the MQ.

- **RQ1** → *Which are the linked data-based publication / consumption steps utilized by software tools in current literature?*
- **RQ2** → *Which serialization formats does the tool support?*
- **RQ3** → *Is the usage of software tool empirically evaluated?*

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

RQ1 provides a starting point to understand the software tools and the main approach (publish/consume) supported by them. This question is responsible for identifying the steps of the publication and of the consumption process supported by the software tools. RQ2 identifies the main serializable formats (RDF, OWL, JSON, CSV, XML and others) used for publishing or consuming linked data. Finally, RQ3 intends to analyze if such studies provide an empirical evaluation of the software tools. Besides, Table 1 presents the central motivation for each research question.

Table 1. Research Question Motivation

RQ	Motivation	Research Question
RQ1	In general, tools support only some steps of the publication/consumption process. In this context, it is important to determine for each analyzed tool the exact set of supported steps.	Which are the linked data-based publication / consumption steps utilized by software tools in current literature?
RQ2	Considering there are different serialization formats available, we want to determine the formats that each analyzed tool supports.	Which serialization formats do the tool support?
RQ3	The evaluation of a publication / consumption tool is essential to quantify the effectiveness of the analyzed tool. So, we intend to verify which empirical evaluations were applied for each tool.	Is the usage of software tool empirically evaluated?

The step II defines inclusion and exclusion criteria adopted in this work. According to Kitchenham et al. (2007), criteria in the SLR process identify those papers that provide direct evidence about research questions, reducing a possible bias. We adopted two types of criteria in the SLR: (1) inclusion criteria; and (2) exclusion criteria. The former defines all the necessary requirements in order an article must be considered in the SLR process. The latter defines all the requirements for an article not to be included in this process. We considered primary papers (those that present some proposal in the area) in the inclusion criteria whereas secondary papers (i.e. those that only review an area topic such as a SLR) in the exclusion criteria. Regarding to publication date, studies are eligible for inclusion in the SLR process whether they were peer-reviewed and published from January 2006 until December 2015. In the other hand, a paper is excluded from the process whether it belongs to some exclusion criteria defined in Table 2.

Table 2. Inclusion and exclusion criteria

#	Inclusion Criteria	#	Exclusion Criteria
1	Papers about tools for publishing and/or consuming linked data	1	Papers in other language than English
2	Primary Studies	2	Short Papers
3	Computer Science Papers	3	Duplicated Studies
4	Only Papers in English	4	Secondary Studies
5	Papers between Jan. 2006 and Dec. 2015	5	Papers only about tools
6	Papers which answer the research questions	6	Papers only about linked data
		7	Papers only about software tools focused open data (without Linked Data)

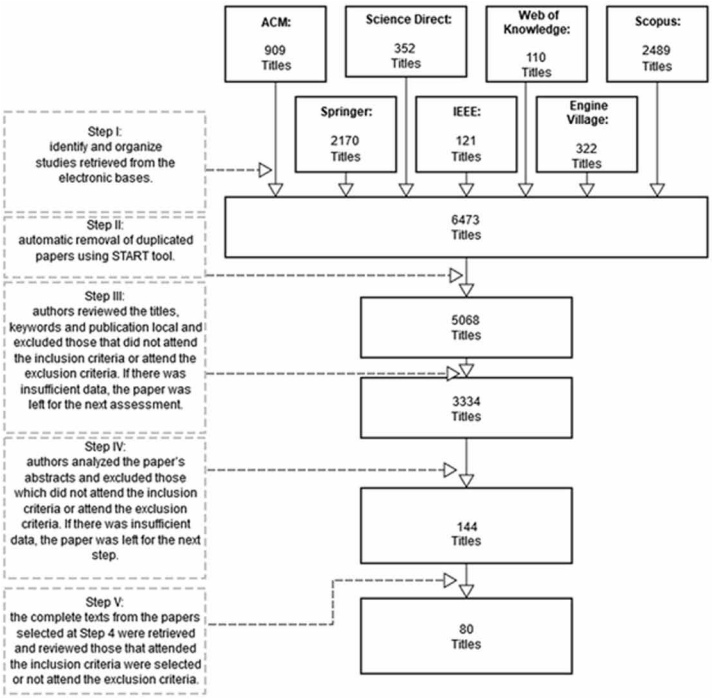
EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To perform the step III, we considered the following electronic databases:

- Science Direct (http://www.sciencedirect.com);
- ISI Web of Knowledge (http://apps.webofknowledge.com);
- Scopus (htttp://www.scopus.com);
- Springer Link (http://link.springer.com/);
- ACM Digital Library (http://dl.acm.org);
- IEEE Xplore (http://ieeexplore.ieee.org);
- Engine Village (http://www.engineeringvillage.com).

Figure 1 shows the systematic review process and the number of papers identified at each stage.

Figure 1. Paper selection flow chart



It is worth highlighting the steps related to the paper selection process. Thus, at the Step I, We extracted the papers from electronic databases using the following search terms: (1) software tool terms, containing "Environment" OR "Authoring" OR "Architecture" OR "Framework" OR "Software" OR "Application" OR "Program"; (2) linked data terms, containing "Linked Data" OR "Linked Open Data"; and (3) ontology terms, containing "Ontology" OR "Ontologies". From the search results (6,473 papers), we automatically accessed, downloaded and organized with aiding of the StArt tool. These terms were combined as follows:

(1) AND (2) AND (3)

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

At the Step II, we detected and removed duplicated papers using the StArt tool, remaining a set of 5,068 papers.

At the Step III, we reviewed titles and keywords of each paper and excluded those not related to the research questions (1,733 papers). The remaining set of papers (3,335) were considered for the next step since data was insufficient to decide on removal.

At the Step IV, we analyzed the abstracts and excluded papers according to the exclusion criteria (3,190 papers). Similarly to Step III, the papers with insufficient information to be classified on the exclusion criteria remained in the list to be analyzed in the next Step.

At the Step V, we retrieved the complete text from the remained papers (144), and read both introduction and conclusion sections and, additionally, performed a full-text screened of each one of the selected papers. From this step, 64 papers were excluded in this step according to the exclusion criteria.

After finishing Step V, 80 papers remained to the data extraction process, which has two activities: (1) reading the full-text of each paper and (2) saving extracted data (i.e. in a spreadsheet, database, text file, etc.). Therefore, all remaining papers of Step V were submitted for full-text reading. To save the data, we used StArt tool. Additionally, during this stage, we extracted data according to an extraction form (see Table 6 in Appendix), which enabled us to record details about the reviewed papers.

3. QUALITY ASSESSMENT

The quality assessment of the selected studies is useful to increase the accuracy of the data extraction results. In addition, it is important to determine the validity of the inferences and in ascertaining credibility and coherent synthesis of results. Table 3 presents the quality assessment (Kitchenham et al., 2007) criteria. Criteria 2, 4 and 8 only receive Yes (Y) or No (N) as score. Additionally, we allowed only Yes (Y) and Partially (P) scores to the last criteria since we are interested in the possible benefits to industry.

The raw data of the quality assessment is presented in Table 7[2] of the Appendix, according to assessment question described in Table 3. The scores of 11 papers are less than 50% and the average score is 7.08 see Figure 2. Regarding the score of proposed criteria, Q1, Q2 and Q3 received the highest averages scores (>0.9), while Q4, Q5, Q8, Q9, Q10 and Q11 received intermediate scores between 0.55 and 0.83. Criteria Q6 and Q7 received the lowest average score, 0.14 and 0.13 respectively.

4. RESULTS

This section presents the results obtained by running the SRL method previously described. We provide a detailed overview of general features of these studies: source types, year of publication, and application context. The reviewed papers were published between January of 2006 and December of 2015. Additionally, the distribution of selected studies over publication sources, including publication name, type, count (i.e. the number of selected studies from each source), and the percentage of selected studies are available[3]. The 80 selected studies are distributed in 49 publication sources, suggesting that linked data tools have been a widespread concern in the community. The studies included in this review belong the following categories: (1) journal; (2) conference; (3) workshop; or (4) book chapters. We identified that most studies belong to the category (2) (38.75% or 31 studies), followed by category (4) (27.5% or 22 studies), category (3) (17.5% or 14 studies) and category (1) (16.25% or 13 studies). We also observed

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

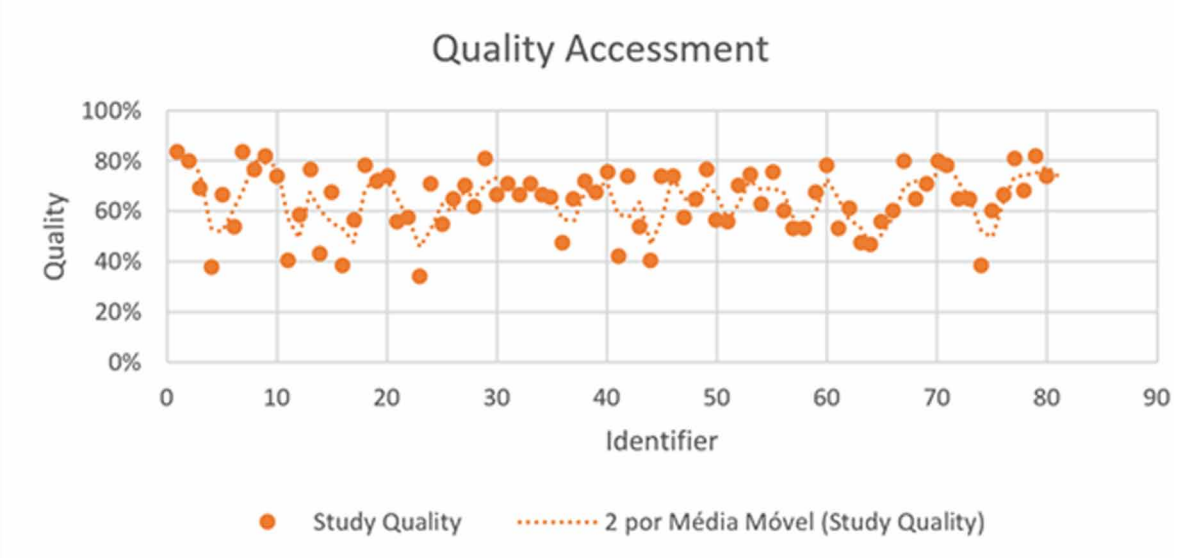
Table 3. Quality assessment criteria

#	Questions	Possible Answers
Q1	Is there a rationale for why the study was undertaken?	Y = 1, N = 0, P = 0.5
Q2	Is the paper based on research?	Y = 1, N = 0
Q3	Is there a clear statement of the research goals?	Y = 1, N = 0, P = 0.5
Q4	Does the study reuse some framework (software, source code)?	Y = 1, N = 0
Q5	Is there an adequate description of the context in which the research was carried out?	Y = 1, N = 0, P = 0.5
Q6	How many steps of the publication process does the study support?	$\frac{\text{Number of publication steps}}{\text{Total of publication steps}}$
Q7	How many steps of the consumption process does the study support?	$\frac{\text{Number of consumption steps}}{\text{Total of consumption steps}}$
Q8	Was the study empirically evaluated?	Y = 1, N = 0
Q9	Is there a discussion about the results of the study?	Y = 1, N = 0, P = 0.5
Q10	Are the limitations of this study explicitly discussed?	Y = 1, N = 0, P = 0.5
Q11	Does the research also add value to the industrial community?	Y = 1, P = 0.5

that most of these selected works were published in 2012 (22.5%) followed by 2010 (15%), 2013 (15%), 2014 (13.8%), 2011 (12.7%), 2009 (6.3%), 2008 (3.8%), 2000 (1.3%), 2007(1.3%).

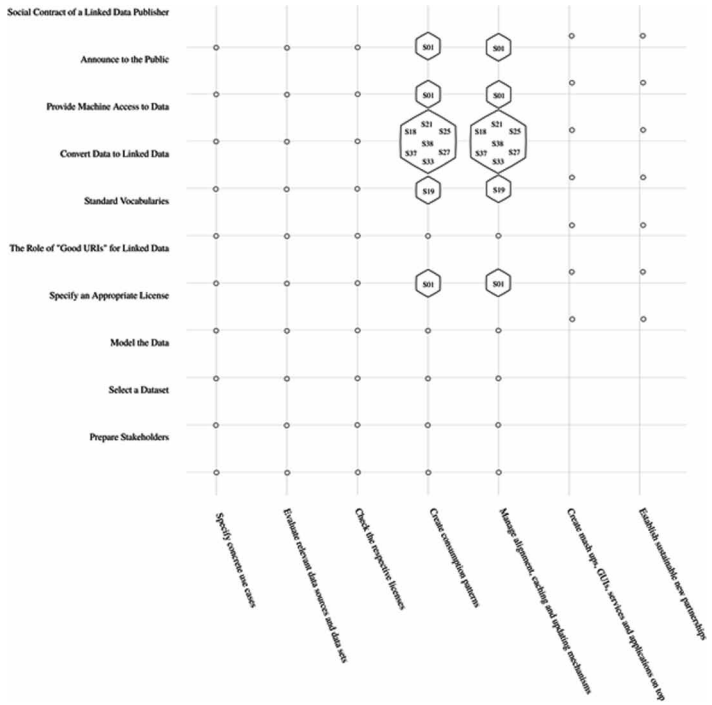
The question RQ1 identifies the purpose of each software tool. We classified the tools into two categories: publication and consumption (see Figure 4). The software tools can be classified in one or both categories, according to the supported steps. Figure 3 depicts that 9 software tools (11.11%) provide

Figure 2. Overview of the studies. Paper quality assessment distribution.



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Classification of software tools in publication and consumption



support to one or more steps of both linked data consumption and publication processes. These tools can be classified, under Publication point of view, according to the following features: RDF publisher (S01, S19, S25, S37, and S38), RDF synchronizer (S33), RDF compactor (S18), Linked Data consulting language (S21) and search federated engine (S27). Table 4 describes details such as source-code language, platform, publisher, supported serializable formats, evaluation method and publication year. Figure 4 depicts the distribution of these 9 studies, in publication and consumption processes. Most solutions (77.77%; 7 studies) are focused on providing machine access (endpoint, publishing data sets, etc.) to data (SPARQL, RDF and RDFa). On the other hand, only one software tool (11.11%, 1 study) is concerned with the conversion of structured data to linked data and another one (11.11%) is concerned with three steps: definition of URIs for Linked Data, announcement of data sets and to establish social contract of a linked data publisher.

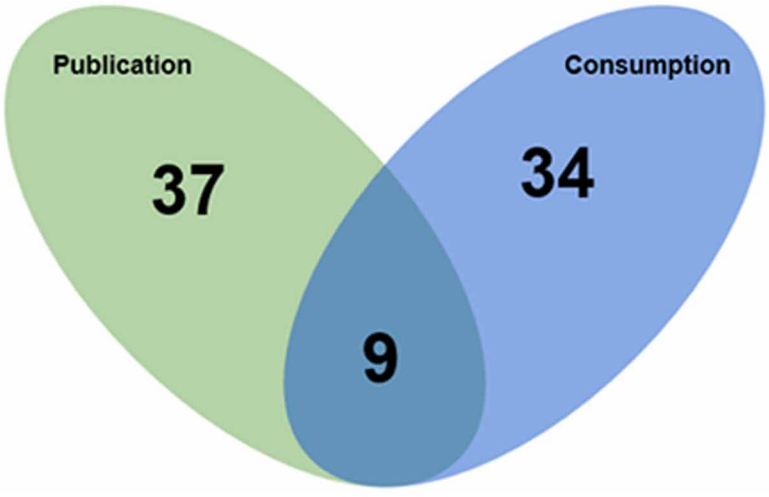
The question RQ2 identifies serializable formats supported by software tools. Figure 5 shows the relation between serialization formats and publication, as well as consumption process. We can note the growing support to RDF serialization formats, where the greatest amount of software tools related to publication process focuses on providing machine access (27 studies). On the other hand, regarding to the consumption process, the consumption patterns (28 studies) and alignment (28 studies) are the two main steps handled. It is also important to pay attention to the low support to non-RDF serializations in Step vii (Convert data) of the LD publication process. In Figure 5, it is worth to note the support is concentrated in the steps 4 and 5 of the consumption process. In fact, the most supported serializations are RDF (33.75%, 27 studies) and SPARQL (12.5%, 10 studies). On the other hand, the most supported non-RDF are XML (8.75%, 7 studies), CSV (7.5%, 6 studies) and JSON (5%, 4 studies).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4. Publication and consumption software tools

Study	Name	Developer	Year	Platform	Language	Supported Serializable Formats	Evaluation Method
S01	OrganiK project	Industry	2010	WEB	PHP	RDF	Experiment
S18	RDSZ	Academy	2014	Not described	Python	RDF	Experiment
S19	RDF extension for DRUPAL	Industry	2000	WEB	PHP	RDFa, RDFS, OWL	Does not present empirical evaluation
S21	FREyA	Industry	2012	Not described	FREyA	SPARQL, RDF	Experiment
S25	LinkedLab	Academy	2011	WEB	Not described	RDF, OWL, XML, JSON, CSV	Use Case
S27	KonneXSALT	Academy	2008	WEB	Java	RDF, SPARQL	Does not present empirical evaluation
S33	RDFSync	Industry	2007	Not described	Not described	RDF, SPARQL	Experiment
S37	Rhizomer	Academy	2011	WEB	Java, HTML, JavaScript	SPARQL	Does not present empirical evaluation
S38	Bioqueries	Academy	2011	WEB	PHP	RDF, SPARQL, RDFS	Does not present empirical evaluation

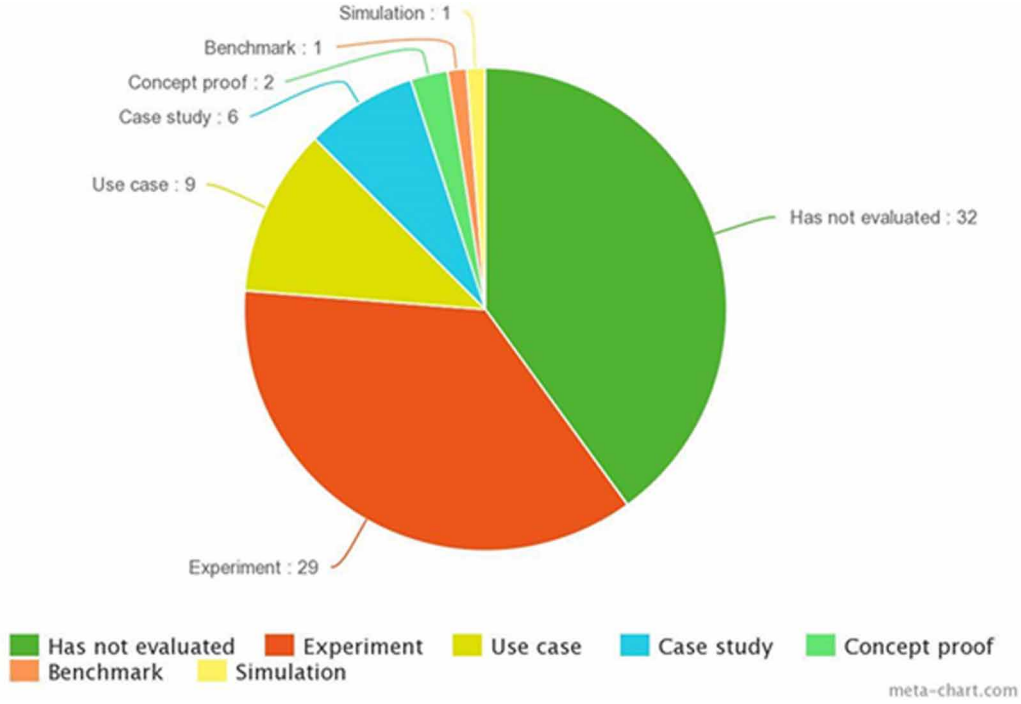
Figure 4. Software tools distribution in steps of publication and consumption processes



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The question RQ3 enables the identification of evaluated-empirically software tools. The classification of these evaluations is obtained from each paper. The number of studies for each category is shown in Figure 5. According to the results, 40% of the studies (32 studies) were not evaluated, and the other studies are distributed between experiment (36.25%, 29 studies), use case (11.25%,9 studies), proof of concept (2.5%,2 studies), benchmark (1.25%,1 study) and simulation (1.25%,1 study). Figure 7 depicts how the evaluations are distributed along publication and consumption. It is worth to note that 50% (23 studies) of the works dealing with the publication process were not evaluated.

Figure 5. Evaluation distribution



5. DISCUSSION

This section presents a discussion on the obtained results. We intend to provide our perspective about each research question, highlighting the faults in the current state of software tools for publishing and consuming Linked Data.

The results indicate an uneven distribution of software tools among the publication steps. We note that 63.82% of the studies were focused on providing machine access, followed by data conversion to linked data and the definition of URIs for linked data (with 34.04% each). On the other hand, we have detected a gap on solutions to prepare stakeholders, support open data license specification (2.12%, one study), select a dataset for reuse (10.63%, five studies), use standards vocabularies for describing objects (12.76%, six studies) and model the data to represent data objects and their relationships (24.89%, seven studies). As we can see, most of the proposed software tools support only the final steps of the publication process (44 studies) while only 24 studies support the initial steps.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 6. Relation between publication and consumption processes and serializable formats

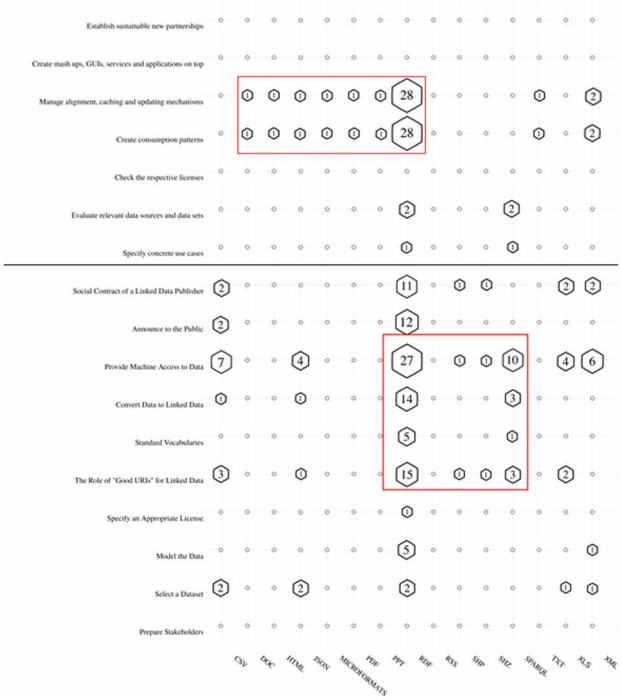
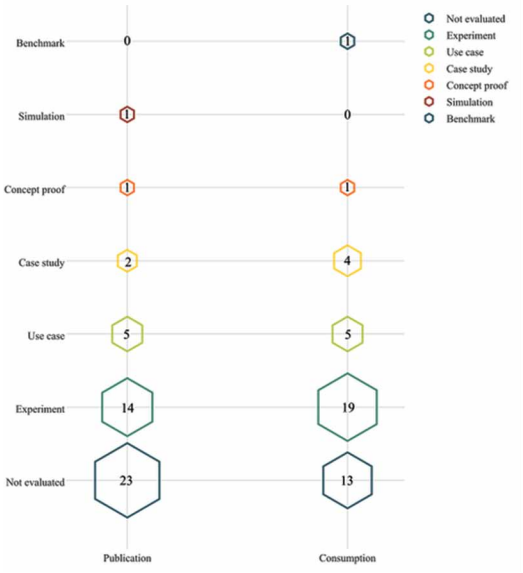


Figure 7. Evaluation by purpose



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The results are partially explained by the high-level vision of the publication process details provided by W3C documents. Although W3C (2014) points out the importance to use/determine data license, it lacks discussing details on how to implement such task or which vocabulary to adopt. As none analyzed tool covers the initial steps of the publication process, there is no tool able to fulfill the whole publication process. Based on the aforementioned discussion, we can point out two questions that can be raised for a research agenda.

1. How to develop software tools to cope with the initial phases of the publication process of Linked Data?
2. How to provide an integrated solution to simplify the publication of Linked Data?

Regarding the LD consumption process, the present results indicate that consumption software tools are concentrated in creating consumption patterns to specify what data are reused from a certain data source (85%, 34 studies), followed by managing alignments (85%, 34 studies). Further, the specification of use cases for new services or applications (2.5%, 1 study) and data sources and datasets evaluation (5%, 2 studies) are supported by few studies, while the remaining steps were not covered by the reviewed studies. Since developers and companies usually have specific objectives to reuse a dataset, they develop their own consumption patterns and alignments. Consequently, we can draw a third question for a research agenda:

3. How to develop and share reusable consumption patterns to facilitate the consumption of Linked Data?

In addition, it is important to provide good URIs[4], convert data to linked data, and provide machine access in publication process. Considering that these steps support a higher quantity of serialization formats, the results point out a disperse use of serializable formats in both processes. Thus, the results indicate that the support of serializable formats impacts directly on how institutions publish their data, as well as consumers reuse the published data on the Web. Another important point is the low support provided by the software tools to previous and subsequent steps of "to create consumption patterns to specify what data are reused from a certain data source" and "to manage alignment, caching and update mechanisms".

Similarly, to the publication process, we were not able to determine any tool capable of supporting the whole consumption process. Thus, it brings us an important challenge that we summarize in the following question to the research agenda:

4. How to provide an integrated solution to simplify the consumption of Linked Data?

The creation of consumption patterns and the management of alignment mechanisms are the steps of LD consumption process that more support the serialization formats. It is worth to note the two rectangles presented in Figure 6, since they contain the highest number of supported steps and serializable formats. Therefore, the low support for serialization formats impacts negatively in the consumption process, thus it is necessary to propose approaches to increase the number of supported formats (structured and RDF serialization). This leads us to a fifth question:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

5. How to provide a solution to supports RDF and non-RDF serialization formats in Linked Data Publication and Consumption process?

The empirical evaluation of any tool is essential to ensure quality, as well as to highlight the tool features. Nevertheless, almost half of evaluated tools (45%, 36 studies) do not present any kind of evaluation (empirical or not). Therefore, it is important to quantify the effectiveness of each analyzed tool to perform the intended task properly, which brings us to the last question:

6. How to validate the effectiveness of the proposed studies according to supported steps?

In the big picture, we can point out an increasing, albeit badly distributed, offer of software tools to supply the publication and consumption of Linked Data. In addition, a considerable part of these tools does not consider existing production and consumption processes during development. Thus, it is important to provide a new set of software tools that take into account the current Linked Data state of the art.

Throughout this study, we presented a considerable number of tools to assist the publisher in both processes of publishing and consuming linked data. Though the important contributions presented, according to Bizer et al. (2009) the following questions are still open: 1) the support of licenses (Heath & Bizer, 2011; Schmachtenberg, Bizer & Paulheim, 2014), 2) the automatic evaluation of data quality (Maα & Qi, 2013; Moss, Corsar, & Piper, 2012), and 3) the data alignment (Bleiholder & Naumann, 2009; Homoceanu, Kalo, & Balke, 2014). Besides, it is noteworthy the need of an integration environment to simplify the process execution.

6. THREATS TO VALIDITY

As threats to the validity of this SLR, the main constructs in this review are the three concepts “Software Tools”, “Linked Data” and “Ontologies”. For the first concept, we used the terms “environment”, “authoring”, “architecture”, “framework”, “software”, “application” and “program” to collect studies related to software tool approaches. For the second concept, the terms “Linked Data” and “Linked Open Data” were used to cover the potentially relevant studies on Linked Data from the database search. For the third concept, the terms “ontology” and its plural “ontologies” were used to collect studies related to ontology approaches. However, we did not use control papers during the search on digital libraries, which may be considered as the main threat to validity. Additionally, we did not perform a complementary manual search.

7. CONCLUSION

In this work, we conducted a SLR to investigate the support of software tools to publish and consume Linked Data. Our goal was to improve the understanding of how these software tools support each step of both processes.

Eighty studies were fully investigated, of which nine provide support in one or more steps of the consumption and publication processes. In regards to the publication process, it is possible to evidence

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the low support in the initial steps. Moreover, in the consumption process, it is possible to evidence the software tools focus the support of the development of consumption patterns, as well as data alignment.

As previously discussed, we raised a set of questions, which involves the steps in processes, software tools, serialization formats and the relations among them. Finally, we highlighted some important questions that are revised and summarized in Table 5 in order to suggest a research agenda on linked data.

Table 5. Questions and motivation

Motivation	Question
The initial step of the publication process is badly explored by the available tools.	How to develop software tools to cope with the initial phases of the publication process of Linked Data?
None solution supports the whole process of publication of connected data.	How to provide an integrated solution to simplify the publication of Linked Data?
There is not a standard and in-depth approach to the consumption process of connected data.	How to develop and share reusable consumption patterns to facilitate the consumption of Linked Data?
None solution covers the whole process of data consumption.	How to provide an integrated solution to simplify the consumption of Linked Data?
There is need to increase the number of supported serialization formats for both publication and consumption processes.	How to provide a solution to supports RDF and non-RDF serialization formats in Linked Data Publication and Consumption process?
Low number of software tools was evaluated. Additionally, these evaluations ware not focused on support publication or consumption process.	How to validate the effectiveness of the proposed studies according to supported steps?

Based on (Kitchenham et al., 2007) we can highlight some contributions provided by this study. Such contributions include:

- The identification of gaps in current research in order to suggest areas for further investigation;
- The provision of a framework/background in order to properly position new research activities;
- The summarization of existing evidence, benefits and limitations.

The result presented in this Systematic Literature Review can be very useful to linked data community, since it gathers evidences from primary studies included in the review, forming a body of knowledge regarding the use of software tools to publish or consume linked data. We can outline the contribution of this work as follows:

- Research agenda based on SRL observations and according to gaps in both processes. Besides, we pointed out the need of an integration environment to simplify the process execution.

As future work, we intend to further investigate the software tool integration. Moreover, we intend to extend this systematic review aiming to clarify the communication interface among software tools between steps in each process.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Auer, S., Bühmann, L., Dirschl, C., Erling, O., Hausenblas, M., Isele, R., & Williams, H. (2012). Managing the life-cycle of linked data with the LOD2 stack. In *The Semantic Web–ISWC 2012* (pp. 1–16). Springer Berlin Heidelberg. doi:10.1007/978-3-642-35173-0_1

Barnes, M., & Martin, R. (2002). Business data linking: An introduction. *Economic Trends*, *581*, 34–41.

Bauer, F., & Kaltenböck, M. (2011). Linked open data: The essentials. Edition mono/monochrom, Vienna.

Bizer, C., Cyganiak, R., & Heath, T. (2007). How to publish Linked Data on the Web. Retrieved September 18, 2016, from http://wifo5-03.informatik.uni-mannheim.de/bizer/HowtoPublishLinkedData.htm

Bizer, C., Heath, T., & Berners-Lee, T. (2009). Linked Data - The Story So Far. *International Journal on Semantic Web and Information Systems*, *5*(3), 1–22. doi:10.4018/jswis.2009081901

Bleiholder, J., & Naumann, F. (2009). Data fusion. *ACM Computing Surveys*, *41*(1), 1–41. doi:10.1145/1456650.1456651

Corlosquet, S., Delbru, R., Clark, T., Polleres, A., & Decker, S. (2009). Produce and Consume Linked Data with Drupal! In *Proceedings of the International Semantic Web Conference* (pp. 763-778). Springer Berlin Heidelberg. 10.1007/978-3-642-04930-9_48

Dermeval, D., Vilela, J., Bittencourt, I. I., Castro, J., Isotani, S., & Brito, P. (2014, September). A systematic review on the use of ontologies in requirements engineering. In *Proceedings of the 2014 Brazilian Symposium on Software Engineering (SBES)* (pp. 1-10). IEEE. 10.1109/SBES.2014.13

Dietze, S., Yu, H. Q., Giordano, D., Kaldoudi, E., Dovrolis, N., & Taibi, D. (2012, March). Linked Education: interlinking educational Resources and the Web of Data. In *Proceedings of the 27th annual ACM symposium on applied computing* (pp. 366-371). ACM. 10.1145/2245276.2245347

Ding, L., Lebo, T., Erickson, J. S., DiFranzo, D., Williams, G. T., Li, X., & Hendler, J. A. (2011). TWC LOGD: A portal for linked open government data ecosystems. *Web Semantics: Science, Services, and Agents on the World Wide Web*, *9*(3), 325–333. doi:10.1016/j.websem.2011.06.002

Heath, T., & Bizer, C. (2011). Linked data: Evolving the web into a global data space. *Synthesis lectures on the semantic web: theory and technology*, *1*(1), 1-136.

Hernandes, E., Zamboni, A., Fabbri, S., & Thommazo, A. D. (2012). Using GQM and TAM to evaluate StArt-a tool that supports Systematic Review. *CLEI Electronic Journal*, *15*(1), 3–3.

Homoceanu, S., Kalo, J. C., & Balke, W. T. (2014, June). Putting Instance Matching to the Test: Is Instance Matching Ready for Reliable Data Linking? In *Proceedings of the International Symposium on Methodologies for Intelligent Systems* (pp. 274-284). Springer International Publishing 10.1007/978-3-319-08326-1_28

Hyland, B., & Wood, D. (2011). The joy of data-a cookbook for publishing linked government data on the web. In *Linking government data* (pp. 3–26). Springer New York. doi:10.1007/978-1-4614-1767-5_1

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Kitchenham, B., & Charters, S. (2007). Guidelines for performing systematic literature reviews in software engineering. In *Technical report, Ver. 2.3*. EBSE Technical Report. EBSE.

LaPES. (n. d.). Start - state of the art through systematic review tool. Retrieved September 04, 2016, from http://lapes.dc.ufscar.br/tools/start_tool

Moss, L., Corsar, D., & Piper, I. (2012, June). A linked data approach to assessing medical data. In *Proceedings of the 2012 25th International Symposium on Computer-Based Medical Systems (CBMS)* (pp. 1-4). IEEE. 10.1109/CBMS.2012.6266391

Schmachtenberg, M., Bizer, C., & Paulheim, H. (2014, October). Adoption of the linked data best practices in different topical domains. In *Proceedings of the International Semantic Web Conference* (pp. 245-260). Springer International Publishing. 10.1007/978-3-319-11964-9_16

Shadbolt, N., OHara, K., Berners-Lee, T., Gibbins, N., Glaser, H., Hall, W., & schraefel. (2012). Linked open government data: Lessons from data.gov.uk. *IEEE Intelligent Systems*, *27*(3), 16–24. doi:10.1109/MIS.2012.23

Villazón-Terrazas, B., Vilches-Blázquez, L. M., Corcho, O., & Gómez-Pérez, A. (2011). Methodological guidelines for publishing government linked data. In *Linking government data* (pp. 27–49). Springer New York. doi:10.1007/978-1-4614-1767-5_2

World Wide Web Consortium. (2014). Best practices for publishing linked data. Retrieved September 04, 2016, from https://www.w3.org/TR/ld-bp/

ENDNOTES

1 https://www.w3.org/2001/sw/wiki/Category:Tool
2 http://bit.ly/2c7UlHc
3 http://bit.ly/2cB9CzE
4 http://www.w3.org/TR/ld-bp/#HTTP-URIS

This research was previously published in the International Journal on Semantic Web and Information Systems (IJSWIS), 13(4); pages 68-88, copyright year 2017 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

APPENDIX

Table 6. Extraction form

#	Study Data	Description	Relevant RQ
1	Study Identifier	Unique id for the study	Study overview
2	Date of data extraction, Authors, Year, Title, Country		Study overview
3	Article Source		Study overview
4	Type of Article	Journal, Conference, workshop, book chapter	Study overview
5	Software tool name	What are the software tool name?	Study overview
6	Version	What are the software tool version?	Study overview
7	Last Update	When was the last update of the software tool?	Study overview
8	License	What is the license?	Study overview
9	Platform	Web, Mobile, Desktop	Study overview
10	Language	What are/is the used language to implement the software tool?	Study overview
11	Application Context	Industrial, Academic	Study overview
12	Purpose	Publication, Consumption	RQ1
13	Steps followed	What are the steps followed of the purpose?	RQ1
14	Serializable formats	What are the serializable formats supported by the software tool?	RQ2
15	Research Method	Controlled experiment, Case study, Use case, Conceptual proof, Benchmark, Simulation, Not applicable	RQ3

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. Quality assessment

ID	References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total Score	Quality
S01	(Aastrand, Celebi, & Sauermann, 2010)	1	1	1	1	1	0,4	0,3	1	1	0,5	1	9,2	84%
S02	(An, Kim, Lee, & Lee, 2013)	1	1	1	1	0,5	0	0,3	1	1	1	1	8,8	80%
S03	(Dimou, De Vocht, Van Grootel, Van Campe, Latour, Mannens & Van de Walle,2014)	1	1	1	1	1	0	0,1	1	1	0	0,5	7,6	69%
S04	(Lehmann, Furche, Grasso, Ngomo, Schallhart, Sellers, & Auer, 2012)	0	0	1	0	0	0,1	0	0	1	1	1	4,1	37%
S05	(Aprosio, Giuliano, & Lavelli. 2013)	1	1	1	0	0,5	0,3	0	1	1	1	0,5	7,3	66%
S06	(Araujo, Houben, Schwabe, & Hidders, 2010)	1	1	1	1	0	0	0,4	0	1	0	0,5	5,9	54%
S07	(Assaf, Louw, Senart, Follenfant, Troncy, & Trastou, 2012)	1	1	1	1	1	0,2	0	1	1	1	1	9,2	84%
S08	(Auer, Dietzold, Lehmann, Hellmann, & Aumuelle, 2009)	1	1	1	0	1	0,4	0	1	1	1	1	8,4	76%
S09	(Augenstein, Padó, & Rudolph, 2012)	1	1	1	1	0,5	0,5	0	1	1	1	1	9	82%
S10	(Lehmann & Bühmann, 2011)	1	1	1	1	0,5	0,1	0	1	1	1	0,5	8,1	74%
S11	(Bottoni & Cerian, 2014)	1	1	1	0	0,5	0	0,4	0	0	0	0,5	4,4	40%
S12	(Chang, Xu, Zhou, Shao, Li, & Yan, 2013)	1	1	1	1	0,5	0,4	0	0	0	1	0,5	6,4	58%
S13	(Chen, Ding, Wang, Wild, Dong, Sun, & Sankaranarayanan, 2010)	1	1	1	1	0,5	0,4	0	1	1	1	0,5	8,4	76%
S14	(Becker & Bizer, 2009)	0,5	1	1	0	0,5	0	0,3	0	0	1	0,5	4,8	44%
S15	(Bizer, Lehmann, Kobilarov, Auer, Becker, Cyganiak, & Hellmann, 2009)	1	1	1	1	0,5	0,4	0	0	1	1	0,5	7,4	67%
S16	(Ciravegna, Gentile, & Zhang, 2012)	1	1	1	0	0,5	0	0,3	0	0	0	0,5	4,3	39%
S17	(Coletta, Castanier, Valduriez, Frisch, Ngo, & Bellahsene, 2012)	1	1	1	1	0,5	0,2	0	0	1	0	0,5	6,2	56%
S18	(Fernández, Arias, Sánchez, Fuentes-Lorenzo, & Corcho, 2014)	1	1	1	1	0,5	0,1	0	1	1	1	1	8,6	78%
S19	(Corlosquet et al., 2009)	1	1	1	1	1	0,4	0	1	1	0	0,5	7,9	72%
S20	(Tao, Song, Sharma, & Chute, 2013)	1	1	1	1	0,5	0,1	0	1	1	1	0,5	8,1	74%
S21	(Agatonovic, Cunningham, & Damljanovic, 2012)	1	0	1	1	0,5	0,1	0	1	1	0	0,5	6,1	55%
S22	(Curry, O'Donnell, Corry, Hasan, Keane, & O'Riain, 2013)	1	1	1	0	1	0,3	0	0	1	0	1	6,3	57%

continues on following page

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. Continued

ID	References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total Score	Quality
S23	(Di Noia, Mirizzi, Ostuni, Romito, & Zanker, 2012)	0,5	0	0	0	0,5	0	0,3	1	1	0	0,5	3,8	34%
S24	(De Vocht, Softic, Mannens, Ebner, & Van de Walle, 2014)	1	1	1	0	1	0	0,3	1	1	1	0,5	7,8	71%
S25	(Darari & Manurung, 2011)	0,5	1	1	0	0,5	0,5	0	0	1	1	0,5	6	55%
S26	(Dastgheib, Kochut, & Mesbah, 2013)	1	1	1	1	0,5	0	0,1	0	1	1	0,5	7,1	65%
S27	(Groza, Handschuh, Möller, & Decker, 2008)	1	1	1	1	1	0,2	0	0	1	1	0,5	7,7	70%
S28	(Delbru, 2009)	1	1	1	0	1	0	0,3	1	1	0	0,5	6,8	62%
S29	(Auer, Dietzold, & Doehring, 2010)	1	1	1	1	0,5	0,1	0,3	1	1	1	1	8,9	81%
S30	(Paret, Van Woensel, Casteleyn, Signer, & De Troyer, 2011)	1	1	1	0	0,5	0	0,3	1	1	1	0,5	7,3	66%
S31	(Elze, Hesse, & Martin, 2011)	1	1	1	1	1	0	0,3	0	1	1	0,5	7,8	71%
S32	(Emaldi, Lázaro, Laiseca, & López-de-Ipiña, 2012)	0,5	1	0,5	1	0,5	0	0,3	1	1	1	0,5	7,3	66%
S33	(Tummarello, Morbidoni, Bachmann-Gmür, & Erling, 2007)	1	1	1	0	0,5	0,3	0	1	1	1	1	7,8	71%
S34	(Baritakis, Fafalios, & Tzitzikas, 2014)	1	1	1	1	0,5	0	0,3	1	1	0	0,5	7,3	66%
S35	(Farouk & Ishizuka, 2012)	1	1	1	0	0,5	0,2	0	1	1	1	0,5	7,2	65%
S36	(Fernández-Tobías, Cantador, Kaminskas, & Ricci, 2011)	0,5	1	0,5	0	0,5	0	0,3	0	1	1	0,5	5,3	48%
S37	(García, Brunetti, López-Muzás, Gimeno, & Gil, 2011)	1	1	1	1	0,5	0,1	0	0	1	1	0,5	7,1	65%
S38	(Aldana-Montes,García-Godoy, & Navas-Delgado, 2011)	1	1	1	1	1	0,4	0	0	1	1	0,5	7,9	72%
S39	(Graves, 2010)	1	1	1	1	0,5	0,4	0	0	1	1	0,5	7,4	67%
S40	(Wang, Liu, Penin, Fu, Zhang, Tran, & Pan, 2009)	1	1	1	1	0,5	0	0,3	1	1	1	0,5	8,3	75%
S41	(Chen, Hsueh, & Huang, 2011)	1	1	1	0	1	0,1	0	0	0	0	0,5	4,6	42%
S42	(Fisteus, García, Fernández, & Fuentes-Lorenzo, 2014)	1	1	1	1	0,5	0,1	0	1	1	1	0,5	8,1	74%
S43	(Han, Finin, Parr, Sachs, & Joshi, 2008)	0,5	1	1	0	0,5	0,4	0	1	0	1	0,5	5,9	54%
S44	(Bauer, Kaltenböck, & Recheis, 2011)	1	1	1	0	0,5	0,4	0	0	0	0	0,5	4,4	40%

continues on following page

Table 7. Continued

ID	References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total Score	Quality
S45	(Auer, Hladky, & Khalili, 2012)	1	1	1	1	0,5	0,1	0	1	1	1	0,5	8,1	74%
S46	(Auer & Khalili, 2013)	1	1	1	1	0,5	0,1	0	1	1	1	0,5	8,1	74%
S47	(Consens & Khatchadourian, 2010)	1	1	1	0	0,5	0	0,3	1	1	0	0,5	6,3	57%
S48	(Grollios, Mitkas, & Vavliakis, 2013)	1	1	1	0	0,5	0	0,1	1	1	1	0,5	7,1	65%
S49	(Konstantinou, Kouis, & Mitrou, 2014)	1	1	1	1	0,5	0,4	0	1	1	1	0,5	8,4	76%
S50	(Hernandez, Lappalainen, & Sicilia, 2013)	1	1	1	0	1	0	0,7	0	0	1	0,5	6,2	56%
S51	(Lehmann, Furche, Grasso, Ngomo, Schallhart, Sellers, & Auer, 2012)	1	1	1	0	0,5	0	0,1	1	1	0	0,5	6,1	56%
S52	(Lowe, 2009)	1	1	1	1	1	0,2	0	1	1	0	0,5	7,7	70%
S53	(Lynden, Kojima, Matono, & Tanimura, 2011)	1	1	1	1	0,5	0,2	0	1	1	1	0,5	8,2	75%
S54	(Machado & Parente de Oliveira, 2011)	1	1	1	0	0,5	0,4	0	0	1	1	1	6,9	63%
S55	(Narasimha, Kappara, Ichise, & Vyas, 2011)	1	1	1	1	0,5	0	0,3	1	1	1	0,5	8,3	75%
S56	(Curé, 2014)	1	0	1	1	1	0	0,1	0	1	1	0,5	6,6	60%
S57	(Ostuni, Di Noia, Mirizzi, Romito, & Di Sciascio, 2012)	0,5	1	1	0	0,5	0	0,3	0	1	1	0,5	5,8	53%
S58	(Otero-Garcıa, Vidal, Lama, Bugarın, & Domenech)	1	1	1	0	1	0	0,3	0	1	0	0,5	5,8	53%
S59	(Merialdo & Papotti, 2012)	1	1	1	0	0,5	0,4	0	1	1	1	0,5	7,4	67%
S60	(Duval & Parra Klerkx, 2010)	1	1	1	1	1	0	0,1	1	1	1	0,5	8,6	79%
S61	(Passant, 2010)	0,5	0	1	0	0,5	0	0,3	1	1	1	0,5	5,8	53%
S62	(Brambilla, Ceri, & Quarteroni, 2013)	0,5	1	1	1	0,5	0,2	0	1	1	0	0,5	6,7	61%
S63	(Radzimski, Sánchez-Cervantes, Rodríguez-González, Gómez-Berbís, & García-Crespo, 2012)	1	1	1	1	0,5	0,2	0	0	0	0	0,5	5,2	47%
S64	(Seguran, Senart, & Trastour, 2012)	1	1	1	0	1	0,1	0	0	0	0	1	5,1	46%
S65	(Shakya, Takeda, & Wuwongse, 2009)	1	1	1	1	0,5	0,1	0	0	0	1	0,5	6,1	55%
S66	(Chapman, Skarka, & Solanki, 2012)	1	1	1	0	1	0,1	0	0	1	1	0,5	6,6	60%
S67	(Solomou, Kalou, Koutsomitropoulos, & Papatheodorou, 2011)	1	1	1	1	0,5	0	0,3	1	1	1	1	8,8	80%
S68	(Sorrentino, Bergamaschi, Fusari, & Beneventano, 2013)	1	1	1	1	1	0,1	0	0	0	1	1	7,1	65%

continues on following page

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. Continued

ID	References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total Score	Quality
S69	(Stadtmüller, Speiser, Harth, & Studer, 2013)	1	1	1	0	0,5	0	0,3	1	1	1	1	7,8	71%
S70	(Stolz & Hepp, 2013)	1	1	1	1	0,5	0	0,3	1	1	1	1	8,8	80%
S71	(Norheim, Roman, & Stuhr, 2011)	1	1	1	1	0,5	0,1	0	1	1	1	1	8,6	78%
S72	(d'Aquin, Motta, & Tiddi, 2014)	1	1	1	0	0,5	0	0,1	1	1	1	0,5	7,1	65%
S73	(Tramp, Heino, Auer, & Frischmuth, 2010)	1	1	1	0	0,5	0,1	0	1	1	1	0,5	7,1	65%
S74	(Tummarello, Cyganiak, Catasta, Danielczyk, Delbru, & Decker, 2010)	1	0	1	0	0,5	0	0,3	0	0	1	0,5	4,3	39%
S75	(Veres, 2012)	0,5	1	1	0	0,5	0	0,1	1	1	1	0,5	6,6	60%
S76	(Montoya, Ibáñez, Skaf-Molli, Molli, & Vidal, 2014)	1	1	1	0	0,5	0	0,3	1	1	1	0,5	7,3	66%
S77	(Gómez-Pérez, Vila-Suero, & Villazón-Terrazas, 2012)	1	1	1	1	0,5	0,4	0	1	1	1	1	8,9	81%
S78	(Zhang, Song, Li, & Liu, 2014)	1	1	1	0	0,5	0,5	0	1	1	1	0,5	7,5	68%
S79	(Kaoudi, Koubarakis, Kyzirakos, Miliaraki, Magiridou, & Papadakis-Pesaresi, 2010)	1	1	1	1	0,5	0	1	1	1	1	0,5	9	82%
S80	(Čerāns & Būmans, 2010)	1	1	1	1	0,5	0,1	0	1	1	1	0,5	8,1	74%
Average		0,92	0,92	0,97	0,55	0,61	0,14	0,13	0,62	0,83	0,74	0,61	7,08	64%

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 93
A Discussion on the Relationship Between Information and Communication Technologies (ICT) and Entrepreneurship

Mehmet Eryılmaz
Uludağ University, Department of Business Administration, Bursa, Turkey

ABSTRACT

Entrepreneurship has recently become one of the hot topics in several disciplines such as business administration, economy, sociology, etc. Thus, several studies in several fields focus on antecedents and consequences of entrepreneurial intentions and activities to get deeper insights about the phenomenon. Furthermore, another rising field of study is Information and Communication Technologies (ICT). Thus, the main objective of the present article was to discuss possible relationships between these two crucial concepts, namely entrepreneurship and ICT.

1. INTRODUCTION

Scholars in several fields discussed about a crucial question that whether the related field was transformed into a "scholar discipline". Finding some examples for this type of discussion is possible in the fields of "business history" (e.g. Kurt, 2016), "organization theory" (e.g. Davis & Marquis, 2005), "strategic management" (e.g. Booth, 1998; Barney, 2002), etc. Furthermore, as in the example of "strategic human resource management" (Wright & McMahan, 1992), disciplinary status of certain integrated fields was questioned.

DOI: 10.4018/978-1-7998-7297-9.ch093

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Fields largely accepted as a scholar discipline share certain common characteristics such as widely shared beliefs by a group of scholars on limits and fundamental questions related to the field and recommended methodologies for addressing these questions (Eryılmaz, 2016), etc. In addition to those mentioned-above, increased complexity in the theoretical and methodological infrastructure of a field may be another indicator (Phelan et al., 2002). These discussions on the fields stated above were similar in the field of entrepreneurship. As a result of some assessments, despite the doubts of certain scholars (e.g. Rauch & Frese, 2006), some studies (e.g. Vesper, 1988; Filion, 1998; George & Wadhwani, 2006; Urban, 2010) heralded that the field of entrepreneurship was institutionalized and achieved the status of "scholarly discipline."

Information and communication technologies (ICT) is another popular subject. ICT is a prerequisite of the current era of knowledge. These technologies transform several societal dimensions such as political, social, technological, etc. dimensions (Yusuf, 2005). The impact of ICT is also inevitable on economic life. Thus, entrepreneurial intentions and activities, which are considered as one of the engines of economies by many scholars, will both affect and be affected by developments in the ICT. Therefore, the present study aimed to examine possible interactions between these two recent hot topics.

Initially, the present study will review the historical roots of entrepreneurship. Then, some factors, which are the antecedents and consequences of entrepreneurship, will be examined. In addition, brief information on ICT will be presented. In the third section, certain possible interactions between these two concepts will be discussed. Following this section, in the part of conclusion and directions for future research, the study will provide information on possible future trends in the field.

2. LITERATURE REVIEW

2.1. Entrepreneurship

2.1.1. Historical Roots of Entrepreneurship and Certain Definitions by the Pioneers

According to certain scholars (e.g. Stevenson & Jarillo, 1990), the concept of entrepreneurship was coined by *Richard Cantillon* (1680-1734), an Irish-French economist. He derived the concept of "entrepreneur" from the French word "*entreprendre*" that means "to undertake" (Matlay, 2005). Furthermore, Cantillon identified the origin of three main intellectual traditions (e.g. Austrian, Chicago and German) in the field of entrepreneurship (Hebert & Link, 1989) and named by Jevon as "the cradle of political economy" (Hayek, 2005). He also emphasized that entrepreneurial activity included buying at a certain price and taking the risk of selling for an uncertain price. For example, when an entrepreneur leases a farm from a landlord, money paid to landlord is definite. However, the price of products that would be harvested on that land cannot be known. The notion of uncertainty made him to identify even robbers and beggars as special types of entrepreneur. Finally, according to Cantillon, there are three classes of economic actors; the landlords, entrepreneurs and hirelings, and the entrepreneurs play the most central role among these classes in the economy (Hebert & Link, 1989).

A French economist, Jean Baptiste Say (1767-1832) improved the definition of entrepreneurship by Cantillon, adding a new element of "combining the factors of production" (Stevenson & Jarillo, 1990). In addition to these two pioneers, English political economist and philosopher, John Stuart Mill (1806-1873) professed that the main element that distinguishes an entrepreneur from a manager is risk taking

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

(Carland et al., 1984). Similarly, Gartner (1989, p. 62) defined entrepreneurship as "the creation of new organizations". Furthermore, Francis Amasa Walker (1840-1897), an American economist and educator, was another pioneer in the field. According to him, an entrepreneur was a person who was born with above average talent in the organization and coordination of factors of production. Walker considered that there was a difference between the investor who supplies the required funds for an investment and receives a certain amount of interest against these funds and the entrepreneur who profits from his/her managerial capabilities (Balachandran & Sakthivelan, 2013).

An Austrian-born American economist, Joseph Alois Schumpeter (1883-1950) also brought a breath of fresh air into the field. Schumpeter, who was inspired by certain intellectuals such as Böhm-Bawerk, Marx, Menger, Walras, Weber and Wieser (Hebert & Link, 1989), defined entrepreneurs as agents of change in an economy (Jones & Wadhwani, 2006) and considered the agents as a vehicle that improves the economy as a whole. According to Schumpeter, innovation is at the center of entrepreneurship. In parallel, Schumpeter defined "enterprise" as forming new combinations. Entrepreneur is the individual who invents these new combinations. At this point, Schumpeter seemed to feel that it was necessary to clarify the term "new combination". According to Schumpeter, there may be several types of new combinations such as: 1) introducing a new commodity or service to the market; 2) utilizing a new production method; 3) entering into a new market that does not have information on the present commodity; 4) discovering a new input source (e.g., raw material / half manufactured goods) and finally; 5) changing the structure of market by creating or breaking a monopoly in the market (or industrial reorganization). For example, three years ago, a Japanese company announced that it will start to generate electricity using bamboo (Milliyet, 2015). This may be regarded as an example of Schumpeterian entrepreneurship. He also distinguished the entrepreneur and the businessman (Carland et al., 1984; Stevenson & Jarillo, 1990).

Another important contributor to field of entrepreneurship is Israel Meir Kirzner (1930 -), who is a British-born American economist inspired by Austrian school of economics. According to Kirzner, the fundamental characteristic of an entrepreneur is alertness. He underlines the importance of quality of perception, in other words, recognition of profit opportunities by the entrepreneurs. Furthermore, according to him, the entrepreneur is the individual who does not possess capital (Hebert & Link, 1989). Entrepreneur is a pure decider without possession of capital (Cadar & Badulescu, 2015). This view by Kirzner is often criticized by certain scholars. According to the critics, if an individual does not own capital, it cannot be proposed that the same individual takes a risk (Hebert & Link, 1989).

In 1985, an American entrepreneur, Gifford Pinchot III (1942-) coined the concept of "intrapreneurship". "Intrapreneurship can be defined as the development, within a large corporation, of internal markets and relatively small autonomous or semiautonomous business units that produce products, services, or technologies by employing the firm's resources in a unique way" (Dollinger, 2008: 384, cited by Hisrich et al., 1985). Intrapreneurs are different from entrepreneurs since they use organizational resources and their main obstacle is the organizational culture (Cadar & Badulescu, 2015). The best condition for intrapreneurship have always been a topic of discussion. For example, certain scholars claimed that large scale organizations and dynamic environments were the most fertile conditions for intrapreneurship (Cadar & Badulescu, 2015).

As seen above, there were two main traditions that conceptualized the entrepreneur and entrepreneurship. The first one associates entrepreneurship with the risk-taking behavior. On the other hand, the second tradition that Schumpeter principally argued mainly emphasized the innovative behavior of entrepreneurs. Some eclectic approaches in the literature also attempted to combine these two approaches. For example, Johnson (2001, p. 137) defined the entrepreneur as "an individual who takes agency and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

initiative; who assumes responsibility and ownership for making things happen; is both open to and able to create novelty; who manages the risks attached to the process; and who has the persistence to see things through to some identified end-point, even when faced with obstacles and difficulties". Consistent with this, according to Shane and Venkataraman (2000), entrepreneurship may be associated with both new and extant organizations. According to the author of the present study, since behaviors of risk-taking and innovation are interrelated and complimentary, it could be more adequate to conceptualize entrepreneurship with a combination of these two approaches. Almost every innovation bears a certain amount of risk. For example, the Siemens pen phone seemed to attract less attention than expected.

2.1.2. Antecedents and Consequences of Entrepreneurial Behavior

There may be several triggers of entrepreneurial intentions, behavior and causes of entrepreneurial successes and failures at macro, meso and micro levels. Even though it was often objected by certain scholars, certain macro variables such as national culture, educational system, financial system, legal institutions, political institutions and religion may have certain effects on the entrepreneurship process (Jones & Wadhwani, 2006; Gohman, 2012; De Clercq et al., 2013; Valdez & Richardson, 2013). For instance, De Clercq et al. (2013) hypothesized that the relationship between individual resources (e.g., human, social and financial capital) and new business activity was moderated by formal institutions (educational and financial systems) and informal institutions (culture and trust). The study revealed partial support for the hypotheses. In a similar vein, Hefner claimed that overseas success of Chinese businesses may be explained by traditionally strong ties among the members of Chinese families and the requirement for success in a minority group. Similarly, Walker demonstrated that how slavery and institutionalized racism in the US before the civil war limited entrepreneurial opportunities of African American entrepreneurs. The same study also indicated that African Americans conducted certain entrepreneurial activities to delegitimize these institutions (Jones & Wadhwani, 2006, cited by Walker, 1986 and Hefner, 1998). In a similar vein, Turkey is 53rd and 66th in the "2017-2018 Global Competitiveness Index" and "innovation and sophistication factors" subbranch of the same index, respectively (Schwab & Sala-i Martin, 2017). According to the author of the present study, this relative failure of Turkey in innovation and entrepreneurship stemmed particularly from certain problems in the higher education system of the country.

On the other hand, another approach, primarily supported by the field of psychology, investigated correlations between micro factors such as personality traits[2], gender, etc. and entrepreneurial intentions, behavior and success/failure (Stevenson & Jarillo, 1990). For instance, Rauch and Frese (2007) found a positive and significant correlation between entrepreneurial behavior and certain personality traits such as generalized self-efficacy, innovativeness, need for achievement, need for autonomy, proactive personality and stress tolerance. Similarly, Engelen et al. (2015) examined the correlation between overconfidence of CEOs and orientation for entrepreneurship. They found a positive correlation moderated by the dynamism of the market. Certain studies criticized the personality traits approach to entrepreneurship. According to Gartner (1989), there were no significant differences between the personalities of entrepreneurs and non-entrepreneurs. Therefore, the adequate question is not "who the entrepreneur is". Instead, the behavioral approach to entrepreneurship recommends that the question that should be asked is "what does an entrepreneur do?" and entrepreneurship skills should be improved with education and training. On the other hand, a meta-analytic research on the correlations between personality traits and entrepreneurial behavior demonstrated that personality of entrepreneurs was significant. Previous

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

studies could not determine a direct correlation between personality traits and entrepreneurial intent, behavior or success/failure, since some of the scrutinized variables mediated the correlation (Rauch & Frese, 2006). Finally, family environment and parenting style (even toys that are provided for a child) may affect future success of a child in entrepreneurial career. For example, majority of parents in certain countries exhibit an interventionist style in their interactions with their children. This style may adversely affect the decision-making skills and future entrepreneurial capacity of children.

On the other hand, emphasizing one group of factors without considering the other could be inadequate. For example, if only macro factors were sufficient to understand entrepreneurship, how could we explain the differences in the success levels individuals who experienced similar conditions in the process of entrepreneurship? However, entrepreneurial behavior in certain countries, where it is supported by certain macro level factors, is stronger. Therefore, a combined set of factors (at macro, meso and micro levels) may be the best alternative to examine and explain entrepreneurial intent and behavior (Rasmussen & Sorheim, 2006).

Furthermore, entrepreneurial intentions and behavior may have consequences at macro, meso and micro levels as well. For example, Schumpeter claimed the essence of entrepreneurial activities in the economic development of a country (Carland et al., 1984; Shane & Venkataraman, 2000). Similarly, certain scholars discussed or empirically supported the impact of entrepreneurial activities on competitive advantage of a nation (Matlay, 2005). In addition, it may be expected that entrepreneurs may stimulate productivity at a national level by advancing the competition (van Stel et al., 2005). Finally, various studies assumed and empirically supported that entrepreneurial activities were associated with regional and local economic development as well (e.g., Malecki, 1993; Baptista et al., 2005; Rasmussen & Sorheim, 2006). At a micro level, one of the possible consequences of a successful entrepreneurial activity is personal accumulation of wealth.[3] Indeed, wealth accumulation is used in academic research as an indicator of entrepreneurial success (Jones & Wadhwani, 2006). Naturally, entrepreneurial behavior may generate a good or bad personal reputation for the entrepreneurs.

2.2. Information and Communication Technologies

"Information and Communication Technologies (ICT)" can be defined as 'electronic means of capturing, processing, storing, and communicating information" (Heeks, 1999, p. 3). It is possible to categorize ICTs in three main categories; "information technologies" (e.g., computers), "telecommunication technologies" (e.g., facsimile machine, mobile phone, videoconference and teleconference facilities) "network technologies" (e.g., Internet, intranet, extranet (Mirrezaei et al., 2013; Okurumeh, 2016).

ICT became an indispensable part of the contemporary world. As a natural result of this development, ICT transforms political, social, legal and other elements in a society. For instance, Yusuf (2005) mentioned the impact of ICT on teaching and learning in conventional and distance education institutions and emphasized the need for a national level educational policy on ICT. It is also certain that countries have different levels in ICT. For example, television and telephone services are still considered as luxury items in Cameroon. Similarly, Internet penetration rate in Cameroon was about 4% in 2009 (Linden, 2011).

There is no doubt that ICT would affect and be affected by the developments in economies and entrepreneurship. For example, previous studies suggested that ICT enables economic development by increasing the speed of information diffusion and introducing new practices in workplaces (Lee & Lio, 2017), developing the business environment and enhancing competitiveness and productivity (Martinez & Nguyen, 2014), and creating new job opportunities (Mirrezaei et al., 2013) such as computer program-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

mers, cyber cafe assistants, data communication analysts, network and system security specialists (Okon & Nyoku, 2016), and thus, augmenting employment rates, etc. However, the focus of the present study is limited by the interaction between ICT and entrepreneurship.

3. ENTREPRENEURSHIP AND INFORMATION AND COMMUNICATION TECHNOLOGIES

ICT might be an input, an output or a part of the entrepreneurial process. As an input, ICT may be used to improve the knowledge and skills of entrepreneurs. For example, Sinkovics et al. (2004) claimed that entrepreneur candidates require three competencies such as intrapersonal, interpersonal and organizational competencies to be successful. Certain ICT tools such as mobile phones, internet discussion groups, video conferencing and computer simulations can enable the achievement of certain interpersonal competencies by students. According to Sinkovics et al. (2004), uses of ICT tools in international entrepreneurship education provide certain benefits such as familiarity with the values of their counterparts in other countries and being acquainted with new ICTs for the students. Furthermore, ICTs can create new areas of business for entrepreneurs. These new business fields add new types of entrepreneurship such as "infopreneurship" (Khosrowjerdi, 2914), "netpreneurship (or "ontrepreneurship" or "e-entrepreneurship")" (Reddy & Singh, 2014). Infopreneurship is a type of entrepreneurship that is mostly based on services such as information brokering and consulting (Du Toit, 2000). Basically, the concept of infopreneur refers to in individual whose primary business is collecting and selling information (El-Kalash et al., 2016). On the other hand, as can be seen above, some alternative concepts were recommended for the concept of infopreneurs. For example, Guthrie (2014) preferred using the concept of "digital entrepreneurship" for infopreneurship. According to him, the former captures better the product and the processes related to the product such as production, marketing and distribution. However, since the use of "infopreneur" is more common in the literature, it was also preferred in the present study. Finally, due to the increasing significance of information among the factors of production, future of infopreneurs is considered to be prosperous. In addition to infopreneurs, netpreneur, which is as another type of entrepreneurship related to ICT, is a special type of entrepreneur with the ability to run a business extensively on the Internet (Balachandran & Sakthivelan, 2013). Furthermore, several studies emphasized the significance of social capital for entrepreneurial success. Huo (2013) discussed the role of ICT in building social capital by female entrepreneurs.

ICTs may be a part of the entrepreneurial process (or production technology) as well. Extant entrepreneurs can access data and information via ICT to increase their performances. For example, a foreign entrepreneur, who aims to enter to the Turkish market, can collect data and information about the Turkish market and on the consumer behavior using the Internet. Consistent with this example, literature review demonstrated that Ongori and Migiro (2010) asserted that small and medium sized organizations utilize ICTs to easily penetrate international markets. Similarly, Pelse and Zeverte-Rivza (2015) found that Latvian entrepreneurs limitedly utilized the ICTs and recommended the use of ICT at higher levels to increase the effectiveness of entrepreneurial activities. ICT is not only common among business organizations, but also among social organizations. For example, several aid organizations in Africa benefited from ICTs in their operations (Molony, 2007). Therefore, ICT may be a beneficial tool for social entrepreneurship as well. Finally, majority of the above-mentioned studies often reported the positive effects of ICT on the entrepreneurial process. However, certain studies also discussed adverse

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

effects of ICT as an input on entrepreneurship. For example, Lee and Lio (2017) claimed that use of ICT by extant firms discouraged new entrepreneurs to enter the market and it could create a barrier of entry.

Finally, ICT may be the output of an entrepreneurial process as well. Certain organizations may choose to produce either tangible or intangible (e.g., hardware, software, web sites) ICTs as an output (Heeks, 1999). WhatsApp, which was bought by Facebook in 2014, is a good example of ICT as an output of the entrepreneurial process. Similarly, robotic autonomous cameras developed by IBM will collect data about water quality in lakes and oceans. It is anticipated that these tools would help solve water shortage problems (Marr, 2018).

4. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

In the present study, the relationships between two popular concepts, "entrepreneurship" and "information and communication technologies", were discussed. According to the study findings, ICT can be an input, an output or a part of the entrepreneurial process. On the other hand, the present study was mainly based on a positive interaction between entrepreneurship and ICT. However, this interaction may have some negative aspects. For example, when an ICT is used in an adverse way, it can be harmful for entrepreneurial success. Therefore, adequate ICT use should be assured.

This relationship is creating a fertile ground for future studies. For example, several studies investigated the correlations between entrepreneurship and personality traits. Future studies could be conducted to determine whether infopreneur and netpreneur candidates require different psychological traits and educational backgrounds when compared to traditional entrepreneur candidates. Furthermore, it was observed that the time period that the individuals were born was another significant factor that might determine infopreneurship and netpreneurship tendencies in individuals. Thus, further studies could investigate whether there were significant differences between members of generation X and Y based on infopreneurship and netpreneurship tendencies.

Furthermore, forgetting is considered a disease in organizations. Therefore, some authors recommended several tactics to remove forgetting in organizations. However, recent studies indicated that forgetting may be useful in certain cases. On the other hand, when it is used in an adequate manner, ICT appears to be an instrument that supports organizational memory. Thus, future studies could focus on organizational behavior solving this problem of balance.

Finally, one of the popular approaches in entrepreneurship studies focused on the relationship between entrepreneurship and economic development. On the other hand, as far as it is known, there are a limited number of empirical studies conducted with large datasets that integrated infopreneurship (or netpreneurship) and economic development.

REFERENCES

Balachandran, V., & Sakthivelan, M. S. (2013). Impact of information technology on entrepreneurship (e-entrepreneurship). *Journal of Business Management & Social Sciences Research*, *2*(2), 51–56.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Baptista, R., Escaria, V., & Madruga, P. (2005). Entrepreneurship, regional development and job creation: the case of Portugal. *Max Planck Institute Discussion Papers on Entrepreneurship, Growth and Public Policy.* Retrieved from https://papers.econ.mpg.de/egp/discussionpapers/2005-06.pdf

Barney, J. (2002). Strategic management: From informed conversation to academic discipline. *The Academy of Management Executive*, *16*(2), 53–57.

Booth, C. (1998). The problems and possibilities of reflexivity in strategy. *Electronic Journal of Radical Organisation Theory,* 4(1), Retrieved from http://merlin.mgnt.waikato.ac.nz/ejrot/Vol4_1/booth.pdf

Cadar, O., & Badulescu, D. (2015). Entrepreneur, entrepreneurship and intrapreneurship: a literature review. MPRA Paper, No 82793. Retrieved from https://mpra.ub.uni-muenchen.de/82793/1/MPRA_paper_78871.pdf

Cardon, M. S., Foo, M., Shepherd, D., & Wiklund, J. (2012). Exploring the hearth: Entrepreneurial emotion is a hot topic. *Entrepreneurship Theory and Practice*, *36*(January), 1–10. doi:10.1111/j.1540-6520.2011.00501.x

Carland, J. W., Hoy, F., Boulton, W. R., & Carland, J. A. C. (1984). Differentiating entrepreneurs from small business owners: A conceptualization. *Academy of Management Review*, *9*(2), 354–359. doi:10.5465/amr.1984.4277721

Davis, G. F., & Marquis, C. (2005). Prospects for organization theory in the early twenty-first century: Institutional fields and mechanisms. *Organization Science*, *16*(4), 332–343. doi:10.1287/orsc.1050.0137

De Clercq, D., Lim, D. S. K., & Oh, C. H. (2013). Individual-level resources and new business activity: The contingent role of institutional context. *Entrepreneurship Theory and Practice*, *37*(March), 303–330. doi:10.1111/j.1540-6520.2011.00470.x

Dollinger, M. J. (2008). *Entrepreneurship: Strategies and Resources* (4th ed.). Illinois: Marsh Publications.

Du Toit, A. (2000). Teaching infopreneurship students' perspectives. *Aslib Proceedings*, *52*(2), 83–90. doi:10.1108/EUM0000000007003

El-Kalash, K. I., Mohammed, S. B., & Aniki, M. Y. (2016). Exploring infopreneurship for economic growth and sustainability in a developing economy: The Nigeria perspective. *Journal of Education Policy*, *3*(7), 240–249.

Engelen, A., Neumann, C., & Schwens, C. (2015). Of course I can: The effect of ceo overconfidence on entrepreneurially oriented firms. *Entrepreneurship Theory and Practice*, *39*(September), 1137–1160. doi:10.1111/etap.12099

Eryılmaz, M. E. (2016). Bir araştırmacının naçizane gözlemleri: Ilgili dergilerin editör ve hakemleri stratejik yönetim alanı yazarlarından ne beklerler? [Humble reflections of a researcher: what do editors and reviewers of relevant journals expect from authors of strategic management field?]. *Turkish Journal of Management*, *1*(1), 9–22.

Filion, L. J. (1998). From entrepreneurship to entreprenology: The emergence of a new discipline. *Journal of Enterprising Culture*, *6*(1), 1–23. doi:10.1142/S0218495898000023

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Gartner, W. B. (1989). "Who is an entrepreneur?" is the wrong question. *Entrepreneurship Theory and Practice*, *13*(Summer), 47–67. doi:10.1177/104225878901300406

Gohman, S. F. (2012). Institutions, latent entrepreneurship, and self-employment: An international comparison. *Entrepreneurship Theory and Practice*, *36*(March), 295–321. doi:10.1111/j.1540-6520.2010.00406.x

Guthrie, C. (2014). The digital factory: A hands-on learning project in digital entrepreneurship. *Journal of Entrepreneurship Education*, *17*(1), 115–134.

Hayek, F. A. (2005). *The Trend of Economic Thinking: The Essays of Political Economists and Economic History*. Routledge.

Hebert, R. F., & Link, A. N. (1989). In search of the meaning of entrepreneurship. *Small Business Economics*, *1*(1), 39–49. doi:10.1007/BF00389915

Heeks, R. (1999). Information and communication technologies, poverty and development. *Institute for Development Policy and Management.* Retrieved from http://unpan1.un.org/intradoc/groups/public/documents/NISPAcee/UNPA N015539.pdf

Huo, H. (2013). The role of ICT in social capital construction of rural female entrepreneurship. In *International Conference on Education Technology and Information Systems (ICETIS 2013)* (pp. 956-959). 10.2991/icetis-13.2013.219

Johnson, D. (2001). What is innovation and entrepreneurship? Lessons for larger organisations. *Industrial and Commercial Training*, *33*(4), 135–140. doi:10.1108/00197850110395245

Jones, G., & Wadhwani, R. D. (2006). Entrepreneurship and business history: renewing the research agenda. *Harvard Business School*. Retrieved from http://www.hbs.edu/faculty/Publication%20Files/07-007.pdf

Kerr, W. R., & Nanda, R. (2011). Financing constraints and entrepreneurship. In D. B. Audretsch, O. Falck, S. Heblich, & A. Lederer (Eds.), *Handbook of Research on Innovation and Entrepreneurship* (pp. 88–103). Cheltenham, UK: Edward Elgar. doi:10.4337/9781849807760.00015

Klein, P. G., Mahoney, J. T., McGahan, A. M., & Pitelis, C. N. (2013). Capabilities and strategic entrepreneurship in public organizations. *Strategic Entrepreneurship Journal*, *7*(1), 70–91. doi:10.1002ej.1147

Klotz, A. C., & Neubaum, D. O. (2016). Research on the dark side of personality traits in entrepreneurship: Observations from an organizational behavior perspective. *Entrepreneurship Theory and Practice*, *40*(January), 7–17. doi:10.1111/etap.12214

Kurt, M. (2016). Bir disiplin olarak işletmecilik tarihi: Doğuşu, gelişimi, Türkiye'de potansiyeli ve zorlukları üzerine [Business history as a discipline: on its origins, progress, prospects and challenges in Turkey]. *Turkish Journal of Management*, *1*(1), 41–57.

Lee, M., & Lio, M. (2017). Can information and communication technology promote venture creation? A cross-country study using an instrument variable approach. *Information Development*, 1–13.

Linden, M. (2011). The role of institutions and ICT entrepreneurship in developing countries: the case of Cameroon [Master of Science Thesis]. Sweden, Stockholm: KTH Industrial Engineering and Management.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Malecki, E. J. (1993). Entrepreneurship in regional and local development. *International Regional Science Review*, *16*(1/2), 119–153. doi:10.1177/016001769401600107

Marr, B. (2018, March 19). 5 big technology innovations of 2018: IBM reveals amazing developments that will impact all of us. *Forbes*. Retrieved from https://www.forbes.com/sites/bernardmarr/2018/03/19/5-big-technology-innovations-of-2018-ibm-reveals-amazing-developments-that-will-impact-all-of-us/#68b6682596c6

Martinez, I. & Nguyen, T. (2014). Using information and communication technology to support women's entrepreneurship in central and west Asia. ADB Briefs.

Matlay, H. (2005). Researching entrepreneurship and education: Part 1: what is entrepreneurship and does it matter? *Education + Training*, *47*(8/9), 665–677. doi:10.1108/00400910510633198

Miller, D. (2015). A downside to the entrepreneurial personality? *Entrepreneurship Theory and Practice*, *39*(January), 1–8. doi:10.1111/etap.12130

Milliyet. (2015). Japonlar Bambu Ağacından Elektrik Üretecek. Retrieved from http://www.milliyet.com.tr/japonlar-bambu-agacindan-elektrik/ekonomi/detay/2092132/default.htm

Mirrezaei, F., Mirrezaei, M., & Pourkaeid, K. G. (2013). Information and communication technology and entrepreneurship development. *European Online Journal of Natural and Social Sciences*, *2*(3), 2271–2277.

Molony, T. (2007). 'I don't trust the phone; it always lies': Trust and information and communication technologies in Tanzanian micro-and small enterprises. *Information Technologies and International Development*, *3*(4), 67–83. doi:10.1162/itid.2007.3.4.67

Okon, F. I., & Nyoku, C. I. (2016). Information and communication technology (ICT) and entrepreneurship skills acquisition among vocational education students for the establishment of small scale business in south eastern states of Nigeria. *International Journal of Educational Benchmark*, *3*(1), 101–116.

Okurumeh, E. A. (2016). Development of entrepreneurial skills through vocational education and information and communication technology (I.C.T.) in Nigeria. *International Journal of Science and Research*, *5*(3), 1745–1748.

Ongori, H., & Migiro, S. O. (2010). Information and communication technologies adoption in SMEs: Literature review. *Journal of Chinese Entrepreneurship*, *2*(1), 93–104. doi:10.1108/17561391011019041

Pelse, M., & Zeverte-Rivza, Z. (2015). Innovations and use of information and communication technologies in entrepreneurship in Latvia. In *Engineering for rural development*. Retrieved from http://www.tf.llu.lv/conference/proceedings2015/Papers/110_Pelse.pdf

Rasmussen, E. A., & Sorheim, R. (2006). Action-based entrepreneurship education. *Technovation*, *26*(2), 185–194. doi:10.1016/j.technovation.2005.06.012

Rauch, A., & Frese, M. (2006). Meta-analysis as a tool for developing entrepreneurship research and theory. *Advances in Entrepreneurship, Firm, Emergence, and Growth*, *9*, 29–51. doi:10.1016/S1074-7540(06)09003-9

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Rauch, A., & Frese, M. (2007). Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of Work and Organizational Psychology*, *16*(4), 353–385. doi:10.1080/13594320701595438

Reddy, R. R., & Singh, T. K. (2014). Impact of information technology on entrepreneurship (e-entrepreneurship). *International Journal of Innovative Technology & Adaptive Management*, *1*(5), 46–51.

Schwab, K. & Sala-i Martin, X. (Eds.). (2017). *The Global Competitiveness Report 2017-2018.* Retrieved from http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf

Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, *25*(1), 217–226.

Sinkovics, R. R., Bell, J., & Deans, K. R. (2004). Using information communication technology to develop international entrepreneurship competencies. *Journal of International Entrepreneurship*, *2*(1/2), 125–137. doi:10.1023/B:JIEN.0000026909.49686.a5

Stevenson, H. H., & Jarillo, J. C. (1990). A paradigm of entrepreneurship: Entrepreneurial management. *Strategic Management Journal*, *11*, 17–27.

Urban, B. (2010). Entrepreneurship as a discipline and field of study. In B. Urban (Ed.), *Frontiers in Entrepreneurship* (pp. 33–62). Springer. doi:10.1007/978-3-642-04502-8_2

Valdez, M. E., & Richardson, J. (2013). Institutional determinants of macro-level entrepreneurship. *Entrepreneurship Theory and Practice*, *37*(September), 1149–1175. doi:10.1111/etap.12000

van Stel, A., Carree, M., & Thurik, R. (2005). The effect of entrepreneurial activity on national economic growth. *Max Planck Institute Discussion Papers on Entrepreneurship, Growth and Public Policy.* Retrieved from http://www.econstor.eu/bitstream/10419/19995/1/2005-04.pdf

Vesper, K. H. (1988). Entrepreneurial academics-how can we tell when the field is getting somewhere? *Journal of Business Venturing*, *3*(1), 1–10. doi:10.1016/0883-9026(88)90026-2

Wright, P. M., & McMahan, G. C. (1992). Theoretical perspectives for strategic human resource management. *Journal of Management*, *18*(2), 295–320. doi:10.1177/014920639201800205

Yusuf, M. O. (2005). Information and communication technology and education: Analysing the Nigerian national policy for information technology. *International Education Journal*, *6*(3), 316–321.

ENDNOTES

1 This study is partially based on a previous chapter entitled "entrepreneurship" that was published in Khosrow-Pour (Ed.), Encyclopedia of Information Science and Technology, Fourth Edition, 2018, pp. 2998-3006.

2 This stream seems to attribute a positive meaning to personality to a large extent. However, there are some studies (e.g. Klotz & Neubaum, 2016) that attract our attention to the darker side of

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

personality (such as Machiavellianism, psychopathy, narcissism etc.) and their relationship with entrepreneurial consequences. In addition, some scholars (e.g. Miller, 2015) discussed that certain personality traits (such as being energetic and having a high self-confidence) that seems to be positive for entrepreneurship may be transformed into negative ones (such as aggressiveness and narcissism) later.

[3] In effect, there also seems to be a reverse correlation between these variables. For instance, Kerr and Nanda (2011) discussed that a desire for personal wealth may trigger the choice of being an entrepreneur.

This research was previously published in the International Journal of E-Entrepreneurship and Innovation (IJEEI), 9(1); pages 13-22, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 94
Continuous Improvement Maturity Models:
How to View Them Effectively

Brian J. Galli
https://orcid.org/0000-0001-9392-244X
Assistant Professor and Graduate Program Director, Master of Science in Engineering Management Industrial Engineering, Hofstra University, USA

ABSTRACT

Maturity models seek to enhance a business with the passage of time. The purpose is to attain a competitive advantage. Various maturity models are accessible, including the continuous improvement maturity model (CIMM). The model offers outstanding techniques and practice models in addition to tools, skill sets, and a proper mindset to process improvement. This article analyzes the need for Continuous Improvement Maturity Models in a company. Hence, the current maturity of a company cannot be indicated by this model. There is a need for progress and knowledge to combine and improve the company's level of maturity. The model assessment refers to an instrument that is research-based and assists the users to set a goal assessment of the maturity level. The purpose of designing this model is for it to be utilized by any manufacturing company. A series of repetitive phases are required by this instrument, and its moderations and validation are based on various case-studies and semi-structured interviews conducted with experts.

INTRODUCTION

For the past decade, there has been growing pressure for companies to attain and maintain a competitive advantage. To do so requires reducing time to the market, cutting cost, improving quality, and more. Therefore, companies ought to enhance processes on a continuous basis (Agrawal & Sharma, 2014; De Bruin et al., 2005). Organizations must make various changes in their programs and software to enhance their capacity to work and deal with increasing expectations and requirements of stakeholders and the market (Lepmets et al., 2012).

DOI: 10.4018/978-1-7998-7297-9.ch094

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Development models are ordinarily acknowledged to cultivate a competitive advantage by both businesses and scholars. They delineate the present development level of a part of the association with the goal that partners can distinguish qualities, change focuses, and organize what they can do to achieve higher development learning and demonstration. For instance, in IT, outsourcing or project management are two areas. The partners will be empowered when the results authenticate the action required to accomplish increased amounts and results in a superior business and spending improvement.

The demand for maturity models is increasing among companies since they support the achievement of company goals. An important fact that needs to be considered is that there is no actual description or definition of the maturity model. Additionally, there is no shortage of the model (Bititci et al., 2015). Regardless, it is noted that these models are utilized for comparison and evaluation so that further improvements can be made (Fisher, 2004). Another and more apparent purpose are to provide a clear approach through which a company can improve its performance (Galli, 2017; Ahern et al., 2004).

The Continuous Improvement Maturity Model (CIMM) provides a proper framework and wide range of practice methods and strategies for companies to achieve various maturity levels. These levels demonstrate onsets and mature organizations (Lockamy III & McCormack, 2004). The Capability Maturity Model (CMM) was developed by the Institute of Software Engineering at Carnegie Mellon University (Agrawal & Sharma, 2014; Paulk et al., 1993). Various development models are created to explore fields like business process administration, data innovation, execution management, learning administration, and undertaking administration.

BACKGROUND

McDermid and Bennet (1999) contended that the human variables to Software Process Improvement (SPI) had been overlooked, which harms their adequacy. Hall & Wilson (1997), likewise, proposed that involvements, feelings, and impressions of programming experts are affected because of the nature of programming created. This suggests such properties impact how programming experts carry on towards SPI execution approaches. In this manner, it is vital to distinguish the perspectives and views of diverse professionals about components that play a positive or negative part in the usage of the SPI program (Galli, 2017). These perspectives and encounters may furnish specialists with adequate information about the idea of issues that play a positive or negative role in the usage of SPI programs. Undoubtedly, this would help them in arranging SPI execution techniques.

Various empirical studies considered the aspects that negatively or positively impact SPI (for example, El-Emam et al., 1999; Rainer & Hall, 2003). A study of 138 people in 56 programming associations (Goldenson & Herbsleb, 1995) recognized the components vital for executing an effective SPI program. The creators distinguished related variables to effective as well as unsuccessful SPI programs (Goldenson & Herbsleb, 1995). Research of 56 programming associations that either executed an ISO 9000 quality framework or led a CMM-based process change activity. Based on this research, there were ten factors that influence hierarchical change in SPI (Stelzer & Mellis, 1998).

El-Emam et al. (1999) researched a portion of the essential achievement variables and obstructions for SPI. This examination is a subsequent report to Goldenson & Herbsleb (1995). They utilized information from 14 organizations engaged in SPICE trials, bearing in mind the end goal of distinguishing which components are most emphatically identified with achieving SPI endeavors and which have no effect. A questionnaire survey was conducted containing participants from 85 UK organizations (Rainer & Hall,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2003). This survey identified vital achievement factors affecting SPI usage. The outcomes demonstrate experts considered four factors that majorly affected effectively actualizing SPI, including surveys, guidelines and processes, preparing and tutoring, and experienced staff. The creators likewise distinguished four other factors (inner authority, investigations, official help, and interior process possession) that developed organizations considered majorly affected achievement of completely actualizing SPI.

The work discussed and reported in the current paper extend the work of previous ones. Most studies mentioned herein implemented the survey method to obtain their findings and knowing which factors create the need for CIMM in a company.

There is a disadvantage linked with the survey method since a specific list is provided to the participants, to which they had to respond accordingly. This persuaded the researchers to acquire the components researched and restrict them to those detailed in existing investigations. It is also conceivable that respondents may misjudge the variables in the survey. These issues are exacerbated if the respondents do not have an adequate idea of the CSF approach. With the goal of improving trust in the investigation, it is vital that professionals' encounters and recognitions be investigated freely and with no proposal from the analyst.

Little consideration has been paid to the change of SPI execution processes. Diverse advances are made for the improvement of SPI measures and models. However, these advances have not been coordinated with the reception of these guidelines and models in programming advancement (Badsi et al., 2017; Leung, 1999). This brought about constrained accomplishment for some SPI endeavors. This proposes the present issue with SPI is not an absence of a standard or model, but instead an absence of a compelling technique to effectively actualize these principles or models. In writing, much consideration is paid to ''what exercises to actualize'' rather than ''how to execute'' these exercises. It is trusted that distinguishing proof of just ''what exercises to execute'' is not adequate and that information of ''how to actualize'' is likewise required for fruitful usage of SPI programs.

The current study discusses what factors bring forth the need for CIMM in a company and make an organization implement it for their success. Moreover, is it able to solve the issues related to productivity and performance?

Problem Statement

The paper intends to understand the need for CIMM in enhancing the performance of companies.

Research Hypothesis

- Identify the correct Continuous Improvement Maturity Model tool.
- Identify the key elements of the Continuous Improvement Maturity Mode
- Identify the need for Continuous Improvement Maturity Mode to boost the performance of an organization.

Originality

The purpose of this study is to contribute to existing literature regarding the effectiveness of CIMM. Moreover, it seeks to compare CIMM features with other maturity models by focusing on their assess-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

ment tools. Data is derived from different studies and combined in a well-mannered approach. This paper is based on original research conducted to check the hypotheses.

The study has taken the viewpoints from different researchers and recommend new ways to resolve already existing issues. The purpose of the study and hypotheses are described. In the paper, the methodology is discussed along with its findings. A valid assessment model of CIMM is developed by using a design-science-investigate strategy, authorizing a valuable growth reveal for both reasonable and hypothetical applications. This paper initially provides an outline of development models with attention to their evaluation instruments as an answer to the examination question. An explanation is provided about the strategy utilized for the outline and assessment of the evaluation instrument. The consequences of the meetings are also laid out in the Analysis. This is trailed by the initial discoveries and suggestions in the conclusion, which also plots investigative limitations and future research ideas.

Contribution to the Industrial Engineering Profession and Research Field

The current study is a significant contribution to the Industrial Engineering (IE) profession and research field. The study saves engineers' time, so they can work more effectively and focus on their goals. It helps engineers in organizing and maintaining the system with the use of the latest technologies. Moreover, it helps engineers save time, materials, machine time, money, energy, work hours, and other resources that hinder generating productivity. Finally, the research helps engineers improve the productivity and quality of their overall work. This model helps organizations make innovations in their products and other essential aspects. It would assist industrialist engineers in finding effective strategies that provide benefits to the organization.

Hence, in the research field, this study is helpful. First, it would be a beneficial piece of writing providing information and awareness to industrialists and all readers. Easy to understand and user-friendly vocabulary and writing are utilized to accommodate all readers. This research reveals a new side of the CIMM model and sheds light on the effectiveness and requirement of this model for the management and production of companies. Moreover, a clear theoretical framework is provided in this research to help readers know the relevant information. Additionally, readers and researchers can use this study as a reference in future studies. It would be helpful for companies to boost their performance and achieve a competitive advantage in commerce. Undoubtedly, this paper is a valuable contribution to the IE profession and research field.

LITERATURE REVIEW

CIMM is a new model and is regularly updated and maintained by the Lean Six Sigma Academy (LSSA). The model consolidates not just the prescribed procedures, strategies and methods of process change, quality administration, and new item advancement, but also the attitude, range of abilities and device set for process change. This system is profitable as it guides associations through the development levels of organization and supervision, and can turn into a world-class association in the long run (Badsi et al., 2017; Lindemulder, 2014). It is contended that CIMM provides an exhaustive procedure change system, of which every development level is described by Lindemulder (2014). Be that as it may, there is minimal hypothetical comprehension on how the different development levels can be surveyed.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Information about development models and their evaluation instruments is scattered. Different research concerning development models have been completed. Harmon (2004), for example, looked at different business process administration development models. Such type of research has concentrated on looking at the appraisal instruments of development models. It is likely that different investigations can be utilized as a reason for a CIMM appraisal. There appears to be a significant gap between the coveted and genuine hypothetical base and, in this manner, the utility of CIMM. This is particularly critical since Bititci et al. (2015) showed that development models could empower productive and successful appraisal of the execution administration hones. Evaluation is therefore important as it shapes the premise of using development models to support associations in achieving the upper hand.

Numerous companies utilize development models to measure and enhance their presentations. A maturity model enables an association to have its strategies and procedures surveyed by the best administration improvement and against a unique arrangement of external benchmarks. Critical advantages have been acknowledged by utilizing these models for business change and in framework advancement applications. However, these models have two issues. First, the vast majority of these models are exceptionally complete and complex for some. Second, they do not consolidate the full arrangement of process change systems and strategies (Elloumi et al., 2017).

Most models have been produced at the season of 'Add up to Quality Management' (TQM), yet do not consolidate the full arrangement of Lean and Six Sigma standards. Enhancing forms inside an association is depicted by the 'Persistent Improvement Maturity Model' or CIMMTM. It is a structure that depicts an approach to process change from making a strong establishment to creating World Class items and administrations. CIMM joins the accepted procedures, strategies and systems of process change, quality administration and new item advancement. It incorporates components from TQM, Kaizen, TPM, Lean, Six Sigma, and Design for Six Sigma.

The CIMM Model is not intended to replace other development models, but rather to assist them. Same as the more significant part of the development models, CIMM incorporates five distinct levels. The CIMM Model can be used as a remain solitary system to direct the procedure of Continuous Improvement from a beginning time to the level of World Class. Picking the correct procedure change strategy and apparatuses relies upon the real development level of the association. If an association chips away at getting to the following level, it ought to also maintain the levels beneath. For example, if an organization is going for 'Able' procedures, it ought to maintain the establishment, culture, and consistency. In the accompanying areas, we survey the five levels and disclose the ideal approach to accomplish the following development level. The levels will be recognized as 'Persistent Improvement Level 1' (CIMM Level-I) through to 'Consistent Improvement Level 5' (CIMM Level-V) (Galli, 2017).

Improvement ought to be a persistent application. It is anything but difficult to predict the end of an SPI scheme, when a researcher tallies his triumphs and failures. It is similarly evident that enhancements are somewhat endless: as a few issues are found, others become noticeably distinct. The key factors in a persistent approach are stepwise change, top-administration duty, and a practical change association. Development models, for example, CMM, Bootstrap, and SPICE (Software Process Improvement and Capability Determination) typify the substance of stepwise change. All encounters recommend that such stepping stools take a long time to climb. A consistent approach in this manner requires duty from top administration. A nearby or base up activity can be successful for some time, yet it effectively loses force. Over the long-term, the attention on SPI activities reduces unless they prevail with regards to winding up some portion of the key factors of the organization (Elloumi et al., 2017; Felfel et al., 2017).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

To effectively climb the development step, the researcher should introduce and maintain changes in the model where required. To do this, the researcher requires a maintainable change association that is versatile to evolving conditions. The administration should straightforwardly assign assets to such an authoritative unit and must enable it to make and maintain organization-wide SPI mindfulness. Elements that undermine the persistent approach are deficient outcomes and a negligible SPI exertion. On the off-chance outcomes are not archived, or the arrival on speculation is weak, the SPI exertion is probably not going to make due past the principal venture. By and large, the researcher cannot archive enhanced development on a regulating scale. Functional persuading is required, and it is commonly best to set up a basic measurements program that can enable the researcher to contend for proceeding with the accomplishments (Kaoud, 2017; Schön, 1996). Even when an SPI exertion comes about, indicating authoritative, legislative issues or other hierarchical issues can underestimate it (Gera et al., 2017; McFeeley, 1996).

Research reveals five standards that are emphatically reliant for the improvement of a strategy or model. If the company neglects to improve one, it genuinely lessens its odds of effectively actualizing the others. For instance, in the event it neglects to concentrate on issues, new knowledge cannot be made by the products of a specific company. An essential inspiration for having specialists take an interest vanishes. The administration will probably decrease change activities to customary help capacities with minimal key significance (Galli, 2017). Also, when the researcher is left with a general concern, there would not be continuous and long-term benefits for improvement efforts. In a situation where the researcher neglects to receive different standards, comparable shortcomings would arise. The five standards are a conscious theory of SPI that are created through training. The hidden esteems are unique in relation or even conflicting to the estimations of conventional change approaches.

Learning SPI is a requesting procedure; it questions individual and expert convictions and difficulties regarding existing conventions. If SPI activity is initiated as a progression of tasks, it can keep up the concentration of the researcher and take into consideration dynamic changes as the development of a specific procedure. Most importantly, SPI requires submitted, persistent members (Kaoud, 2017). According to research, if a person wants to learn SPI, the person should be set up to enhance both programming rehearses and existing change conventions. To set the person up for such a test, the person needs to get some specific training and follow specific instructions as well as suggest the exploitation of learning. Eventually, be that as it may, every association must locate its particular way to SPI achievement (Kaoud, 2017). The essential and most critical part will be that of a progress operator. The best change specialists abstain from becoming plainly closed-minded SPI devotees. Alternatively, they realize what they can, tune in to the many voices inside their association, and, given both, diagram the best way towards change.

Research conducted by Larrucea et al. (2016), revealed there is a requirement to improve process management and strategies in an organization to enhance performance. When employee performance is increased, there is the possibility that the company enhances its productivity and increases profit. Specifically, when a company is small, the need for process improvement increases. The international standards should be followed to get assistance here. The CIMM can help organizations gain success by developing a strategic concept and following it.

RESEARCH METHODOLOGY

A qualitative method is used to conduct the study. Content analysis is also performed. The study is linked with a naturalistic inquiry and explores the need and effectivity of the CIMM directly. A collec-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tion of studies were used. The theoretical point of view regularly connected with subjective analysts is phenomenology. Following the content analysis, specialists try to comprehend the significance of using CIMM. The setting is also critical to understand the information. This approach requires the analyst " focus on the industry to accomplish a feeling of the suggestions that others provide for their particular circumstances."

The information gathered in a subjective report incorporates more than words, states of mind, emotions, vocal, and outward appearances, and different practices are likewise included. The information is gathered by using previous researches and the annual reports of companies. The findings are generated by the in-depth analysis of the content emerging from this real information.

To perform this study, 20 companies were interviewed. Semi-structured interviews were conducted to know if they work well or if they need improvement in productivity, software being used, techniques currently boosting productivity, the criterion to assess creativity and productivity, and thoughts on the future of the company's competitive advantage. Random sampling was done by connecting these companies via mail and getting their consent through a consent form.

It is further imperative to recognize the experts sampled within organizations are representative of specialists in associations overall. A genuinely representative sample is very difficult to accomplish, and the specialist should attempt to abandon much of the sample biases. In this exploration, with a specific end goal to make the specimen genuinely illustrative of SPI professionals specifically association, one to three specialists from every association self-chose partaking in the research. The sample incorporates engineers, business examiners, methodology investigator, specialized executives, project administrators, and senior administration.

20 companies used include 6 CMM level 3 companies, 5 CMM level 2, and nine implemented a general formal program of internal quality assurance. Additionally, almost 20 published reports, articles, and case studies are analyzed to assess the aspects that may play an imperative role in applying CIMM model.

The setting (industry or business) that is using CIMM and maturity models also plays an important role in analyzing the information and findings identified from previous research studies. The context or setting that companies are using CIMM required us understand the context since that setting could have played a factor or role in the findings or conclusions found in the previous research studies; therefore, setting (industry or business) is a factor that could not be discounted in our research study.

FINDINGS

The results of the questions mentioned above are discussed below. This section reveals the essential barriers cited in the literature and discusses previous empirical studies. The method of content analysis is performed to obtain findings.

The findings related to question 1 reveal that Continuous Improvement Maturity Model is valid. The work is performed by using specific levels. When the checking is done through a proper criterion, then it would provide valid results. The validity of a tool is important to know how well the software can work. Validity is fundamentally done by analyzers through testing. While approving the item, if some deviation is found in the final findings from the normal outcome, then a bug is accounted for or an occurrence is raised.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Not all occurrences are bugs. Be that as it may, all malfunctions are occasions. These occasions can be a sort of 'Question' where usefulness is not clear to the analyzer. Consequently, approval helps in unfurling the correct use of highlights and causes the analyzers to comprehend the item in a better way.

Findings regarding question 2 reveal the essential and key components of CIMM model. These elements include maturity-based transformation, sustainability through a three-tiered system, and functional integration. First, an initiative is taken, and after that, the process is repeated to know the reaction of specific organizations and projects. Then, the project is properly defined. In the next step, the procedures are measured and controlled, and in the last step, the focus is on improving that strategy. If there is any need to improve, the improvement is made, and again the process is repeated (Kaoud, 2017; Hart, 2017). It is necessary to know the basic steps to understand the effectiveness of a tool. The CIMM is a software program that helps in knowing the effectiveness of activity during a company's progress. There is the necessity to find the ways and strategies that become helpful to the success of a company and assist in increasing the productivity (Galli, 2017).

Regarding the findings of question 3, it is important to know the needs of a company and where there are loopholes. In this age of technology, the level of competition is very high among companies, so they are adopting the latest technological tools to enhance performance. When a company implements CIMM model to boost its performance, this model works remarkably. It assesses the needs and requirements of a company and provides a strategic plan that would lead the company towards success. When everything has been clarified to the administration about the loopholes, timesaving measures, strategies that could be adopted to boost the productivity, and other vital factors, then it would be natural for the company to maintain its competitive advantage (Kaoud, 2017).

It is necessary to keep checks and balances of the strategies a company uses for increasing its productivity and changing technology. The companies should check new trends in the industry. There are obvious explanations for remaining fully informed regarding what is going on in the specific vocation field, like keeping a focused edge in the active market or situating one deliberately for advancement. Remaining educated and exploring a specific profession to be balanced on the borders of information can expand the validity, relevance, and encouragement among associates in a specific industry. Publication, events, seminars, forums, mentors, and social media are effective ways to keep updated with technological advancements. The content analysis reveals these findings that make sure companies need to implement Continuous Improvement maturity models to boost their productivity.

In-Depth Research and Information

The CIMM model is very important in maintaining consistency, saving time, improving performance, increasing marketing demand, and overall process improvement of a company. Numerous associations utilize maturity models to gauge and enhance their exhibitions. A maturity model enables an association to have its strategies and procedures surveyed by the best administration. Noteworthy advantages are acknowledged by utilizing these models (Nabi et al., 2015).

There is a need to perform in-depth research and get proper information regarding the Continuous Improvement Maturity Model. This information can be gathered by using in-depth research. It is one of the best tools for planning and evaluating a program. When in-depth research is performed, then it allows the researcher to explore both basic and expert aspects of the specific criteria. In-depth research is performed to conduct the present study. As a result, more amount of information is gathered that also

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

helped in getting the findings and knowing the assessed the effectiveness of the CIMM (Nabi et al., 2015; Wilkerson, 2015; Agrawal & Sharma, 2014).

DISCUSSION

A high development association where all people perceive their part and duty regarding business achievement is an association that will probably make progress. Companies with attention on merely winning the CIMM affirmation barely locate the substantial advantages of embracing the quality structure. High development, with its emphasis on quality and process execution targets, put associations and activities in a place to succeed (Galli, 2017).

Empirical investigations which utilize the artifacts of software are famous in the last century because of the accessibility of archives from open source projects. The current paper studies examinations over the past three years of ICSE, FSE, and maturity models and procedures, order these investigations regarding open source versus restrictive source ventures, and the decent variety of subject projects utilized as a part of these examinations. The overview demonstrated that half of the examinations utilized exclusively open source schemes. Existing studies either reach general implications from these outcomes or renounce any conclusions that stretch past particular subject programming (Hatch & Cunliffe, 2013).

It is concluded that analysts in observational programming design must consider the outside acceptability issues emerging from utilizing a few plainly understood open source programming projects, and that dialog of information source choice is an essential theme in programming building research (Singh & Vyas, 2016). The paper discussed the need for making continuous improvements in the strategic model required in a company. When there are changes regarding the advanced technology in the model, only then is it possible for the company to achieve progress and be first among the competitive companies. It is essential for a company to fulfill the competitive advantage to gain more progress and profit as compared to competitors (Galli, 2017; Singh & Vyas, 2016).

In this paper, the discussion of continuous improvement maturity model is displayed that can enable organizations to evaluate and enhance their execution forms. CMMI model depends on CSFs and primary obstructions distinguished through writing and an experimental examination. For the advancement of this model, we investigated the encounters, assessments, and perspectives of professionals to distinguish factors that have a positive or negative effect on the usage of SPI programs (Galli, 2017). In any case, this model needs change and assessment. A specialist board audit will be directed to keep in mind the end goal and gather input from various professionals. Given the assessment input enhanced rendition, the development model will be delivered. A contextual investigation will likewise be directed to approve and test the development and usage of this mode.

Implications to the Field of IE (Industrial Engineering)

The implication of this study is remarkable in the field of IE (industrial engineering). The companies would know the importance of CIMM model for performance. The findings revealed a significant improvement in the performance of companies using this model for their strategic development. Moreover, the model is important to know essential strategies beneficial for the company, and the improvements required to boost the company's performance (Tinnila, 2013).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The implication of this study is for the development of solutions, for enhancing the purchasing of services and products required to boost productivity, and for boosting the delivery of creation of service systems and services. Furthermore, its implications to the field include checking how much time is required to complete a task, what products are used to enhance the capability of a specific program, what can result, and other factors. Conclusively, its implication plays a vital role to make a company successful among its competitors (Galli, 2017; Caffyn, 1999).

Applications to IE (Industrial Engineering)

The application of continuous improvement maturity model to IE is apparent. There is a need to apply this model. The companies that accomplish long-term investigation sustainability by effective challenging for research funding would not just generate their quality science. Hence, they also generate human resources to eliminate the risk of turning into a security threat. Real difficulties to these associations incorporate recognizing and organizing financing facilities, securing and directing outside allow honors, and distributing both the results of research and applicable observation information.

The absence of an established assessment method to evaluate institutional research capacities poses challenges for recognizing and focusing on, repeatable procedures that prompt authoritative changes. Long and short-term objectives, which are tested by inquiring about quality, financing, and HR, should be set up to accomplish complex missions, such as diminishing worldwide wellbeing security dangers. When pattern capacities are built, a predictable assessment method gives a target view to supplement different advances that upgrade abilities (Tinnila, 2013).

The capacity development display, which is regularly utilized as a part of business and innovation segments for setting up life cycle and arranging sustainment is a strategy that improves execution by characterizing three levels of ability (beginning, oversaw and enhanced). An association can survey its present condition of ability (‘as may be’) and build up a noteworthy procedure for its next movement (‘to be’). What is more, use of CIMM helps to make a technique for understanding a more repeatable and upgraded process. Research programs regularly depend on fundamental measurements, such as the quantity of associate investigated distributions, and give subsidizing credits to quantify their quality.

Our investigation recommends an approach that incorporates references and devices, particularly those that are chance based, which can be utilized to set up beginning accepted procedures, characterize measurements, measure yields, and rates of achievement in a stepwise way. Also, we give a pilot case from an overview of research organizations in under-resourced regions (Yeh et al., 2017; Tinnila, 2013).

CONCLUSION

Maturity models are expanding in popularity as an instrument to control associations towards the upper hand. Different development models exist with fluctuating appraisal instruments. It was discovered that there is an unmistakable direct thought between process thoroughness and confirmation bolster. Instruments which score high on the two perspectives regularly envelop more significant evaluation groups, incorporate both inside and outer assessors, and make more association than instruments which score low on these viewpoints. It can in this manner be presumed that the pointed consequence of an appraisal is critical to consider while settling on choices amid the advancement of an evaluation instrument. The planned CIMM appraisal needed to demonstrate the current CIMM development status of an association.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Besides, it must be usable by any assembling association. The instrument accomplishes this by focusing on general subjective articulations (just proposing effective devices and strategies). Also, the instrument is meant to be a reasonably confirm-based appraisal with negligible process thoroughness. This was set up by building an inspection/appraisal instrument and proposing to incorporate various (external and internal) assessors amid the evaluation. The current perspective of how inspection/appraisal instruments are developed was inadequate. This paper sought out to present the different maturity appraisal/inspection instruments and it also sought to develop an approach to analyze the different maturity appraisal instruments. From this analysis, a CIMM evaluation instrument was created. In turn, this instrument, with a strong logical premise, was used to show the association of how maturity helps an organization to develop its status of project success; this in turn adds to the utility and value of CIMM. The assessment of the appraisal instrument let different upgrades concerning detail, structure, and other components.

Moreover, it is discovered that associations and specialists see the additional estimation of an appraisal and support the proposed strategy for the CIMM evaluation instrument. Findings contributed to understanding different assessment tools. A unique diagram of development appraisal instruments was inadequate. This paper depicts existing development show evaluation instruments and provides a system which analyzes investigated appraisal instruments. A CIMM evaluation instrument was created. This instrument, with a strong logical premise, shows the association's present development status and adds to the utility of CIMM.

The definitive point of leading the experimental investigation and creating development was to build up an SPI usage system. It is essential to utilize the exact discoveries and compose a structure for managing the de-indication of viable usage techniques for programming process change (Aurum et al., 2013). It is important to identify and follow the essential components required for bringing improvement in a maturity model. These components provide an exceptionally logical structure with which to actualize SPI programs.

Keeping in mind the end goal to viably design SPI execution systems, the goal of ''SPI usage design'' is to furnish experts with adequate learning about the idea of issues that play a positive or negative part in the execution of SPI programs and to help them in successfully arranging SPI execution procedures. ''SPI execution guide'' objective is to give a development model to SPI usage with a specific end goal to control associations in surveying and enhancing their SPI execution forms. In ''SPI execution demonstrate,'' the perspectives and encounters of professionals concerning SPI usage are experimentally investigated, and a model is created to successfully actualize SPI programs. This paper secured the structure and execution of the model that is the exact guide to the implementation of it.

Limitations

The study contains some limitations. This examination investigated the encounters and view of experts concerning the use of a maturity model. These insights, awareness, and encounters have not been checked specifically. This may imply that what specialists say regarding basic elements may not be the basic variables for execution of this model. Moreover, viewpoints of experts may not be exact. The findings of this study are trustable that come in the shape of information and awareness in the light of the fact that the information is gathered from previous researchers that were conducted to know the usage of CMMI model in companies.

Moreover, practitioners' encounters and observations were explored autonomously and with no recommendation from the analyst. The qualitative approach that is the method of content analysis is

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

used to know the findings. There can be another approach used for this research to get more obvious results. Though the product advancement industry is characterized by worldwide rivalry and interest, our investigation is restricted to programming development associations. This eradicates the problem of relational correspondence and tends to advance a more institutionalized gathering of associations.

Recommendations for Future Research

In the future, if there would be the need of conducting research, the researcher ought to find ways through which more effectivity can bring to the model. Moreover, he should take a larger sample so that more objectivity can be found in the results. To overcome the above-mentioned limitations, more qualitative research ought to be performed.

REFERENCES

Agrawal, T., & Sharma, J. (2014). Quality Function Deployment in Higher Education: A Literature Review. *International Journal of Service Science, Management, Engineering, and Technology*, *5*(1), 1–13. doi:10.4018/ijssmet.2014010101

Ahern, D. M., Clouse, A., & Turner, R. (2004). *CMMI Distilled: a practical introduction to integrated process improvement*. Addison-Wesley Professional.

Aurum, A., Jeffery, R., Wohlin, C., & Handzic, M. (Eds.). (2013). *Managing software engineering knowledge*. Springer Science & Business Media.

Badsi, H. B. A., Ghomari, A. R., & Zemmouchi-Ghomari, L. (2017). A CRM Process Model for Agent-Based Simulation. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(4), 56–82. doi:10.4018/IJSSMET.2017100104

Bititci, U. S., Garengo, P., Ates, A., & Nudurupati, S. S. (2015). Value of maturity models in performance measurement. *International Journal of Production Research*, *53*(10), 3062–3085. doi:10.1080/00207543.2014.970709

Caffyn, S. (1999). Development of a continuous improvement self-assessment tool. *International Journal of Operations & Production Management*, *19*(11), 1138–1153. doi:10.1108/01443579910291050

De Bruin, T., Freeze, R., Kaulkarni, U., & Rosemann, M. (2005). Understanding the main phases of developing a maturity assessment model.

El-Emam, K., Smith, B., & Fusaro, P. (1999). Success Factors Barriers for Software Process Improvement: An Empirical Study.

Elloumi, N., Kacem, H. L., Dey, N., Ashour, A. S., & Bouhlel, M. S. (2017). Perceptual Metrics Quality: Comparative Study for 3D Static Meshes. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(1), 63–80. doi:10.4018/IJSSMET.2017010105

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Felfel, H., Ayadi, O., & Masmoudi, F. (2017). Pareto Optimal Solution Selection for a Multi-Site Supply Chain Planning Problem Using the VIKOR and TOPSIS Methods. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(3), 21–39. doi:10.4018/IJSSMET.2017070102

Fisher, D. M. (2004). The business process maturity model: A practical approach for identifying opportunities for optimization. *Business Process Trends*, *9*(4), 11–15.

Florence, A. (2001). Lessons learned in attempting to achieve software CMM Level 4. *Crosstalk*, (August): 29–30.

Galli, B. (2017). Risk management in project environments: Reflection of the standard process. *Journal of Modern Project Management*, *5*(2), 40–49.

Galli, B., & Kaviani, M. A. (2017). The impacts of risk on deploying and sustaining Lean Six Sigma initiatives. (2017). *International Journal of Risk and Contingency Management*, *7*(1), 46–70. doi:10.4018/IJRCM.2018010104

Galli, B., Kaviani, M. A., Bottani, E., & Murino, T. (2017). An investigation of shared leadership & key performance indicators in Six Sigma Projects. *International Journal of Strategic Decision Sciences*, *8*(4), 1–45. doi:10.4018/IJSDS.2017100101

Gera, R., Mittal, S., Batra, D. K., & Prasad, B. (2017). Evaluating the effects of service quality, customer satisfaction, and service value on behavioral intentions with life insurance customers in India. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(3), 1–20. doi:10.4018/IJSSMET.2017070101

Goldenson, D., & Herbsleb, J. D. (1995). After the appraisal: A systematic survey of process improvement, its benefits, and factors that influence success.

Hall, T., & Wilson, D. (1997). Views of software quality: A field report. *IEE Proceedings. Software*, *144*(2), 111–118. doi:10.1049/ip-sen:19971072

Harmon, P. (2004). Evaluating an organization's business process maturity. *Business Process Trends*, *2*(3), 1–11.

Hart, R. (2017). *The key components of a sustainable CI system. CCI*. Retrieved from https://traccsolution.com/blog/sustainable-continuous-improvement/

Hatch, M. J., & Cunliffe, A. L. (2013). *Organization theory: modern, symbolic and postmodern perspectives*. Oxford university press.

Kaoud, M. (2017). Investigation of customer knowledge management: A case study research. *International Journal of Service Science, Management, Engineering, and Technology*, *8*(2), 12–22. doi:10.4018/IJSSMET.2017040102

Larrucea, X., O'Connor, R. V., Colomo-Palacios, R., & Laporte, C. Y. (2016). Software process improvement in very small organizations. *IEEE Software*, *33*(2), 85–89. doi:10.1109/MS.2016.42

Lepmets, M., McBride, T., & Ras, E. (2012). Goal alignment in process improvement. *Journal of Systems and Software*, *85*(6), 1440–1452. doi:10.1016/j.jss.2012.01.038

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Leung, H. K. (1999). Slow change of information system development practice. *Software Quality Journal*, *8*(3), 197–210. doi:10.1023/A:1008915509865

Lindemulder, M. J. (2015). *Development of a Continuous Improvement Maturity Model Assessment Instrument* [Bachelor's thesis]. University of Twente.

Lockamy, A. III, & McCormack, K. (2004). The development of a supply chain management process maturity model using the concepts of business process orientation. *Supply Chain Management*, *9*(4), 272–278. doi:10.1108/13598540410550019

McDermid, J. A., & Bennett, K. H. (1999). Software engineering research: A critical appraisal. *IEE Proceedings. Software*, *146*(4), 179–186. doi:10.1049/ip-sen:19990618

McFeeley, B. (1996). *IDEAL: A User's Guide for Software Process Improvement (No. CMU/SEI-96-HB-001)*. Carnegie-Mellon Univ Pittsburgh, PA Software Engineering Institute. doi:10.21236/ADA305472

Nabi, G., Wei, S., & Shabbir, M. (2015). Does selection mechanism for temporary employees in public sector universities affect right selection? *International Journal of Service Science, Management, Engineering, and Technology*, *6*(3), 1–11. doi:10.4018/IJSSMET.2015070101

Paulk, M. C., Curtis, B., Chrissis, M. B., & Weber, C. V. (1993). Capability maturity model, version 1.1. *IEEE Software*, *10*(4), 18–27. doi:10.1109/52.219617

Rainer, A., & Hall, T. (2003). A quantitative and qualitative analysis of factors affecting software processes. *Journal of Systems and Software*, *66*(1), 7–21. doi:10.1016/S0164-1212(02)00059-6

Schön, D. A. (1996). Organizational learning II: Theory, method and practice. Reading: Addison Wesley, 305, 2.

Singh, B., & Vyas, O. P. (2016). A PSO Based Approach for Producing Optimized Latent Factor in Special Reference to Big Data. *International Journal of Service Science, Management, Engineering, and Technology*, *7*(3), 55–70. doi:10.4018/IJSSMET.2016070104

Stelzer, D., & Mellis, W. (1998). Success factors of organizational change in software process improvement. *Software Process Improvement and Practice*, *4*(4), 227–250. doi:10.1002/(SICI)1099-1670(199812)4:4<227::AID-SPIP106>3.0.CO;2-1

Tinnilä, M. (2013). Measurement of service efficiency in different types of banking services: Mass services, service factories, service shops, and professional services. *International Journal of Service Science, Management, Engineering, and Technology*, *4*(1), 47–67. doi:10.4018/jssmet.2013010104

Wilkerson, D. F. (2015). *Youth assault-injury variation patterns and their dimensional structure* [Doctoral dissertation]. Walden University.

Yeh, K. B., Adams, M. L., Marshall, E. S., Dasgupta, D., Zhunushov, A., Richards, A. L., & Hay, J. (2017). Applying a capability maturity model (CMM) to evaluate global health security-related research programs in under-resourced areas. *Global Security: Health, Science and Policy*, *2*(1), 1–9.

This research was previously published in the International Journal of Service Science, Management, Engineering, and Technology (IJSSMET), 10(4); pages 26-38, copyright year 2019 by IGI Publishing (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Section 8
Emerging Trends

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 95
New Trends and Tools for Customer Relationship:
Challenges in Digital Transformation

Ana Lima
Polytechnic of Porto, Portugal

Jorge Pacheco
Polytechnic of Porto, Portugal

ABSTRACT

Digital transformation is leading companies to change their business and adjust the strategies to the new market reality – an era of constant customer connectivity focus on transforming the customer value and the use of digital technologies for greater customer interaction and collaboration. This is putting the customer first in many organizations' strategies to leverage the customer journey and experience with brands. Digital transformation is the combined effect of the main digital innovations responsible for changing structures, practices, and values within companies. In terms of customer, it means changing the way business interaction occur during the customer journey. The digital era faces a tremendous growth of customer empowerment, so companies need to structure news ways to be innovative in terms of customer support, anytime, anywhere, and with the proper device – text, video, instant messages, and unexpected ways. The authors strongly recommend any company or organization to bring the customer experience to the early stages of the implementation of a new tool.

INTRODUCTION

This chapter presents a broad perspective of how new tools are emerging from digital transformation aiming to better reinforce the interaction with customers. This means new ways to follow customer preferences in terms of customer support and building emotional boundaries with target groups. Nowadays, customers in digital era are more demanding, expecting a real time response and innovative approaches. Digital transformation is highly in progress and it provides new ways to interact with customers in a

DOI: 10.4018/978-1-7998-7297-9.ch095

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

digital way. The market is growing fast in digital era and companies are forced to move faster and update the communication among customers and stakeholders. It has transformed the way customers buy and the experience exchange. Today, customers are driving the buying process among websites, blogs, and social platforms According to this real time changes, this chapter describe some of the main concepts of digital transformation, trends and tools to develop close relations with customers, and also considered benefits to companies. The chapter is structured in a simply way, with a literature review in the section one, presenting some of the main concepts - digital transformation, customer relationship and customer experience. Section two and third present some of the trends and tools that support the relation between companies and customers in the growth of digital era. Final section is concerned with the challenges and issues faced by companies when embracing digital transformation in their process of relationship with customers, aiming to differentiate customer service and innovate the customer journey. The author's motivation is based on their experience with mapping customer experience journey in some fields of work and industries in digital era. Our contribution is to present an organized approach and list of the main trends and tools that can support companies to leverage the digital transformation among customer service departments able to face the fast growing industries.

PART 1: DIGITAL TRANSFORMATION AND CUSTOMER EXPERIENCE

Digital Transformation

Nowadays, more and more people use digital channels and devices in their interactions with brands and companies, so there is an exponential attention for digital customer experience.

Digital transformation is one of the strongest trends in the past few years and those in leadership positions must plan to move ahead of these organizational, technology and social shifts to stay competitive or they could be left overdue as digital business disruption becomes a requirement. This digital transformation is considered a methodology that uses digital technologies to transform and create new business models and cultures. Is also connected with the development of the World Wide Web and all around it, from communications to ecommerce and government management. Digital transformation is known as the integration of digital technology with all areas of a business, resulting in several changes in the business, mainly in managerial operations and the value delivered to customers. In simply words, we can consider that the focus is to change the way companies interact with the market, the customers, and how they deliver and improve a particular consistent customer experience in real time. According to Fitzgerald et al (2013) digital transformation is the use of new digital technologies (social media, mobile, analytics or embedded devices) to enable business improvements such as customer experience, streamlining operations or creating new business models.

World Wide Web has grown at an overwhelming pace from less than 10 million sites in 1998 to more than 500 million in 2008. There where 2.4 billion users in 2014, now there are 4.1 billion users, with Asia leading the way with 2023 million users followed by Europe with 704.8 million and 3.3 billions searches every day on Google alone and more than 2,1 Billions active social media users, only on Facebook (Statista, 2018).

The most commonly performed activities online are: instant messaging, like Whatsapp, Skype or Facebook chat (85%), use of social networks such as Facebook, Instagram or Snapchat (77%), use of e-mail (60%), voice or video call conversation, such as Skype or WhatsApp (54%), watch videos, pro-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

grams, movies or online series (64%), listen to music online 59%), share texts, images or videos 66%, post texts, images or videos (38%) and create or update blogs, websites (16%) according to Linhares (2017).

65% of Portuguese online surveys are done through mobile devices, standing new challenges to public and private institutions that seek to interact with current or potential clients. With the Internet, consumers access to a vast sources of information that have transformed the way decisions are made, and at the limit, it can be stated that even the purchase process itself has changed due to this technological evolution, giving rise to the ROPO effect (Dionísio, Rodrigues, Faria, Canhoto & Nunes, 2009).

The companies who actually play digital transformation are creating a strong bond with customers, resulting in engaged customers. And even so, customers are: six times more likely to try/buy a new product or service from their preferred brand; four times more likely to start referring the brand to friends, family and network; two times more likely to make a purchase with their preferred brand, even when a competitor has a better offer. In the digital world, firms are recognizing the huge power of the Internet as a way for co-creating value with customers. They are excited for new formats and ways to communicate and interact with friends, family and government, at school, at work, at everything that is connected. They shifted from "consumer" to "prosumer," increasingly stimulating communication by embracing the use of new technologies to communicate, learn, evaluate, buy, and sell (Ritzer, Dean, & Jurgenson, 2012). But, this concept of "prosumer" is not a new word from digital era, Toffler (1980) defined prosumers as people who produce some of the goods and services entering their own consumption. In his book, The Third Wave, the author argues that consumers are a phenomenon born from the Industrial revolution, as the number of pure consumers declined, they were replaced by "prosumers" – those who produced their own goods and services. The essence of being a prosumer is prefer producing one's own goods and services. Progression from traditional marketing to digital marketing happened abruptly for most businesses, especially small and medium-sized businesses.

From Relationship Marketing to Customer Experience

Defining a relationship marketing strategy is being leverage by new tools and digital mechanisms. The process is that:

relationship marketing is to identify and establish, maintain, and enhance relationships with customers and other stakeholders, at a profit, so that the objectives of all parties involved are met; and this is done by a mutual exchange and fulfilment of promises. (Grönroos, 1996, p. 11)

One of the major driver of digital transformation of any company is the customer experience (Solis, 2013). Meyer and Schwager (2007, p. 118) argue that "customer experience is the internal and subjective response customers have to any direct or indirect contact with a company". Customer relationship management (CRM) is the process of identifying the company's best customers and maximise the value from them by satisfying and retaining them. From a historical perspective, in its initial concept (between 1960 and 1970) it was sought to understand the decision purchasing process, accepting it, as a repetitive and purely rational process. From the 1970s onwards, elements such as customer perceptions and attitudes about the consumer experience, and how they influence customer satisfaction and loyalty, were added to the same process, planting the roots for the CRM. Since 1980, services are gaining more importance and come the need to evaluate them through the identification of essential elements for their success, arising for the first time the need to map the client's journey, betting on relationship marketing with

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CRM programs (2010s). The use of these programs made it possible to detect specific elements of the customer's journey, allowing an immediate action, placing the customer in the centre of all decisions. According to Schmitt, Brakus, and Zarantonello (2015) every service exchange leads to a customer experience, regardless of its nature and form, so it's indispensable planning a customer experience.

Digital transformation and digital customer experience in most of the cases go hand in hand through the businesses. The suitable management of customer experience can turn customers into advocates, states a long-term competitive advantage and profitability can be reached (Smith & Wheeler, 2002).

Lemon and Verhoe (2016) claim that customer experience can be viewed from multiple perspectives: from the customer's point of view (Schmitt, 2011), from the firm's point of view, with the firm essentially designing and crafting an experience for the customer to receive (Stuart & Tax, 2004); or from a co-creation perspective, in which the customer experience is deemed a culmination of a customer's interaction with other actors in a broader ecosystem, while recognizing the customer's role in the co-construction of the experience (Chandler & Lusch, 2015).

Actually companies recognized the role of customers in the experience and value co-creation between all parts, considering the customer engagement as the most important fact in this marketing era. Since 2010 customer engagement concepts become more relevant to predict or explain specific consumer behaviours related to loyalty and satisfaction. The concept assumes greater relevance, in contexts typified by highly dynamic consumer experiences, often interactive, and co-created by companies and consumers. Involving the client through their active participation in delivering experiences between the two parties produces a positive relationship, becoming a revenue-generating source throughout the client's life cycle (Hollebeek, 2015). Any exchange between a company and the consumer, translates into an experience for the client, regardless of its nature and form (Schmitt, Brakus, & Zarantonello, 2015). Consumer experience must relate to customer engagement as it is a creator or destroyer of value through its influence on online social networks, word of mouth, and referrals between consumer groups (Libai, Bolton, Bügel, De Ruyter, Götz, Risselada, & Stephen, 2010).

Digital channels have been introduced as an essential part of marketing and communication plans to promote brands, products, and services through websites and applications, seeking to provide useful and value-creating experience. Sharing experiences has become more natural with the advent of new technologies, especially the Internet and the progress of mobile devices along with exponential growth of social media platforms like Facebook, Instagram, Whatsapp and others.

With this openness to markets, competition has increased in all areas. There is a need for companies to involve the consumer in their activities and for this, he decides to map his route in order to develop the contact points necessary to involve him in a unique and memorable experience, whether offline in his products, services, and stores, whether online on their websites, applications and social media profiles, always engaging with relevant content and the correct touch points. Searching, buying and selling products or services, and even information, over the Internet becomes mainstream, and ecommerce develops on this ground.

In the current retail environment, as in other environments, online is gaining increasing importance in the consumer dispute, through the existence of a larger number of stores in this format and may even increase satisfaction and loyalty, functioning as a customer retention platform (Zhang, Jie, Farris, Irvin, Kushwaha, Steenburgh, & Weitz, 2010). The suppression of time and place, interactivity, and adaptation to the behaviour of all the actors in the sales process, in real time, explains the success of this channel. Sales through e-commerce totalled more than $1.3 billion (2014) in 2014, being $2.3 billion in 2017 and plan to be over $4.8 billion in 2021. This rapid growth requires companies to adapt quickly, either

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

because the market is increasingly global and with more competitors, or because of the users' desire to achieve greater customer experience from brands, through all the touch points.

Customers are changing the way they connect with brands and buy products and services on this technological era. They are using new devices and channels in the so-called purchase funnel, and according to Rapp et al (2015) due to this, brands have much less control of the customer experience trough the journey. This control of the journey touch points has become more gradually complex for companies, and requires firms to incorporate marketing, information technology, service operations, logistics, human resources, and even external partners, in creating and delivering positive customer experiences. Market leaders and early adopters have already embraced the shift, and creating a strong experience is now a leading management objective for companies like Google, Ebay and Amazon who start creating job positions like chief customer experience officers or customer experience managers responsible for this customer centric goal and for designing the customer journey mapping. This journey is becoming more complex because new customers, like the millennial, now interact with brands through numerous touch points in multiple channels and media. They have 3 key mindsets: the know me (expect that firms know their desires, needs and preferences); the Empower me (want to interact and to buy what they want, wherever they want, whenever they want trough their devices); and the Wow me (they want to be surprised with an excellent service and products that anticipate their needs, and they want to share it with their network). Prioritizing the customer over the product is where more companies are, and a good customer experience is essential. But it requires a constant search for ways to adapt communications with the customer journey. The static PDF bills, functional website or electronic payments are not enough to satisfy consumers. A bigger level of personalization is needed to surprise and engage them.

PART II: TRENDS AND TOOLS TO DEVELOP CLOSE RELATIONS WITH CUSTOMERS

Trends in Customer Experience Journey

In this next section is presented a broad view concerning some of the most emerging trends and experienced tools. As we state, digitalization is increasing the significance of customer care in acquiring and retaining new and actual customers. To face this scenario, customer care teams are promoting new technology tools to enable their service teams to engage with customers on web, mobile, social channels and leverage cross-channels. Below is listed some trends that companies can observe and use aimed at mapping the customer journey for creating a worthy customer experience:

1. **Responsive Design in all Digital Touch-Point:** Because customer can use smartphone, tablet, or other device like smart watches and should be able to navigate, search information, use and make transactions in a secure and useful mode. Every piece of content must shape to the proper device and give the best user experience in every browser. The browser issue should not be responsible for having a poor experience. Companies must adapt to the different web browsers regardless the user location and language option. Companies should not emphasis the omnichannel but focus on delivering a unique response regardless of the channel the customer is. This means that this experience must be transcend to all business process, from top to down and right to left.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2. **Original and Adjustable Content:** Consumers want original, organized and interactive content to consume and share in multiple ways. This mean that companies should be ready for users that want to re-publish this contents in various formats, like blogs, forums and social media profiles.
3. **Search Engine Optimization:** Or search engine optimization is the process of making a website more visible to search engines like Google, Safari, Yahoo! or Bing (each with its own algorithm) so that it appears in the first results of this research on predefined themes, through on-page (internal) or off-page (external) optimization, generating more traffic and conversions (Fishkin & Høgenhaven, 2013). SEO is defined as an organic and free technique of positioning the website (the natural ordering of pages is not possible to be purchased). Authors like Jerath, Ma, and Park (2014) report that 95% of all searches performed on search engines are organic links, and that consumers search on average for 2 to 3 pages of results. An optimized site is more likely to appear in early search results (higher PageRank) influencing its success (Zilincan, 2015). To achieve this positioning in the first places, SEO managers manipulate more than 200 factors that influence the navigation algorithm, among which: creating a website with a user-friendly design, fast, intuitive and organized information layout; a structure of domains and url's correct, without navigation errors or broken links and with included metadata; existence of a map of the website; alt attributes in images and other elements, with terms that identify the site in question; keyword density, and use of keywords in elements such as body text, titles, descriptions and files; link building; have relevant content that provides a correct response to searches conducted by Internet users; and submission to search engines (Davis, 2006). There is a set of tools that can be used to measure and optimize these processes, such as Woorank, Pingdom, SEMrush, Google Analytics, Google Tag Manager, Google Optimize, and Experiments, among others, that can be tried for free (BackLinko, 2017).
4. **Online Advertising:** The Internet, as has already been said, has changed the way users look for and generate information. The volume of data increases day by day, and it is necessary to organize them so that consumers can find what they are looking for. Search engines took on the role of intermediaries, and they also started selling information, data, ads, matching advertisers and consumers. There is a new phenomenon in purchasing behaviour, the ROPO (Research Online, Purchase Offline) effect in which consumers search for products online and then buy offline, changing their research habits (Figueiredo, 2015). The search engine advertising or advertising in search engines came about around the year 2000 when Google launched a tool called Google Adwords that revolutionized the company, and the online advertising industry itself. This tool uses the keyword concept and is divided into 2 formats: Search and Display ads (banners on Google partner sites such as Youtube) running on computers, tablets, and smartphones. Consumers, when conducting a search for a particular keyword, receive a set of sponsored results allowing companies to advertise their services, products or content (Jansen, 2007). Unlike SEO, here the ads have a cost that can be evaluated by PPC (pay per click), CPC (cost per click) or CPM (cost per thousand impressions) always working in an auction scheme where the advertiser sets a value maximum for the ad.

In addition to the bid value influencing the position of the ad, Google always takes into account a quality score, aiming to improve ad positions and reduce costs. This index consists of elements such as account history, ad performance, the importance of keywords, geographic information, devices used, relation to, the landing page among others (Langville & Meyer, 2011).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

5. **User-Friendly Purpose:** User experience must be one of the priorities when companies design her own experiences. The true experience goes far beyond offering customers what they say they want, or providing a check-list of features. Interfaces with bad design have significantly more costs due to hard execution and time consuming for both parts (sometimes it even requires long training periods) and, for sure, a poor experience. For designing customers experiences some professionals use personas to establish a set of consumer profiles.

A Persona lies in the elaboration of a fictional character, with its own name, characteristics, needs, desires, motivations and illustrative environments of a group of consumers, based on actual data collected from existing clients or market insights. Personas contribute to the optimization of the experience because it is a consumer-centric element; it is elaborated in its image, defining the channels that he uses in the customer journey. According to Pruitt and Adlin (2010) this tool has been incorporated in the design of experiences for the consumer. Questionnaires, personal interviews, field observation, among others, can be techniques used for the elaboration of the Persona, searching for references, specific vocabulary, gestures, discussion points, emotional triggers, styles of clothing, music, occupation, hobbies, personality, etc. In the end it becomes necessary to give a sense, a life to this whole set of data, to realize, from the consumer point of view, what is the process that can lead to the contact with the company, and possibly buy a product or service (Christensen, Anthony, Berstell, & Nitterhouse, 2007). In terms of online shopping behaviour, it is necessary to identify elements such as: what words, terms or research topics, what electronic equipment they use, what browsers they use, what time they search: what formats they like most (video, podcasts, info graphics, articles, whitepapers, audio blogs) to determine what kind of content they are looking for (Nielsen, 2014).

6. **A/B Test:** first introduced in 1908 by William Sealy Gosset as Z-test, they are suitable for comparing, under strict conditions, normality and a known standard divergence, having first been used in the online world by Google in 2000 (already recognized as A/B Test) to determine the number of optimal results to be presented in a search engine, but it had a catastrophic result, as it considerably increased page load time and turning the customer experience, worst! However, in 2011 it was already a success, having Google performed more than 7000 tests successfully. According to Chaters (2011) these types of tests have two versions of the same item (for example a landing page) called A and B, one being the control (A) and the other the controlled experiment (B), using a different variable for analysis, which can be: colour, layout of an element such as page header, action button, differentiated offers, amount of text (short vs. long) position of a given piece of text, price of the different product, and then delivering that content to the consumers, randomly through a division that can result in a 50/50, 20/80 or other percentage according to the purpose, and then observe the results. Through these results, the company can choose to change its version in order to increase its performance and improve the user experience.

Chaters (2011) identifies another version of these tests, called Multivariate Test, where multiple versions with multiple test elements of the control version are applied, being more complex and requiring the implementation of JavaScript code in the pages to be controlled.

Kohavi and Longbotham (2015) present in their work a case study conducted in a controlled environment in the Bing search engine, where a difference in the advertisement they published by modifying a link directly to the general site (A) for a set of links directly to each service (B) generated revenue in extra

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tens millions dollars, due to the greater acceptance of version B. Chopra (2010) refers to several examples: 37signals decided to test a new header (B) on its page price, highlighting the offer of 30 days of free use in all accounts, resulting in an increase of registrations of more than 30% to the version without offer (A). In Care Logger's case, changing the colour of the newsletter subscription button, from green (A) to red (B), resulted in a plus 34% (B) conversion. Sony used the Optimizely tool (nd) for an A/B/C test on a banner (A) of their products, featuring two variations of the original version: the first (B) focused on the campaign objective (computer customization) and the second (C) focused on the promotional part (referencing the temporary offer). The results showed that the first version resulted in a click-through rate increase of 6%, as well as 21.3% of users who came to the shopping cart page against the original banner. The second version still had a click-through rate of 1.8% but with a conversion of less than 2.9% over the original. Having said this, Sony opted for version B, given the higher conversion rate. This use of A/B testing is based on the assumption that sometimes professionals in the field understand that their ideas are good for their clients, and most of the times they are not. According to Kaushik (2006) 80% of the time, these managers think they are correct about what the consumer wants, but deep down they are wrong. So, this A/B tests are a useful tool for companies to test their products, services, promotions, communications and others versions with analytics data to confirm their choices.

7. **Shift From Engagement to Experience Using Analytics:** Digital transformation brings some analytics tools to companies and professionals to use, to get a better customer experience. They can track every click, every contact with a touch point, every action related with that product or service. All this data helps to understand the relevance of the customer journeys and give insights that validate decisions. Digital world is a data world, and analytics assists managers shift from engagement to experience. It can be use to deliver real time experiences and to create personalization in the exact context, increasing relationships by delivering bigger relevancy at the right moment that reinforces customer loyalty and adds to brand authenticity
8. **Transparency Policy:** Users can find who did what or look at anytime to something they had written or done, like a complaint, in a easy way, without barriers. This step strengthens compliance and a positive relation with the corporation.
9. **Social Media:** Social Media had a huge growth in the past 10 years. People spend more and more time on social networks, looking at Facebook, we can see that is one of the networks that have achieved more success in the last decade with more than 2,13 billion users (1.40 billion daily active users) that spent about 20 minutes per day, making it a showcase for any business and an excellent online communication tool (Weforum, 2018) if it were a country it would be the 1st in the world, bigger then China. This social network, as well as YouTube (+1 billion users), Whatsapp (1.20 Billion users), Instagram (600 million users), Twitter (317 million users), Snapchat (301 million users and Linkedin (106 million users) allows a huger brands visibility and notoriety in a global scenery allowing the entry into new international markets, a new clients opportunity and the creation of a two ways communication channel. But this bilateral communications brings along the new opportunities, new challenges. Companies must adapt to the different kinds of the distinctive publics that interact with. According to Chen et al (2017) social media can give the stimulus necessary for a purchase, online or offline, because consumers are using it to get information to assist them in the buying process. Different information from distinctive social media channels might be critical in driving consumer's behaviors and perceptions when they buy online and help them to be less vulnerable to potential offerings offline.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Ever then ever, people are online, and they are buying more and more, but its necessary to understand what are Social Commerce and Ecommerce. They are distinctive but both are on this digital transformation, and can, should, be used by companies that want to be leaders in the actual market.

Social commerce is one of the most important piece in this digital transformation because involves offline and online backgrounds. Social commerce is a way of commerce that uses Social Media where users can give product recommendation to a friend, a review, enter a discussion board. This environment promotes social knowledge and experiences that support them on the purchase process decision. Ecommerce relies in surrounding factors like the quality of the market place (like website design, website speed, reliability, information relevance) or the product or service value.

Goals like establishment a strong network, sharing information and collaboration are the Social Commerce primary focus, shopping is second. In Social Commerce users interact with others users, sometimes creating communities around one brand, and they can express feeling and information with each other's. Ecommerce focus on sales by optimizing strategies like one-click buying and using some analytics data from past shopping behaviour from customers delivering virtual catalogues, recommendations and refined searches. Usually consumers interact independently and typically in a one-way direction without sharing information with other customers (Shanmugam, Sun, Amidi, Khani, & Khani, 2016).

So what companies could do? First they need to understand how to communicate with their actual and potential clients. They should assign more resources to creating forums and communities to put, and to gather, relevant information. With 90% of online consumers reading reviews prior to purchase and about 83% believing that online reviews influence their decision-making, turned Online reviews as a valid resource information, so companies must control the ratings and reviews on their own channels, like websites and social media profiles, or exterior platforms like Yelp, TripAdvisor, Amazon, always in a factual and responsible way.

Tools to Develop Close Relations With Customers

In this next section we present a selection of some of the best tools to improve the customer journey satisfaction in digital era.

1. **Live Chat:** This is one of the best ways to get instant communication with a company and strength the relation with the target – it the highest satisfaction rates among customers. According to study – US Wireless Customer Care Full-Service Performance (2013), the online chat feature has become the leading contact source, as 42% of full-service customers indicate using a live online chat feature vs. email (23%) or other social media forum (16%). Moreover, online satisfaction is highest among customers who use the chat feature. For customers, the main convenience is that they can continue browsing and chatting while viewing online contents. On the other hand, for companies, live chat operator will have direct access to each customer's history and many other helpful tools. With access to better tools, companies are able to provide more relevant and efficient support to customers. Customers are more demanding and typically, they want to have answers and help right away, when they are in the middle of a transaction, for example. But, even before engaging with live chat, having "Live Chat" button at the website, enhance confidence. Customers like knowing that they can get immediate help at anytime. Using live chat as a tool to support and engage with customers is a "win-win" relation for both customers and companies. "According to a poll by

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Andersen Consulting, almost 62% of Internet consumers said they would purchase more products online if live customer support was available."

2. **Instant Messages - Use of Messenger Apps:** With cheaper handsets, more affordable data connections reaching further around the world and with mobile-oriented services like WhatsApp, WeChat and Facebook Messenger, we can see that mobile is increasingly dominating the digital world. Our digital behaviour is now converging around mobile devices. There has been an intense shift in the way customers want to communicate with brands and companies - they want the interactions to take place in their lives in a flexible and casual manner. With 85%, instant messaging, is the most commonly performed activities online and is becoming more important with more options like sending money to friends, order a taxi, pay for purchases, renew passport, book medical appointments, order food delivery, read web articles and news, donate to charity, pay municipal charges & fines, play games and to communicate with everyone trough the app.

This is important for companies because through more active communication with visual elements such as text, images, videos or audio, these can increase its effectiveness thus providing better customer service. Companies can use these applications to interact with their customers at all times of contact during the customer journey and in real-time with low cost budget. Even for international communications, this is a better choice because of roaming taxes and others costs associated with the service. With more than 465 million users Whatsapp has becomes one of the preferred instant messaging app. Another important facts, according to Aberdeen's CEM Executive's Agenda 2017, it says that 1.4 billion people around the world send over 80 billion messages each day to communicate with one another. In addition, WhatsApp and Messenger have over 1 billion monthly active users each and WeChat around 900 million. Messaging as a conversation and interaction interface has fundamentally shifted how we communicate with one another, and it is about to shift how people communicate with your company.

3. **Skype Video Call:** It was launched in August 2003 and has over than 4.9 million active users daily (Digital Marketing Ramblings, 2015). Originally, Skype's name was intended to be Sky Peer-To-Peer, and later, developers decided to named it Skype (Price, 2011). Skype was founded in 2003 by a Swede software writer Nicklas Zennström and Dane Janus Friiswhose in cooperation with Estonian group (Ahti Heinla, Priit Kasesalu, and Jaan Tallinn). In 2006, Skype developed the new function - the Video calling - that allows communication between users all over the world with a low delay (Xu, & Yang, 2013). The feature video is growing in popularity as a mainstream channel, and Skype can give to businesses the edge to offer a better customer experiences in real time. This tool can dismiss the resistance that some customers have with technology, because it allows them to speak and see someone that is real. In August 2017, Delta Air Lines introduced video chat as part of a their customer service strategy and starting with a test at Ronald Reagan Washington National Airport. They placed five kiosks with "interactive screens" and phone receivers have been arranged to allow a two-way conversation with Delta operators about flights and reservations. However, there are some others platforms providing video chats with calls to support customers. Video chat is becoming central and strategic to companies. Around 400 million people use Facebook Messenger each month to make voice and video calls, while WhatsApp's 2 billion users are making over 55 million video calls a day. WhatsApp recently announced that WhatsApp users are spending a lot of time on video calls, and 1.2 billion users are spending more than 340 million minutes a day making more than 55 million video calls.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

4. **Chatbots:** This new feature is a conversational operator which conducts conversations via text or voice commands and its main purpose is provide content, give assistance to a purchase or simply connect with customers. It's clearly a marketing tool to boost customer engagement. These applications are very useful to perform basics and standard tasks and to start a communication with the customers. They will progress in the future, as the Microsoft CEO Satya Nadella recently stated that "People-to-people conversations, people-to-digital assistants, people-to-bots…that's the world you're going to get to see in the years to come". According to a study from Gartner - an American Research Consultant Group, artificial intelligence will amount for 85% of customer relationships by 2020. For Will Wiseman, chief strategy officer of PHD U.S., "Chatbots will replace the search window". Is important to notice that this service seems particularly suited for the new generations like Millennials and Z's, who grew up using all of these on-demand technologies in the day life.
5. **Bot's Integration:** Each smart device is able to smartly communicate with other connected things and make concerted decisions due to the user data accumulated. Software robots like Bots use natural-language processing to interact with users based on deep-learning pattern recognition. Devices like Amazon Echo with their virtual assistant Alexa are selling millions every year and companies must realize that this is a new way of ordering and getting information. Alexa is a virtual robot that can listen and react to user voice command. She can order toys, music, food, toilet paper and other products and services, she can answer to user questions, control other devices like air-conditioned, windows and lights and even record the sound environment. These open exciting opportunities for selling to customers in this virtual environment because of the nature of the user perception.

According to Purington et al. (2017) they are particularly relevant because Alexa has a human generated voice and users love this feature and feel a stronger social presence when they communicate with this machine-generated profile. Another great example, the tech giant Uber, has integrated a bot into Google Maps features. This bot knows where you want to travel and show the ride option without the need to download the app. And more, it also integrates the bot into social media via FB Messenger.

6. **Emoji and Stickers Power:** The actual communication process goes beyond simple speech or writing, as it is known that there are other ways of conveying a message. In the age of the Internet and the digital world new forms of communication have emerged in recent years through the use of graphic elements called emoticons, intensified through MSN Messenger. According to Pompeu and Sato (2015) the emoticons were developed in platforms of dialogue in which the text calls the form of interaction as a way to compensate for the absence of the physical person at the moment, thus adding some emotionality to the moment. Currently emoticons multiply themselves in elements like stickers, gifs, memes and emojis, considered in 2015 the word of the year by Oxford Dictionaries. At this moment, a total of six billion emoticons or stickers are being use around the world every day on mobile messaging apps. Companies have slowly adopted this type of communication, but it is now possible to verify their use in systems for evaluating the quality of service through POS machines, voting products or services through social networks such as Facebook where the user chooses his/her preference through an emoji, through online satisfaction surveys, or through online communication systems.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

PART III: CHALLENGES FOR THE FUTURE

Issues, Controversies and Problems

Consumer buying behaviour, something addressed since the beginning of the twentieth century, has changed, and the current consumer lives in a digital world, seeking for meaningful experiences and not just the simple acquisition of products or services. Sharing experiences has become more natural with the advent of new technologies, especially the Internet and the progress of mobile devices. With this openness to markets, competition has increased in all areas. There are a lot of tools, software's, platforms, devices, but there is no one-size-fits-all solution for companies that wish to implement a digital transformation approach. Perceptions of experiences and customers' expectations are a complex and diverse subject. In order to create the conditions for improved customer experiences in digital era, company culture is at least as important as strategy. Depending on the customer's context and expectations, a customer experience can create or break a business relationship.

Another important issue is that cultural change is the top barrier to implement a digital transformation process worldwide (McCuaig, Enright, Rossi, Macdonald, & Hansen, 2016). According to Chris Davis, a member of Russell Reynolds Associates' Digital Transformation Practice says:

Digital transformation's greatest barrier is organizational ambiguity. Many companies are struggling to coordinate the roles played by core digital teams, IT, and marketing. Successful digital strategies require an integrated approach with clear delineation of governance and decision rights, and the institution of joint metrics across shared areas of oversight. (Kane, Palmer, Phillips, Kiron, & Buckley, 2015)

Also digital transformation can fail when leaders start creating new competencies and forces them to integrate into an organization with strong legacy cultures and complex operating models (Libert, Beck, & Wind, 2016). All the business perspectives must be integrated.

Is being crucial for companies to manage the customer experience across various digital touchpoints with a consistent customer experience and value creation. Thinking about tools to manage the customer relationship, some businesses have products and services that match best with email support, phone support, or other traditional support channels.

For example, a live chat platform is perfect for most, but it's not a good fit for everybody. Older generations in some countries, for example, will probably prefer typically a phone call when they have a problem instead of starting a live chat. Businesses need to really know their customers habits and what type of support best fits their needs. This maybe is the principal challenge that companies face when deciding which tools fits better the market and knowing their preferences is ambitious. Is also needed to look for cultural issues and social/physical interactions that characterize people. Traditional channels, like the phone and email, still play an important role in customer support operations. However, these traditional channels normally require that consumers start the contact and wait on the line for the resolution. By contrast, instant messaging allows customers to send a message to an organization and receive support in real time, without "holding" the line.

Some of the tools mentioned are still improving their features in terms of innovation and disruptive approach. For example, Microsoft did not make initially Skype for Business to work as a contact centre solution. Specifically, it lacks the multichannel capabilities required to control resources in a modern contact centre, the interface purpose and reporting capabilities need improvements.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Are all these new tools that separate people from social relationships?

We are social human's beings and this is an intrinsic characteristics from the nations, but some of them have more ability to be technological, but deep in the question, we need to move forward and keep abreast of innovations and the benefits to the market and business. For example, chatbots are beneficial for both parties: implementing a chatbots is cheaper than training and hiring a human customer support, and customers often prefer to start a mobile interaction over talking with someone, holding the line in call center. In fact, chatbots are incredible efficient for users and brands, mainly because they cut costs for companies, decreasing interactions with traditional call agents and they are easy to use and more convenient for customers, streamlining interactions. But, it always depends on the product but more important it depends on the type pf customer. The Canadian mobile messaging app *Kik* reports that 60 percent of bot users are between 13 and 19 years old, with more females than males, clearly the Millennial and Z generation. For Generation X, with members that are not digital natives, it remains much harder to target with chatbots.

In the case of social media platforms, things may get trickier. Customers can use their own social media and talk about their bad experience and this can reflect negatively on the business and modify the impression of the brand on the market. The best thing to do in this type of situation is to professionally manage the company social media account regularly, understand customer concerns and reply to them with appropriate answers, in the shortest time.

Websites were originally designed to increase the company's presence on the Internet but were often overlooked in annual communication plans. The website were implemented and later updated in terms of design and sometimes content. Currently the website is seen as the centrepiece of a digital presence strategy functioning as a channel for sales, communication and distribution of relevant and meaningful contents for the consumer, and even for internationalization.

To fall into the drafting of a website is often to miss the opportunity to increase awareness and sales through this channel. We have seen in a number of business sectors a neglect of this medium, perhaps because of its lack of potential or lack of capital to invest. However we believe that companies should invest in this field because of its potential. This can be a great way of people getting information and establish relationships with the company staff and others clients, creating sometimes events in physical facilities where people get to know who's behind the platform. Digitalization doesn't mean isolation or breaking true relationships and going for virtual relationships. We believe that this could be a natural process and with good sense, everything can coexist in the same place.

Solutions and Recommendations

With the advent of new technologies, especially the Internet, and the progress of digitalization, competition has increased in all areas. There is a need for companies to involve the consumer in their activities and for this he decides to map his journey in order to develop the touch points necessary to involve him in a unique and memorable experience, whether offline in his products, services and stores, whether online on their websites and applications.

To empower the relation between customers and brands/companies is important to reshape how companies collect data from customers and all the metrics and analysis that need to be done. Companies must invest in CRM solutions and collect all the correspondence, customer history and habits to offer a consistent customer support. Is also important to invest in staff training and personal skills to deal with customer's issues. Another thing is related to cloud solutions when concerning to be agile and meet

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

customer demands in real time, and also update the latest tools features. Companies must consider having an omnichannel strategy and approach, considering how to tie all the digital channels and front-offices in order to provide a consistent and user-friendly customer experience.

Corporate culture must integrate these digital points, adapting their solutions, and training their professionals, to the challenges that new technologies pose daily, by offering an integrated solution and focused on the total satisfaction of their current and potential clients. The focus should not be 100% on the technology but on the consumer behaviour, that today is more digital than ever. With new customer's behaviours, there are new products and services, and new ideas in action. This mean for us: Innovation, and sometimes this means investment and companies should have this in mind. There are always the two sides of an innovation and the pro and cons must be analysed from the point of view of the company and the customer, the real benefits. But companies that don't innovate, usually don't grow at the same pace of the markets needs and this could be dangerous. Companies who don't want to integrate this digital era are becoming more exposed to the market and prosumers. Corporations should start for looking solutions for customer's behaviours and this occasionally means cooperation and working with another companies from, or out of, the sector where they are in. Sometimes for going abroad, these alliances can give more dimension and capacity of delivering and producing the goods. Sometimes it means an online platform than can serve everyone interested like www.marcasportuguesas.pt that has all Portuguese brands in one place.

Companies can also aggregate know-how from all the departments and partners to develop a combined solution and use digital tools, like Basecamp or Slack, to communicate and discuss ideas. And sometimes these solutions are freemium so companies can try and evaluate this approach.

The digital transformation and the customer experience must be supported at an executive level. That is the only way to succeed, which requires strong collaboration from all company leaders and departments. We also advice that not only technology, digital tactics and IT tools drive to a successful digital transformation, leadership and strategy are core concepts. Is necessary to clearly define the business direction, organization's vision, digital strategy, digital culture and a broad roadmap. Afterwards, to use the tools to support your approach to the market, the recommendation for business is simply: try it. Given the easiness of implementation, and the cost, of some of the tools covered in this chapter, this will be the best option. New solutions are emerging on the market at competitive prices that justify, at least, the consideration of their use. Digital brought a huge set of metrics that can be used to verify the return of some action, being this one of its main advantages. Trying should be the watchword in current companies led by managers who are risk averse and willing to innovate. This may be the best solution for the topic covered in this chapter. And there isn't a good moment to start, because everything is moving. So start today, starts now.

Companies need to implement a strong CRM process and build a common system of customer information or a single integrated digital platform to store data and knowledge. CRM solutions can reduce the communicating costs with customers, optimise work flows as a result of integration with other data systems, and facilitate the market segmentation and leverage customer interactions, relationship and personalisation opportunities (Adehanjo, 2003). The major benefits of CRM is to link every operation in a business that can positively affect the customer experience.

Companies need to take risks and learn from mistakes in order to keep up. So, we strongly recommend any company or organization to bring the customer experience to the early stages of the implementation of a new tool. Give to all stakeholders, including the customers, the opportunity to see, touch, experience and use the new touchpoint so they can provide feedback and get involve. This should be done several

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

times before the new tool or device is ready to go to market. This will ensure a very good customer experience and reinforce the customer commitment.

We also advice companies to have consistency across tools and processes to offer a successful customer experience. It's crucial to consider not only the different interfaces and digital touchpoints, but also the user's motivations and goals. Also, the power of a digital transformation process is related not only to digital tools but, mainly with scope and objectives. Sometimes less digitally companies tend to focus on individual technologies and have strategies that are particularly operational in focus. Digital transformation in most organizations must be developed with an eye on first transforming the all business.

CONCLUSION

Although experience is something transverse and everywhere, this field of customer experience in contemporary management is still a recent development.

The actual consumers are highly mutants with quickly transformations and always seeking the most appropriate solutions for their needs, often in real time. Digital evolution has introduced new hardware and software that has transformed the current way of living.

In today's fast-moving business environment, people are always connected and companies are forced to seriously consider implementing a digital transformation strategy to take advantage in the market.

When they connect to the online world, their lives change and they immediately begin to leave their digital footprint. This footprint allows organizations to use one of the greatest weapons ever: information. Compiling, managing and adapting all these data is a procedure that can bring voluminous results, allowing the experience customization and contact trough different channels.

Digital transformation offers organizations an opportunity to engage and reinforce customer experience and deliver value regardless of channel or place. Is crucial for companies to implement the digital transformation, as it is hard to have a great customer experience without an on-going digital transformation process.

And, sometimes more important and urgent is not the front-end experience, the design, the app to have a great customer experience, is the company culture to deal with the challenges and society transformation. Companies are made of human, and interactions between them, so first of all, companies should know who are their customers and define which tools best suit their preferences and which digital trend they are facing. Customer care teams should not make the mistake of waiting for stability or to see others companies strategy. Leaders must develop and continuously look forward for new opportunities.

Many say that this will be the Future; we believe that this is already the present. Disregarding these consumers characteristics, is to ignore reality and, consequently, to fail.

Building a good experience today is one of the greatest challenges for all professionals in all areas. Today the consumer can destroy a brand through online and new technologies, but can also leverage and generate high value for it.

Today, brands have to work together with consumers; they have to listen to them, to talk, to establish a strong relationship to gain recognition. The tools discussed in this chapter are essential to generating this relationship over time. This part of the chapter is called "conclusion" but we think that this is the "beginning" for a new way of management and methods of doing business.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Digital transformation is a key issue, a very complex process that leads many business leaders to uncertainty. It is advisable that leaders fight through that and take solid steps to go through the culture, processes, and technology that will enable their business to compete in the digital age.

The author's perspective for this future work is to go deep in the subject, conducting an exploratory research to explore the motivations and drivers to use the tools presented in the chapter from the customer length and to compare with companies length. The goal is to find common touchpoint and different perspectives from this important players in the market – companies and customers and how digital transformation is taking part from strategy to customer experience.

REFERENCES

Adebanjo, D. (2003). Classifying and selecting e-CRM applications: An analysis-based proposal. *Management Decision*, *41*(6), 570–577. doi:10.1108/00251740310491517

BackLinko. (2017). *Seo Tools.* Retrieved from http://backlinko.com/seo-tools

Chandler, J. D., & Lusch, R. F. (2015). Service Systems: A Broadened Framework and Research Agenda on Value Propositions, Engagement, and Service Experience. *Journal of Service Research*, *18*(1), 6–22. doi:10.1177/1094670514537709

Chaters, B. (2011). *Mastering Search Analytics: Measuring SEO, SEM and Site Search*. O'Reilly Media, Inc.

Chen, A., Lu, Y., & Wang, B. (2017). Customers' purchase decision-making process in social commerce: A social learning perspective. *International Journal of Information Management*, *37*(6), 627–638. doi:10.1016/j.ijinfomgt.2017.05.001

Christensen, C. M., Anthony, S. D., Berstell, G., & Nitterhouse, D. (2007). Finding the right job for your product. *MIT Sloan Management Review*, *48*(3), 38.

Da Silva Linhares, M. C. (2017). Redes Em Contextos De Aprendizagem: Possibilidade De Conhecimento-Regulação E/Ou Emancipação. *Interfaces Científicas-Educação*, *5*(2), 41–52. doi:10.17564/2316-3828.2017v5n2p41-52

Figueiredo, S. D. A. (2015). *Comportamento de compra online da geração Y em Portugal* (Doctoral dissertation). Instituto Superior de Economia e Gestão.

Fishkin, R., & Høgenhaven, T. (2013). *Inbound marketing and SEO: Insights from the Moz Blog*. John Wiley & Sons.

Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2013). Embracing Digital Technology: A New Strategic Imperative. *MIT Sloan Management Review*, 1–12.

Grönroos, C. (1996). Relationship Marketing: Strategic and Tactical Implications. *Management Decision*, *34*(3), 114–135. doi:10.1108/00251749610113613

Hollebeek, L. D. (2015). 4 Exploring customer engagement. *Customer Engagement: Contemporary Issues and Challenges*, 67.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Howard, J. A., & Sheth, J. (1969). *The Theory of Buyer Behavior*. New York: John Wiley & Sons.

Jansen, B. J. (2007). The comparative effectiveness of sponsored and nonsponsored links for Web e-commerce queries. *ACM Transactions on the Web*, *1*(1), 3, es. doi:10.1145/1232722.1232725

Jerath, K., Ma, L., & Park, Y. H. (2014). Consumer click behavior at a search engine: The role of keyword popularity. *JMR, Journal of Marketing Research*, *51*(4), 480–486. doi:10.1509/jmr.13.0099

Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2015). Strategy not Technology, Drives Digital Transformation Becoming a digitally mature enterprise. *Sloan Management Review*, (57181), 27.

Kaushik, A. (2006). *Experimentation and Testing: A Primer*. Retrieved from http://www.kaushik.net/avinash/2006/05/experimentation-and-testing-a-primer.html

Kohavi, R., & Longbotham, R. (2015). Online controlled experiments and A/B tests. Encyclopedia of machine learning and data mining, 1-11.

Langville, A. N., & Meyer, C. D. (2011). *Google's PageRank and beyond: The science of search engine rankings*. Princeton University Press.

Lavidge, R. J., & Steiner, G. A. (1961). A Model for Pre- dictive Measurements of Advertising Effectiveness. *Journal of Marketing*, *25*(November), 59–62. doi:10.2307/1248516

Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing*, *80*(6), 69–96. doi:10.1509/jm.15.0420

Libai, B., Bolton, R., Bügel, M. S., De Ruyter, K., Götz, O., Risselada, H., & Stephen, A. T. (2010). Customer-to-customer interactions: Broadening the scope of word of mouth research. *Journal of Service Research*, *13*(3), 267–282. doi:10.1177/1094670510375600

Libert, B., Beck, M., & Wind, J. (2016). *The Network Imperative: How to Survive and Grow in the Age of Digital Business Models*. Harvard Business Review Press.

McCuaig, L., Enright, E., Rossi, A., Macdonald, D., & Hansen, S. (2016). An Eroding Social Justice Agenda: The Case of Physical Education and Health Edu-Business in Schools. *Research Quarterly for Exercise and Sport*, *87*(2), 151–164. doi:10.1080/02701367.2016.1163978 PMID:27100057

Meyer, C., & Schwager, A. (2007). Understanding Customer Experience. *Harvard Business Review*, *85*, 116–126, 157. PMID:17345685

Nielsen, N. V. (2014). *E-commerce: Evolution or revolution in the fast-moving consumer goods world*. Retrieved from, http://www.nielsen.com/us/en/insights/reports/2014/e-commerce-evolution-or-revolution-in-the-fast-moving-consumer-goods-world.html

Pedro, D., Vicente, R., Hugo, F., Rogério, C., & Rui, N. (2009). *B-Mercator*. Lisboa: Dom Quixote.

Pompeu, B., & Sato, S. K. (2015). Iconoliteracia publicitária: a linguagem complexa dos emojis na propaganda brasileira. In *Congresso Brasileiro Ciências da Comunicação, INTERCOM*. Academic Press.

Price, E. (2011). *The History of Skype (Infographic)*. Techno Buffalo. Retrieved from http://www.technobuffalo.com/2011/07/14/the-historyof-skype-infographic/

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Pruitt, J., & Adlin, T. (2010). *The persona lifecycle: keeping people in mind throughout product design*. Morgan Kaufmann.

Purington, A., Taft, J. G., Sannon, S., Bazarova, N. N., & Taylor, S. H. (2017). Alexa is my new BFF: social roles, user satisfaction, and personification of the amazon echo. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 2853-2859). ACM. 10.1145/3027063.3053246

Ritzer, G., Dean, P., & Jurgenson, N. (2012). The coming of age of the prosumer. *The American Behavioral Scientist*, *56*(4), 379–398. doi:10.1177/0002764211429368

Schmitt, B. (2011). Experience marketing: Concepts, frameworks and consumer insights. *Foundations and Trends in Marketing*, *5*(2), 55–112. doi:10.1561/1700000027

Schmitt, B., Brakus, J. J., & Zarantonello, L. (2015). From experiential psychology to consumer experience. *Journal of Consumer Psychology*, *25*(1), 166–171. doi:10.1016/j.jcps.2014.09.001

Shanmugam, M., Sun, S., Amidi, A., Khani, F., & Khani, F. (2016). The applications of social commerce constructs. *International Journal of Information Management*, *36*(3), 425–432. doi:10.1016/j.ijinfomgt.2016.01.007

Smith, S., & Wheeler, J. (2002). *Managing the Customer Experience: Turning Customers Into Advocates*. Pearson Education.

Solis, B. (2013). *WTF? What's the Future of Business? Changing the Way Businesses Create Experiences*. Gildan Media, LLC.

Statista. (2018). *Worldwide retail e-commerce sales*. Retrieved from https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/

Stuart, I. F., & Tax, S. S. (2004). Toward an Integrative Approach to Designing Service Experiences: Lessons Learned from the Theatre. *Journal of Operations Management*, *22*(6), 609–627.

Toffler, A. (1980). *The third wave*. New York: William Morrow.

Webster, F. E., & Wind, Y. (1972). *Organizational Buying Behavior.* Prentice Hall.

WEforum. (2016). *Facebook is bigger than the worlds largest country*. Retrieved from https://www.weforum.org/agenda/2016/04/facebook-is-bigger-than-the-worlds-largest-country/

Xu, Y. (2013). *Video Telephony for End-Consumers: Measurement Study of Google+, iChat, and Skype*. Retrieved from http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6528023&url=http%3A

Xu, Y. (2013). *Video Telephony for End-Consumers: Measurement Study of Google+, iChat, and Skype*. Retrieved from http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6528023&url=http%3A%2F%2Fieeexplore.ieee.org%2Fiel7%2F90%2F4359146%2F06528023.pdf%3Farnu mber%3D6528023

Zhang, J., Farris, P. W., Irvin, J. W., Kushwaha, T., Steenburgh, T. J., & Weitz, B. A. (2010). Crafting Integrated Multi-channel Retailing Strategies. *Journal of Interactive Marketing*, *24*(2), 168–180. doi:10.1016/j.intmar.2010.02.002

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Zilincan, J. (2015, September). Search Engine Optimization. In *CBU International Conference Proceedings* (*vol. 3*, pp. 506-510). Academic Press. 10.12955/cbup.v3.645

ADDITIONAL READING

Berger, J. (2016). *Invisible Influence: The hidden forces that shape behavior*. Simon and Schuster.

Kotler, P., & Armstrong, G. (2018). *Principles of Marketing* (17th ed.). Prentice Hall.

Kotler, P. M. (2016). *4.0 From Products To Customers To The Human Spirit*. John Wiley & Sons.

Perreault, W. D. Jr, Cannon, J. P., & McCarthy, E. J. (2017). *Essentials of Marketing: a Marketing strategy planning approach* (15th ed.). New York: McGraw-Hill/Irwin.

KEY TERMS AND DEFINITIONS

Chatbot: Is a computer program that attempts to simulate the conversation or "chatter" of a human being via text or voice. A user can ask a chatbot any question or make a command, and the chatbot responds or performs the requested action.

Customer Experience: The entirety of the interactions a customer has with a company and its products. Understanding the customer experience is an integral part of CRM. The overall experience reflects how the customer feels about the company and its offerings.

Customer Focus: The orientation of an organization toward serving its clients' needs. Having a customer focus is usually a strong contributor to the overall success of a business and involves ensuring that all aspects of the company put its customers' satisfaction first. Having a customer focus usually includes maintaining an effective customer relations and service program.

E-Commerce: Is the process of buying and selling products, services and even information over the internet, between business-to-consumer, business-to-business, consumer-to-consumer, or consumer-to-business.

Online Advertising: Use of internet as an advertising medium where promotional messages appear on a computer screen. Since the communication software (browser) reveals sufficient information about the site's visitors, online advertising can be custom-tailored to match user preferences.

Search Engine Optimization (SEO): Refers to the process of improving traffic to a given website by increasing the site's visibility in search engine results. Websites improve SEO by improving content, making sure that the pages are able to be indexed correctly, and ensuring that the content is unique.

Transformation: In an organizational context, a process of profound and radical change that orients an organization in a new direction and takes it to an entirely different level of effectiveness. Unlike 'turnaround' transformation implies a basic change of character and little or no resemblance with the past configuration or structure.

This research was previously published in Educational and Social Dimensions of Digital Transformation in Organizations; pages 1-26, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 96
Transhumanism and Innovative Leadership:
A Question of Quality

Ebba S. I. Ossiannilsson
ICDE OER Advocacy Committee, Sweden

ABSTRACT

Rethinking leadership at all levels is required to reach the goals of learning and education in 2030 through which learners will take the lead in orchestrating the process and manner of their own learning and in choosing their personal learning journeys. The fourth industrial revolution will continue to change the ways we act, perform, live, work, and learn. Therefore, there is a need for a social revolution that includes the understanding of transhumanism and its effects. The term "cutting edge" does not concern technology as much as it concerns humans. Accordingly, transhumanism is crucial for a sustainable ecosystem of learning with and through technology and digital transformation, which encompasses all levels of institutions—macro, meso, and micro. This chapter is focused on future trends, issues, and challenges in management and leadership as well as on issues and challenges in communication, which is essential in both leadership and smart learning.

INTRODUCTION

Transhumanism, which is often abbreviated as H+ or h+, is an international philosophical movement that advocates the transformation of the human condition by developing widely available sophisticated technologies that greatly enhance human intellect and physiology (Boström, 2005). Advocates of transhumanism study the potential benefits and dangers of emerging technologies that could overcome fundamental human limitations as well as the ethical limitations of using such technologies. Emerging technologies are those perceived as capable of changing the status quo. These technologies are generally new, but they include older technologies that are still controversial and relatively undeveloped in their potential. Rotolo, Hicks, and Martin (2015) considered that emerging technologies are characterized by

DOI: 10.4018/978-1-7998-7297-9.ch096

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

radical novelty, relatively fast growth, coherence, prominent impact, uncertainty, and ambiguity. They argued that emerging technologies could be defined as having a certain degree of coherence that persists over time as well as the potential to exert considerable influence on the socio-economic domain, which is observed in the composition of actors, institutions, and the patterns of interactions among them, including the associated processes of knowledge production. The predominant influence of emerging technologies, however, lies in the future; therefore, in the emergence phase, they are still somewhat uncertain and ambiguous. O'Reilly (2008) argued that emerging technologies include a variety of technologies, such as educational technology, information technology, nanotechnology, biotechnology, cognitive science, psychotechnology, robotics, and artificial intelligence. In short, the link between transhumanism and emerging technologies promises us freedom from the biological limitations inherent in our nature. It aims to enhance the physical, emotional, and cognitive capacities of humans, thus opening up new possibilities and horizons of experience.

Sisman-Uğur & Kurubacak (forthcoming) argued in the call and outline of this book, that:

[T]transhumanism must advocate the moral right to use technologies to extend individual capacities, to surpass natural limits, and to improve humans not only physically and psychologically but also educationally. In other words, cutting-edge technologies must be used to improve humans by enabling them to live longer, healthier, and more intellectual lives. At this point, transhumanists must be progressive, advocating the use of emerging technologies to improve not only human lives, including cybernetics, artificial intelligence, social networks, space colonization, cryonics, and curing aging but also human learning. Transhumanism, therefore, must be a sound philosophy by valuing scientific facts, reason, and logic above spiritual principles as well as viewing humankind as controlling its transformation and promoting rational thinking, freedom, tolerance, democracy, and concern for human beings. Improving human learning means improving the human organism so that it can transform beyond its natural and biological limits.

In contributing to this book, this chapter considers a futuristic view of how transhumanism can achieve sustainability in the context of human learning to promote human intelligence in the future. The objectives of this chapter are to emphasize the need for a social revolution in response to the influence of transhumanism and the fourth industrial revolution, which is much more than a technical and digital revolution. The fourth industrial revolution and its accompanying social revolution will change the way we act, perform, live, work, communicate, and interact with each other and society, and hence the way we learn. The term "cutting edge" does not concern to technology as much as it concerns humans. Accordingly, the influence of transhumanism is crucial in a sustainable ecosystem of learning with and through technology and digitization. The digital transformation encompasses all levels of institutions—macro, meso, and micro. This chapter is focused on future trends, issues, and challenges in management and leadership as well as on issues and challenges in communication, which is essential in both leadership and smart learning. Rethinking leadership at all levels is required to reach the goals of learning and education in 2030 through which learners will take the lead in orchestrating the process and manner of their own learning and in choosing their personal learning journeys. This chapter is informed by the author's research and experiences in this field as well as by the relevant current literature. This chapter delineates a position rather than providing case studies, although some models are presented.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In the following sections, the concept of transhumanism is described, followed by a discussion of current and future trends related to the needs of transformation of education. Next, the model of substitution vs. transformation (SAMR) is discussed as well as the concepts of digitization and digital transformation. Thereafter, challenges in management and leadership related to future trends are discussed. The issues in smart learning are then discussed. The chapter ends by considering future research directions and offering conclusions.

BACKGROUND

The rise of transhumanism has become obvious during the last two or three years. One major reason is that transhumanists advocate new approaches, methods, and techniques that have influenced and will continue to influence social, political, ethical, and spiritual issues. However, there are some major dilemmas within this philosophy, and it is not clear how to identify the global values, norms, and ethics that are related to the diverse needs of learners in the digital era. Therefore, it is urgent to establish appropriate learning modalities (i.e. methods, processes and procedures) for humans in addressing future priorities and needs and to predict future issues and challenges for transhumanism in the near future.

Transhumanism is defined as the use of technology for the improvement of humans. Moreover, transhumanism is a way of thinking about the future. The transhumanist movement has developed gradually over the past two decades, based on the rapid digitalization of global society in recent decades. Therefore, transhumanism can be viewed as an extension of the concept of humanism. As a movement, transhumanism aims to improve the human body through science by constantly pushing back biological limits by using cutting-edge technologies to repair and improve the human body beyond its natural abilities, such as in learning. In this context, new and emerging communication and information technologies will be ways to help human transformation. Hence, learning about technologies, with technologies, and for technologies is one of the most important focuses of transhumanism (Boström, 2005).

This new era in human development is being enabled by extraordinary technological advances (Rotolo, Hicks and Martin, 2015). Moreover, Schwab (2017) and Schwab, Davis, and Nadella (2018) argued that the fourth industrial revolution will continue to fundamentally change the ways in which we live, work, learn, and relate to one another. It has been argued that the fourth industrial revolution concerns more than technology-driven change and technological opportunities (World Economic Forum, 2017). It must also be aligned and integrated with a social revolution. Accordingly, the digital revolution must involve a social revolution that is based on the needs of humans and how they respond proactively in this new era. Thus, encompassing both digital and social revolutions, the fourth industrial revolution will affect the ways in which humans relate, interact, and communicate with each other. In addition, it has been argued that this revolution concerns not only technological innovation but also human empathy, collaboration, emotions, attitudes, competences, and values. Consequently, because the fourth industrial revolution is aligned with a social revolution, and the transhumanism movement will radically change human habits, including learning practices, it will change the ways in which we live, work, learn, and relate to one another.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CURRENT AND FUTURE TRENDS

As argued above we stand on the brink of both a technological and a social revolution that fundamentally will alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced. Although it is not yet clear how it will unfold, the response to it must be integrated and comprehensive, and it must involve all stakeholders in the global polity—from the public and private sectors to academia and civil society (Schwab, 2017; Schwab, Davis, Nadella, 2018; World Economic Forum, 2016 2017).

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) Sustainability Goals (SDG), specifically SDG4, have emphasized and fostered global, lifelong, and life-wide learning. UNESCO's mandate stipulates that education should be available to all at anytime, anywhere, and through any device (UNESCO, 2015a, 2015b, 2015c). Its SDG4 goals are designed to empower and ensure inclusion, equity, equality, and quality in education. These goals are designed to be achieved through access, democracy, affordability, efficacy, and lifelong or ongoing learning (S. Järvelä, personal communication, October 25, 2018). In brief, the SDG4 are aimed to ensure inclusive equality, equity, quality education for all, and lifelong learning.

In Europe, the digital single market (2018) emphasized the global challenges, as globalization, demographic changes, technology, and digitalization. Furthermore, the digital single market stressed that global changes include speed and scale. In addition, they underlined the importance of investing in the future and of embracing and empowering digital citizens. Although knowledge, infrastructure, attitudes, and mindsets are of utmost importance, the main issue concerns digitalization or marginalization. A different approach is to become mainstreamed to ensure a competitive Europe. This approach should, according to the digital single market, build on a "rock and roll" way of working, which means accelerating the process of marketization, forming and collaborating in partnerships, destroying silo thinking, executing all means, including "walk the talk," that is, putting ideas into action. The digital single market also emphasized the importance of freedom, diversity, user-centeredness, and entrepreneurship. Thus, solutions need to build on technological development, investment in human resources, and user experiences. Thus, any solution should be comprehensive and consumer-oriented. In January 2018, the European Commission adopted the Digital Education Action Plan, which includes three priorities and 11 initiatives to support technology use and digital competence in education (European Commission, 2018). The three priorities and the11 initiatives are elaborated below in the discussion on issues related to leadership:

Priority 1: Making better use of digital technology for teaching and learning
Priority 2: Developing digital competences and skills
Priority 3: Improving education through better data analyses and foresight

Other challenges in education and society include the influence and use of emerging technologies, such as block chain, 3D, the Internet of Things, cloud computing, artificial intelligence, learning analytics, robotization, and other developments in technology-enabled social and mobile learning (Rotolo, Hicks, & Martin, 2015). These challenges affect issues concerning transhumanism. Additionally, education is now facing a growing trend toward micro-credentials and the need for microlearning in workplaces and in continuing professional development. Hence, there are urgent calls for modern governance, as well

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

as extensive and agile university reforms with dynamic, proactive leadership and management as well as innovative and inclusive open pedagogical approaches (Digital Single Market, 2018).

The following section presents selected models to consider for the digital and transhumanist transformation.

THE SUBSTITUTION VS. TRANSFORMATION MODEL

In the 21st century, a new era of technology has been reshaping everyday life, facilitating outdated processes, and giving rise to entirely new business sectors (Schwab, 2017; Schwab, Davis, & Nadella, 2018; World Economic Forum, 2016 2017). Some common catchphrases used to refer to this era are digitization, digitalization, and digital transformation. However, they are used synonymously, and there has been persistent confusion regarding the differences between them are significant and should be taken into account in discussing the kinds of changes that business is, or should be, making. Bloomberg (2018) provided an overview. Because the excitement about the digital transformation continues, the terms digitization and digitalization have only added to the confusion. In reality, these three terms have distinct meanings depending on the context in which they are discussed. However, this confusion is more than a question of semantics. In reality, these terms are confused in ways that do not consider the power and importance of the digital transformation, thus putting the very survival of the organizations in peril. In the context of transhumanism, is it worth elaborating these distinctions.

Digitization is a straightforward term and refers to encoding analog information into zeroes and ones so that computers can store, process, and transmit it. According to the *Gartner IT glossary* (2018), digitization is the process of changing from analog form to digital form. Hence, converting handwritten or typewritten text into digital form is an example of digitization, such as converting the music from a long-playing record (LP) or a video from a Video Home System (VHS) tape. Digitization is the process of making information available and accessible in a digital format. In contrast, digitalization is the application of digitized information in practice for the benefit of humans, such as customers. Finally, in the digital transformation, digitalization is used to create completely new business concepts. Because of digitization and digitalization, data are easily accessible for use across various platforms, devices, and interfaces. The digital transformation is the process of devising new business applications that integrate all digitized data and digitalized information. Consider the example of Netflix; once films were digitized, the path was paved for a completely new business model, such as movie streaming. Films have been the biggest "game changers" in the digital transformation. Definitions of digitization, digitalization, and digital transformation are provided in Table 1.

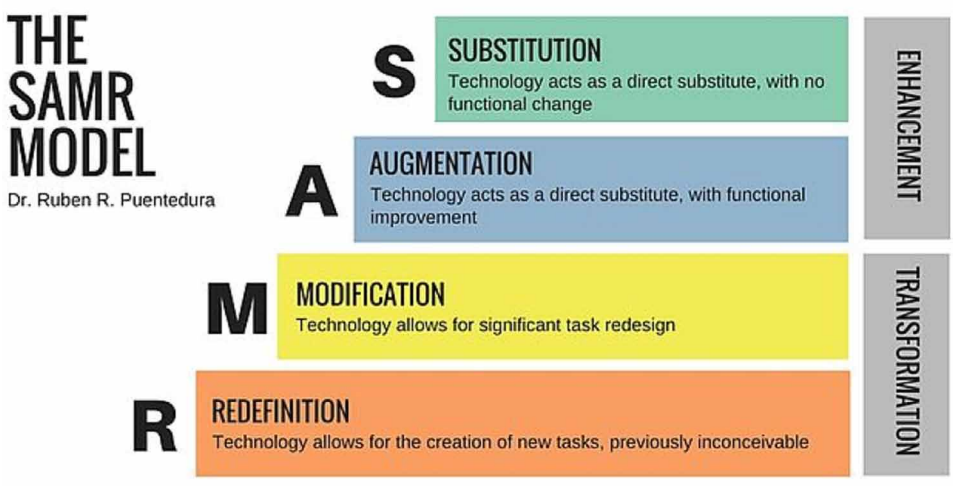
Table 1. Definitions of digitization, digitalization, and digital transformation

Concept	In short
Digitization	Refers to encoding analog information in zeroes and ones so that computers can store, process, and transmit it
Digitalization	The application of digitized information in practice
Digital transformation	Taking advantage of digitalization to create completely new business concepts

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The distinctions between digitization, digitalization, and digital transformation are more than semantic. Parallels can be drawn between these distinctions and Puentedura's (2012) SAMR model. The SAMR model is the abbreviation of the four different stages of implementing technology in education: substitution, augmentation, modification, and redefinition (see Figure 1).

Figure 1. The model of four different stages of implementing technology in education
Source: Puentedura (2012)



The four stages are described as follows: Substitution (S) occurs when technology acts as a direct substitute with no functional change (e.g., digitization is a move from analog to digital). Augmentation (A) occurs when technology acts as a direct substitute but with functional improvement. Hence, they are both correlated to enhancement. Real transformation requires modification (M), which occurs when technology allows for significant task redesign. Finally, redefinition (R) occurs when technology allows for the creation of new tasks that were previously inconceivable.

In relation to transhumanism, it is thus a question of what technology brings in the stages of modification and redefinition. As mentioned above in the discussion of future trends, the influences and uses of emerging technologies, such as block chain, 3D, the Internet of Things, cloud computing, artificial intelligence, learning analytics, robotization, and other developments in technology-enabled and social and mobile learning, influence the issues in transhumanism. Therefore, the main concerns are whether they serve as substitutions or transformations. According to Schwab (2017), Schwab, Davis, and Nadella (2018), and the World Economic Forum (2016), emerging technology will change the ways in which we live, work, learn, and relate to one another. Aligned with the social revolution, the application of emerging technology will change human habits, attitudes, communication, interactions, relationships, and mindsets. Accordingly, it makes sense not only to empower and embrace this development but also to be critical in anticipating its consequences.

Transhumanism must therefore advocate the moral right to use technology to extend human capacities, to surpass natural limits, and improve human lives not only physically and psychologically but also educationally. In other words, cutting-edge technologies must be used to improve human lives by

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

enabling them to be longer, healthier, and more intellectual. At this point, transhumanists must be progressive. They must advocate the use of emerging technologies to improve not only human lives including cybernetics, artificial intelligence, social networks, space colonization, cryonics, and curing aging, but also human learning. Transhumanism, therefore, must be based on a sound philosophy by that values scientific facts, reason, and logic above spiritual principles as well as seeing humankind as controlling its transformation. It must promote rational thinking, freedom, tolerance, democracy, and concern for all human beings. Human learning will be improved by transforming the human organism beyond its natural and biological limits. Accordingly, learning about technologies, with technologies, and for technologies must be one of the most important focuses of transhumanism. Transhumanism can radically change both human habits and learning practices. Therefore, it is also crucial to foresee that transhumanism can achieve sustainability in the context of human learning to promote human intelligence in the future. The foundation of a revolutionary transformation of human learning will be established by social networks. Thus, transhumanism must be sustainable in transforming humans in the contexts of ecological learning environments. In particular, senior management and leadership have a crucial role in this development and in agile processes in not only sustainability, policies, strategies, incentives, financing, and professional development but also in human resource-related issues and concerns. In the following section, the challenges of management and leadership in relation to future trends will be elaborated.

CHALLENGES OF MANAGEMENT AND LEADERSHIP IN RELATION TO FUTURE TRENDS

The main purpose of this handbook is to identify, discuss, and scrutinize the future trends, priorities, and needs of learning in the age of transhumanism. According to the editors (Sisman-Uğur & Kurubacak, forthcoming), the scholarship on learning in the age of transhumanism should address several issues and challenges arising from future trends, such as the following: management, communication, pedagogy, technology/computing, evaluation, and sociological/intelligent social networks. The challenges for leadership and management will be elaborated in this section.

In previous research by the Ossiannilsson (2017a, 2017b, 2018a, 2018b, 2018c), the next generation of leaders in the digital era must be in the forefront of responding to the rapid global change due to emerging technologies and to the digital explosion in societies. This need has been pointed out in the United Nations Sustainability Goals, especially SDG4 (2018), Education for All 2030, and the European Digital Education Action Plan 2020 based on the upcoming requirements of the fourth industrial revolution (Ossiannilsson, 2017a, 2017b, 2018a, 2018b, 2018c). Education and learning should, according to UNESCO SDG 4 for 2030 (UNESCO, n.d.) be available for all, at any time, from anywhere, and through any device. In this global, lifelong, and lifewide perspective, learners take the lead in orchestrating the process and manner of their learning, thus choosing their personal learning journey in its widest interpretation. There have been calls for modern governance arrangements and dynamic, proactive leadership and management (UNESCO, 2016). The Director-General of UNESCO (UNESCO, 2016 n.p) argued the following:

[A] fundamental change is needed in the way we think about education's role in global development because it has a catalytic impact on the well-being of individuals and the future of our planet…. Now, more than ever, education has a responsibility to be in gear with 21st-century challenges and aspira-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tions and foster the right types of values and skills that will lead to sustainable and inclusive growth and peaceful living together.

The fourth industrial revolution, as argued above, has changed the ways we act, perform, live, work, and learn today (Schwab, 2017; Schwab, Davis, & Nadella, 2018; World Economic Forum, 2016). The consequences are that the digital transition encompasses all levels of an educational institution. Therefore, rethinking leadership and management is needed at all levels: macro, meso, micro, and nano (Ossiannilsson, 2018a, 2018b, 2018c).

Learning technologists and instructional designers have often taken responsibility for developing and merging technology and pedagogy for their mutual enrichment. Hence, these individuals are in an ideal position to influence institutional strategies. However, the often self-imposed role has not always been supported, recognized, or understood by senior leaders. Next-generation leadership involves staff at all levels in the institution in playing a strategic role in enabling, supporting, and facilitating effective institutional change. In open education, leadership is also a shared responsibility. In the Opening up Education framework, developed by the European Commission's Joint Research Institute, leadership is so crucial that it is an own, and one of the four transversal dimensions of open educational practices in higher education institutions (Inamorato dos Santos et al., 2016). The framework includes in total 10 dimensions of open education. In this framework, there are four transversal dimensions, and six core dimensions. The transversal dimensions are leadership, technology, quality, and strategy. The six core dimensions are pedagogy, recognition, collaboration, research, access, and content. Leadership affects all the other dimensions, and not only the other transversal dimensions but also each one of the core dimensions (see Figure 2).

Figure 2. Smart learning is disruptive
Source: Inamorata dos Santos et al. (2016)



EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Leaders at all levels can foster sustainable open education activities and initiatives through transparent top-down and bottom-up approaches. They can pave the way for creating openness by inspiring and empowering people. The greatest challenges probably are related to mindsets and attitudes because systemic changes are required. Hence, human capital is crucial for cultural change, which includes ownership, inclusiveness, and participation. Thus, a key issue for leaders is to promote a culture that allows people to grow, take responsibility, and build trust throughout the organization as well as to promote a culture of passion and persistence (Ossiannilsson, 2017a, 2017b, 2018a, 201b). The cultivation of a culture of quality is crucial. Moreover, it must be in the interests of everyone (i.e., the nano level), and it must be encouraged by leaders (Ossiannilsson, 2017a, 2018a). Rethinking the culture of quality as it applies to open pedagogy, situated learning, and self-directed learning requires rethinking quality assurance. Recognized international quality models of open online education take a holistic approach that includes an ecosystem, focusing not only on the learning and teaching processes but also on policy, strategies, curriculum, course design, course delivery, infrastructure, and support for staff and students (Ossiannilsson et al., 2015). Quality dimensions also relate to efficiency, learner and faculty satisfaction and engagement as well as short- and long-term outcomes. In addition, the work and study conditions of learners and staff must be considered. Gulliksen, Lantz, Walldius, Sandblad, and Åborg (2015) argued that the consequences of competitive advantage, meeting student expectations, reorganization, and continuing professional capacity building for staff are often neglected. Thus, because it is neglected, digital transformation in working places usually fails. Digital tools are often not incorporated in a well-planned manner, and most are used as substitutions or augmentations (Puentedura, 2012). Many problems could be minimized or prevented if leaders and managers had insights and knowledge of the benefits of digitalization.

To promote, realize the potential, and be at the forefront of the digital transformation, the European Commission launched the action plan for Europe (2018), which has three priorities, setting out measures to help European member states to meet the challenges and opportunities of the digital age (European Commission, 2018):

Priority 1: Making better use of digital technology for teaching and learning
Priority 2: Developing digital competences and skills
Priority 3: Improving education through better data analyses and foresight

Achieving these priorities in the European Single Market (2018) requires strong senior leaders and managers who have insights into the development, potential, and consequences of transhumanism. Being a transhumanist leader requires planning and financing learning in the transhumanist age, not only assets and equipment but also continuous professional development, infrastructure, and research in the field of transhumanism, taking into account its potential and limitations. The following are some recommended actions for implementing the three priorities according to the European Commission (2018):

- Making better use of digital technology in teaching and learning (Actions 1 to 3)
  - **Action 1:** Connectivity in schools
  - **Action 2:** Self-reflection tool and mentoring scheme for schools (SELFIE)
  - **Action 3:** Digitally-signed qualifications
- Developing digital competences and skills (Actions 4 to 8)
  - **Action 4:** Higher education hub
  - **Action 5:** Open science skills

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

  - **Action 6:** EU code week in schools
  - **Action 7:** Cybersecurity in education
  - **Action 8:** Training in digital and entrepreneurial skills for girls
- Improving education through better data analysis and foresight (Action 9 to 11)
  - **Action 9:** Studies on ICT in education
  - **Action 10:** Artificial intelligence and analytics
  - **Action 11:** Strategic foresight

In addition, the D-transform project in Europe emphasized the crucial importance of senior management and leadership for the digital transformation to succeed. Hence, D-transform training programs for leaders in European universities were developed and implemented to focus on the major role played by emerging digital technologies and transhumanism in the necessary transformation of their institutions.

The premise is that e-education (digital pedagogy and training) can become a strategic tool for European universities, enabling them to be pedagogically more effective, more cost-effective, more attractive and able to meet the needs of the professional world with regard to youth training and life-long learning (D-transform (n.d)).

Cöster, Ekenberg, Gullberg, Westelius, and Wettergren (2017) emphasized that increased digitization, digital transformation, and change allow organizations to have better conditions than ever to succeed. However, they need to understand and utilize the potential of the digital era. Some are successful, but others not; digitalization is not an easy process. However, Cöster et al. explained how organizations could create value in the context of a digitized reality. They focused on what an organization is, what it needs, and how digitization could be a solution instead of a means. Their suggestions included goals, business models, strategies, organizations, decisions, and projects. They emphasized structure, efficient decision-making, and successful project implementation.

Experts in academia, the international organizational community, and industry are currently focusing on the real-world practices of digital transformation. For example, they are engaged in discussions on the ways in which artificial intelligence (AI), the Internet of Things, and even robotization could bring value to this evolution. It is therefore essential to clearly identify the values, norms, and ethics in relation to transhumanist approaches to learning. It is also essential to examine the qualifications and expectations of learners in the transhumanist age and how to support learning by technology.

Smart environments and smart cities are developed by empowering the potential of transhumanism. Hence, there are needs to live, work, perform, communicate, interact, relate, and learn in smart ways in an information and knowledge society. In the following section, smart learning will be elaborated with regard to its role in smart cities and smart environments. A framework for the ecologies of smart learning, smart learning environment and smart cities is also presented.

SMART LEARNING

The revolutionary transformation of human learning take place through social networks, and transhumanism can be fostered in ecological learning environments. Therefore, ecological learning environments should be agile, resilient, and sustainable. This new era in human development is being enabled

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

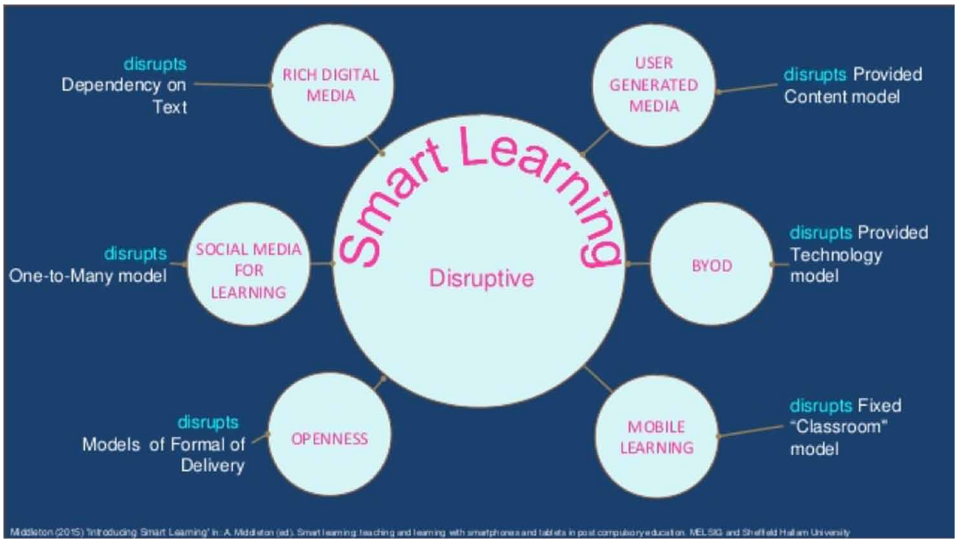
by extraordinary technological advances. However, the fourth industrial revolution concerns more than technological opportunities; it also involves a social revolution (Schwab, 2017; Schwab, Davis, Nadella, 2018; World Economic Forum, 2016). The literature on smart learning environments indicates that previous research has focused on technology and pedagogy, and only a few studies have considered the citizen's learning perspective. Therefore, there is a need to define the elements, functions, and scenarios of smart learning environments, which could be addressed in models of smart learning environments and in best practice and case studies that build on the existing research. In both education and learning, the real opportunity is to look beyond technology to a systemic change in education and the ways in which smart learning spaces can foster and encourage the ecologies of smart learning for smart citizens in smart cities in the 21st century. A smart city is a place where traditional networks and services are made more efficient by the use of digital and telecommunication technologies for the benefit of its inhabitants and businesses. With this vision in mind, the European Union is now investing in information and communication technology (ICT) research and innovation, and it is developing policies to improve the quality of life of citizens and increase the sustainability of cities. The concept of the smart city goes beyond the use of ICT to reduce resource use and emissions. It extends to smart urban transport networks, upgraded water supplies and waste disposal facilities as well as efficient ways to light and heat buildings. It also encompasses an interactive and responsive city administration that ensures safe public spaces and meets the needs of an aging population (Digital Single Market, 2018). Figure 1 shows a framework for smart learning and its disruptions. Disruptive innovation, which is an artistic term coined by Clayton Christensen (1997), describes a process in which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves upward in that market, eventually displacing established competitors. Several issues affect the growing number of reasons that smart learning is crucial both in the digital era and for transhumanism. In addition, there is a huge rise in the number of disruptions in several areas (see Figure 3). First, in response to the increasing development of openness in education, a large variety of delivery models have been proposed, such as Inamorata et al.'s 2016) framework, which is described above. Second, the use of social media in learning has disrupted the common communication model one to many. In addition, social media allow cross action spaces (Jahnke, 2017). Hence, it will be established via transhumanism, and it will affect learning. Third, the development of rich digital media will disrupt the dependency on texts. Fourth, user-generated media will disrupt models of provided content. Fifth, "bring your own device" (BYOD) will disrupt models of provided technology. Sixth, the rise of mobile learning will disrupt the fixed learning model.

In education and learning, real opportunities will arise in meeting the challenges of looking beyond technology to how smart learning spaces can foster and encourage smart learning in the 21st century. Smart learning environments will have positive effects on both personal and collaborative learning in smart cities and in communities. The educational sector will be challenged in implementing and adapting to the SDG4 goals, which are designed to empower and ensure inclusion, equity, and quality education. These goals will be achieved through access, democracy, affordability, efficacy, and equality. In addition, learners will be challenged in taking the lead in orchestrating the process and manner of their own learning and in choosing their personal learning journeys according to the widest interpretation of education (Hwang, 2014; Kinchuk et al., 2014; Koper, 2016, Traxler & Kukulska-Hulme, 2016).

The terms future learning environment, smart classroom, learning spaces, smart campus, and technology-enhanced learning are synonymous with smart learning environments. All these terms refer to utilizing information technology to build a personalized and adaptive learning environment. According to Hwang (2014), technology-enhanced learning can be perceived as a smart learning system. In smart

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 3. Smart learning and its disruptions
Source: Ossiannilsson (2018)



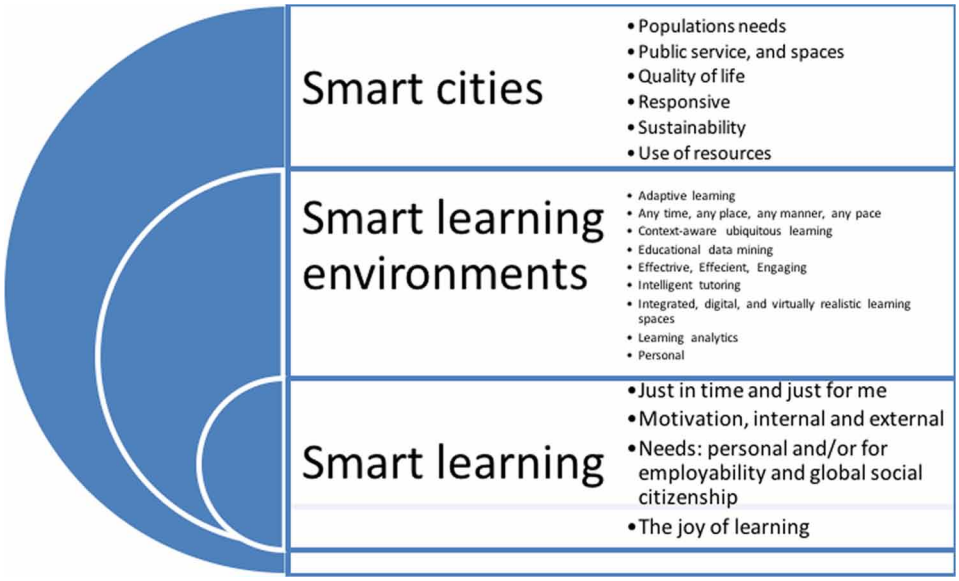
learning environments, several systems are integrated and combined, such as intelligent tutoring, learning analytics, educational data mining, adaptive learning, and personalized learning (Yang et al., 2015). However, the literature on smart learning environments indicates that previous research has focused on technology and pedagogy, and only a few studies have considered the citizen' s learning perspective. Therefore, there is a need to define the elements, functions, and scenarios of smart learning environments based on the integration of formal and informal learning in physical and virtual spaces in community learning contexts. These needs could be addressed by focusing on models of smart learning environments models and by presenting best practice and case studies based on research. Based on the current literature review, informed by the author's research and experiences in this field and by the relevant literature, a the proposed framework for the ecologies of smart learning, smart learning environments, and smart cities is presented in Figure 4.

Innovation in educational systems, which is understood as the adoption of new services, technologies, and competences by educational organizations, can help to improve learning outcomes, enhance equity, and improve efficiency. Innovation is the most effective and sustainable when it is embraced by well-trained teachers and embedded in clear teaching goals. Further research is needed on how to best use digital means to reach educational objectives. Education can benefit by opening classrooms to real-life experiences and projects and by applying new learning tools, materials, and open educational resources. Learners can be empowered by online collaboration. The access to and the use of digital technologies can help reduce the learning gaps between students from high- and low-socioeconomic backgrounds. Personal teaching can result in the increased motivation of individual learners (Downes, 2016). However, the progress in integrating technology in education remains limited.

Digital advances have brought new challenges for pupils, students, and teachers not only in Europe but also worldwide. The algorithms used by social media sites and news portals can be powerful amplifiers of biased or "fake" news" moreover, data privacy has become a key concern in the digital society. Both young people and adults are vulnerable to cyber bullying and harassment, predatory behavior, and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 4. The ecologies of smart learning, smart learning environment and smart cities
Source: Ossiannilsson (2018)



disturbing online content. The daily exposure to digital data that consist of inscrutable algorithms creates clear risks, which requires critical thinking and the ability to engage positively and competently in the digital environment. The constantly evolving need for media literacy, the wide mix of digital skills and competences required to ensure the safety, security, and privacy of the public and private sectors remains a challenge.

The ecologies of smart learning, smart learning environments, and smart cities empower the potential of global, lifelong, life-wide learning, ongoing learning, and education available to all, at anytime, anywhere, and through any device, according to the UNESCO SDG4. These goals, which were designed to empower and ensure inclusion, equity, and quality education, could be achieved through access, democracy, affordability, efficacy, and equality. Cöster et al. (2017) examined the use of technology by government agencies to collect and secure data, make intelligent decisions for personal service while considering ethics, legality, soft and hard infrastructures, human resources, and capacity building among others. They emphasized that citizens' experiences are a key driver in this journey.

Wheeler (forthcoming) argued that a rapidly growing area of technology that will significantly influence the future is AI and its potential effects on the future of learning and technological development. He and others believe that this subject must be explored. According to Wheeler, there are several philosophical debates about the nature of intelligence and the ways in which human intelligence differs from machine intelligence. One of the sources he cites is Tegmark's book, *Life 3.0* (2017), in which the author presents some compelling arguments for the future of AI. According to Wheeler, Tegmark argued that the benefits of AI will surpass the threats provided they are aligned with human intentions. One of the greatest concerns was not that computers might become sentient, or "evil," but a scenario in which the goals of "competent" AI would become misaligned with ours. His key argument is that the debate about whether computers will attain consciousness or emotional capability is spurious (Tegmark, 2017). The future co-existence with technology will be premised on the ability of computers to make

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

life better for humanity, not to "out-think" us. For Tegmark, intelligence, whether human or artificial, is the ability to accomplish complex goals (good or bad). He argued that intelligence ultimately relies on information and computation, not on flesh and blood or on metal and plastic. Therefore, he reasoned, because of the exponential developments taking place in the world of technology, there is no barrier to computers eventually attaining and even surpassing human intelligence. However, Wheeler noted that regardless of whether the arguments are supported or not, it is interesting to note the comparisons between humans and machines. Arguably, all the above attributes, such as free will, emotion, abstract thinking, and intuitive action not only make us who we are but also create a permanent and unbridgeable divide between humans and computers.

FUTURE RESEARCH DIRECTIONS

Currently and in the near future, further research should be conducted on transhumanism, particularly in relation to leadership and quality. In addition, research should be conducted on emerging trends related to the digital transformation and their effects on individuals and educational systems as well as the ways we work, live, and learn in a smart global world. It is worth emphasizing that times are changing faster than ever today. Statistics have shown that business is also changing faster than ever. However, many people neglect important aspects of change, which include decision-making and disruptions in almost every sector. It is significantly more difficult to make a decision in a time of change than in a time of stability. In the latter, one can learn from the successes and failures in previous experience. In times of change, previous experiences cannot be applied to the situation because the landscape has changed. Clark (2015) recommended the following rule for navigating change in uncertain circumstances: do not apply the first solution that occurs. She meant that it is fine to accept the initial solution when the conditions are unchanged, and "two plus two still equals four." However, under conditions of change, relying on the same assumptions and action plans could be a damaging mistake. Instead, she recommended a framework for making smarter decisions in times of change and in smart environments. This simple framework consists of three steps:

Step 1: What worked previously?
Step 2: What has changed?
Step3: What solutions have others found to related problems?

According to Clark (2015), decision-making is critical in times of rapid change. By answering the questions in Clark's three-step framework, other solutions might become apparent. In order to innovate, mental agility must be cultivated. Accordingly, although everyone is responsible for the cultivation of his or her mental agility, leaders and senior managers have a crucial role in ensuring that its development is aligned with the fourth industrial and social revolution in the 21st century. Furthermore, leaders and senior managers have crucial roles in meeting the SDG as well as the SDG4, which are designed to empower and ensure inclusion, equity, equality, and quality in education through access, democracy, affordability, efficacy, lifelong learning, and ongoing learning.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

The research and the issues discussed in this chapter on transhumanism and innovative leadership clearly concern the question of quality. My research on the next-generation leadership's role in achieving the goals of Education for All 2030 has revealed the urgent need for not only the modernization of the approach to education but also effective organizational leadership in the digital era. Leaders and managers can make a difference to higher education offers, services, processes, quality, and consequences. The cultivation of a culture of quality is critical. It must be in the interests of everyone, and it must be empowered and encouraged by leaders (Ossiannilsson, 2017a, 2017b, 2018a, 2018b); Innamorata dos Santos et al., 206; Wheeler, forthcoming).

To succeed in the era of new trends and emerging new technologies, a trusting relationship should be focused on the return on investment. The following measures are recommended to survive data breaches, emerging technologies, and new platforms:

- Understand the audience.
- Review the social media marketing strategy.
- Allocate time and budgets for new tools and technologies such as software and hardware as well as professional development and evaluation.
- Focus on what works.
- Strive to build trust with users in every campaign.

To meet the challenges of transhumanism, there is an urgent need for people who have the knowledge, abilities, competences, and attitudes to lead the process as well as to analyze and evaluate digital work environments by applying appropriate methods to analyze complex digital environments. Moreover, there are needs to analyze and evaluate the consequences of transhumanism and digital work environments by using appropriate methods to analyze the influence of complex digital environments on society.

ACKNOWLEDGMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

Bloomberg, J. (2018, April 29). Re: Digitization, digitalization, and digital transformation: confuse them at your peril [web log post]. *Forbes*. Retrieved from https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confuse-them-at-your-peril/#1f02cf102f2c

Bostrom, N. (2005). A history of transhumanist thought. *Journal of Evolution and Technology*. Retrieved from https://nickbostrom.com/papers/history.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Christensen, C. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Boston: Harvard Business School Press.

Christensen, C., & Overdorf, M. (2000, March). Meeting the challenge of disruptive change. *Harvard Business Review*.

Clark, D. (2015). *Reinventing you and stand out*. Inc. Magazine.

Cöster, M., Ekenberg, L., Gullberg, C., Westelius, A., & Wettergren, G. (2017). *Organisering och digitalisering: Att skapa värde i det 21a århundradet* [Organization and digitalization: To empower value in the 21st century]. Liber.

D-Transform. (n.d). *Transforming universities for the digital age*. Retrieved from http://www.dtransform.eu/about-us/

Daniel, J. (2015). *Making sense of educational technology: From MOOCs to blended learning: What next? Journal of Open Education Research*.

Digital Single Market. (2018). *ITC2918, Investing in the future*. Retrieved from https://youtu.be/5UqvCXFjShs

Digital Single Market. (2018, March 19). *Smart cities*. Retrieved from https://ec.europa.eu/digital-single-market/en/policies/smart-cities

Downes, S. (2016). Personal and personalized learning. *EMMA Newsletter*. Retrieved from https://us8.campaign-archive.com/?u=17ce08681f559814caf1359d3&id=fa1770e58d&e=6fb1272e29

European Commission. (2018). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions on the digital education action plan*. Brussels: European Commission. COM (2018) 22 final. Retrieved from https://ec.europa.eu/education/sites/education/files/digital-education-action-plan.pdf

Gartner. (2018). *IT Glossary*. Retrieved from https://www.gartner.com/it-glossary/digitization/

Gulliksen, J., Lantz, A., Walldius, Å., Sandblad, B., & Åborg, C. (2015). *Digital arbetsmiljö* [Digital work environment]. Report 2015:17: Stockholm (Arbetsmiljöverket). Retrieved from https://www.av.se/globalassets/filer/publikationer/rapporter/digital_arbetsmiljo-rap-2015-17.pdf

Hwang, G. J. (2014). Definition, framework and research issues of smart learning environments: A context-aware ubiquitous learning perspective. *Smart Learning Environments*, *1*(1), 4. doi:10.118640561-014-0004-5

Hwang G. J., & Tsai, C. C. (2011). Research trends in mobile and ubiquitous learning: A review of publications in selected journals from 2001 to 2010. *Br. J. Educ. Technol.,42*(4). doi:10.1111/j.1467-8535.2011.01183.x

Inamorato dos Santos, A., Punie, Y., & Castaño-Muñoz, J. (2016). Opening up education: A support framework for higher education institutions. *JRC Science for Policy Report, EUR 27938 EN*. Retrieved from http://publications.jrc.ec.europa.eu/repository/bitstream/JRC101436/jrc101436.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Jahnke, I. (2016). *Digital didactical designs: Teaching and learning in cross action spaces*. New York: Routledge.

Kinshuk, C., Chen, N.-S., Cheng, I.-L., & Chew, S. W. (2016). Evolution is not enough: Revolutionizing current learning environments to smart learning environments. *International Journal of Artificial Intelligence in Education*, *26*(2), 561–581. doi:10.100740593-016-0108-x

Koper, R. (2014). Conditions for effective smart learning environments. *Smart Learning Environments*, *1*(1), 5. doi:10.118640561-014-0005-4

Learning with "e"s. (2018a, Sept. 24). Re: Digital learning in organizations [Web log post]. Retrieved from http://www.steve-wheeler.co.uk/2018/09/digital-learning-in-organisations.html

Learning with "e"s. (2018b, Dec. 14). Re: Humans, machines and learning [Web log post]. Retrieved from http://www.steve-wheeler.co.uk/2018/12/humans-machines-and-learning.html

Liu, D., Huang, R., & Wosinski, M. 2017). *Smart learning in smart cities: Lecture notes in educational technology*. doi:10.1007/978-981-10-4343-7_2

Mercer, C. (2014). Religion and transhumanism: The unknown future of human enhancement. Santa Barbara, CA: Praeger.

O'Reilly. (2008). *The shape of things to come*. *Emerging Technology Conference*.

Ossiannilsson. (2017a). Leadership in global open, online, and distance learning. In J. Keengwe & P. H. Bull (Eds.), *Handbook of research on transformative digital content and learning technologies* (pp. 345–373). Hershey, PA: IGI Global. Retrieved from https://altc.alt.ac.uk/blog/2017/12/its-time-for-the-next-generation-of-leadership/#comments

Ossiannilsson. (2017b, Dec. 16). Re: It is time for the next generation of leadership [Web log post]. Retrieved from https://altc.alt.ac.uk/blog/2017/12/its-time-for-the-next-generation-of-leadership/#comments

Ossiannilsson. (2018a). Leadership: In a time when learners take ownership of their own learning. In K. Buyuk, S, Kocdar, & A. Bozkurt (Eds.), Administrative leadership in open and distance learning programs (pp. 1–33). Hershey, PA: IGI Global.

Ossiannilsson. (2018b). Visionary leadership for digital transformation: In a time when learners take the ownership of their own learning. *Distance Education in China: An International Forum, 5*, 22-34.

Ossiannilsson. (2018c, Sept. 26). The case for mobile learning [web log post]. Retrieved from https://virtuallyinspired.org/?s=leadership

Puentedura, R. R. (2012). *The SAMR model: Background and exemplars.* Hippasus. Retrieved from http://www.hippasus.com/rrpweblog/archives/2012/08/23/SAMR_BackgroundExemplars.pdf

Rotolo, D., Hicks, D., & Martin, B. R. (2015, Aug. 9). What is an emerging technology? *Research Policy*, *44*(10), 1827–1843. doi:10.1016/j.respol.2015.06.006

Schwab, K. (2017). *The fourth industrial revolution.* World Economic Forum.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Schwab, K., Davis, N., & Nadella, S. (2018). *Shaping the fourth industrial revolution*. World Economic Forum.

Sisman-Uğur, & Kurubacak, G. (2019). *Handbook of research on learning in the age of transhumanism*. Hershey, PA: IGI Global.

Tegmark, M. (2017). *Life 3.0: Being human in the age of artificial intelligence*. London: Penguin Books.

Thompson, J. (2017). Transhumanism: How far is too far? *A Multidisciplinary Journal of Biotechnology and the Body, 23*(2), 1–14.

Traxler, J., & Kukulska-Hulme, A. (Eds.). (2016). *Mobile learning: The next generation*. London: Routledge.

UNESCO. (2015a). *The Incheon Declaration. Education 2030. Towards inclusive and equitable quality lifelong learning for all*. Retrieved from http://unesdoc.unesco.org/images/0023/002338/233813m.pdf

UNESCO. (2015b). Education 2030. The Incheon Declaration and framework for action for sustainable goal 4. Retrieved from http://unesdoc.unesco.org/images/0024/002456/245656E.pdf

UNESCO. (2016, Sept. 9). *Education needs to change fundamentally to meet global development goals.* Retrieved from http://www.unesco.org/new/en/media-services/single-view/news/education_needs_to_change_fundamentally_to_meet_global_devel/

UNESCO. (2016, Sept. 9). Education needs to change fundamentally to meet global development goals. Retrieved from http://www.unesco.org/new/en/media-services/single-view/news/education_needs_to_change_fundamentally_to_meet_global_devel/

UNESCO. (n.d.). *Sustainable development goal 4 and its targets*. Retrieved from https://en.unesco.org/education2030-sdg4/targets

United Nations. (2018). Sustainable development goal 4. Progress of goal 4 in 2018. Retrieved from https://sustainabledevelopment.un.org/sdg4

Wheeler, S. (forthcoming). Digital learning in organisations. London: *Kogan Page.*

World Economic Forum. (2016). The fourth industrial revolution: What it means and how to respond.

World Economic Forum. (2017, March 28). *The digital revolution is not about technology – it's about people.* Retrieved from https://www.weforum.org/agenda/2017/03/the-digital-revolution-is-not-about-technology-it-s-about-people/

ADDITIONAL READING

Adams Becker, A., Brown, M., Dahlstrom, E., Davis, A., DePaul, K., Diaz, V., & Pomerantz, J. (2018). *NMC Horizon Report: 2018 Higher Education Edition*. Louisville, CO: EDUCAUSE.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chen, N. S., Cheng, I. L., & Chew, S. W. (2016). Evolution is not enough: Revolutionizing current learning environments to smart learning environments. *International Journal of Artificial Intelligence in Education*, *26*(2), 561–581. doi:10.100740593-016-0108-x

Ferguson, R., Barzilai, S., Ben-Zvi, D., Chinn, C. A., Herodotou, C., Hod, Y., ... Whitelock, D. (2017). *Innovating pedagogy 2017: Open University innovation report 6*. UK: Milton Keynes: The Open University.

OECD. (2016). *Innovating education and education for innovation: The power of digital technologies and skills.* OECD.

Traxler, J. (2013). Mobile learning: Shaping the frontiers of learning technologies in global context. In R. Huang, Kinshuk, & J. M. Spector (Eds.), Reshaping learning: New frontiers of educational research. Berlin; Heidelberg: Springer.

UNESCO. (2013). *Policy guidelines for M-learning*. Retrieved from http://unesdoc.unesco.org/images/0021/002196/219641e.pdf

KEY TERMS AND DEFINITIONS

Artificial Intelligence (AI): The simulation of human intelligence processes by machines, especially computer systems. These processes include learning (i.e., the acquisition of information and rules for using the information), reasoning (i.e., using rules to reach approximate or definite conclusions), and self-correction.

Digital Transformation: Digital transformation is the process of devising new business applications that integrate all digitized data and digitalized applications. Taking advantage of digitalization to create completely new business concepts. Because of digitization and digitalization, data are easily accessible for use across various platforms, devices, and interfaces.

Disruption: Disturbances or problems that interrupt an event, activity, or process. Events, activities, or processes are often used or understood differently than they were at the beginning. Disruptive innovation, which is an artistic term coined by Clayton Christensen, describes the process by which a product or service is initially offered in simple applications at the bottom of a market and then moves relentlessly upward in the market, eventually displacing established competitors.

Innovative Leadership: The innovative leader's focus is on the big picture and on working with creative thinkers who contribute to enhancing that vision. The innovative leader needs to be able to communicate her/his vision and generate enthusiasm for it. The leader's team needs to be able to see the vision and be willing to invest their time and resources into making it happen. Innovative leaders know that leadership by demand is far less effective in encouraging creativity and innovation than leadership through motivation and inspiration. The innovative leader needs to have confidence in her/his team and their ability to work together to achieve the vision.

Internet of Things (IoT): The network of devices, vehicles, and home appliances, such as electronics, software, actuators, and connectivity, which allows these devices to connect, interact, and exchange data.

Quality in Open Online Learning: In education and learning, quality is usually defined as teaching methods that successfully help learners develop the knowledge and skills they will require in the digital age. the short answer to the question of quality in open online learning. A longer definition requires

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

examining, at least briefly, institutional and degree accreditation, internal (academic) quality assurance processes, differences in quality assurance between traditional classroom teaching and online and distance education, the relationship between quality assurance processes and learning outcomes, and quality assurance that fits the purpose, all of which are necessary for meeting the goals of education in the digital age.

Smart Learning: Learning anytime and anywhere based on individual cognitive ability. It takes place by using an advanced electronic device. Smart learning is also called advanced distributed learning, e-learning, online leaning, hybrid learning, and blended learning.

Transhumanism (H+ or h+): An international philosophical movement that advocates the transformation of the human condition by developing and making sophisticated technologies widely available for the enhancement of human intellect and physiology.

This research was previously published in the Handbook of Research on Learning in the Age of Transhumanism; pages 78-97, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 97
Exploring the Impact of Flexible and Permeable Work–Life Boundaries in a Mobile World

Donna Weaver McCloskey
Widener University, USA

ABSTRACT

Work-life boundaries are often studied on a segmentation-integration continuum, which fails to consider that boundaries can be multidimensional. A flexible boundary allows work to be completed at different times and locations, whereas a permeable boundary allows for the integration of work and personal demands. This chapter examines boundary flexibility, home boundary permeability, and work boundary permeability as separate constructs, positing eight possible boundary configurations. In this exploratory research, differences in demographics, technology usage, work-family conflict, and work and life satisfaction for 65 knowledge workers who maintain different levels of boundary flexibility and permeability are examined. This research offers a new boundary configuration framework, which should guide future research and organizational policy.

BOUNDARY FLEXIBILITY AND PERMEABILITY

In the past the line between work and home was defined by time and location. During work hours and in the office, employees were in their work role and outside of that time/place, were in their personal life. The advent of mobile technology has all but eradicated those temporal (time) and physical boundaries. The transportability of computing means that work activities can now be done at alternate times and locations. Likewise, the ubiquitous nature of communication means that personal demands can be made while working. With the breech of temporal and physical boundaries, the psychological boundary that individuals maintain between their work and personal lives becomes more important. This research seeks to further define those boundaries and explore the impact of boundary decisions on work-family conflict as well as work and life satisfaction.

DOI: 10.4018/978-1-7998-7297-9.ch097

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The vast majority of the boundary literature utilizes a segmentation-integration continuum, positing that employees have preferences for either keeping their work and personal life separate or allowing them to overlap (Ashford, Kreiner & Fugate, 2000; Bulger, Matthews & Hoffman, 2007; Kossek, Ruderman, Brady & Hannum, 2010; Tremblay & Genin, 2008). This construct may be too simplistic. Boundaries can be flexible without being permeable and vice versa. The failure to separate flexibility from permeability has contributed to difficulties in reconciling and integrating research results (Den-Nagy, 2014). Recently researches have acknowledged that flexibility and permeability of boundaries should be examined as distinct constructs (McCloskey, 2016; Methot & LePine, 2016). This research does that by examining differences in demographics, technology use and work and personal outcomes based on boundary flexibility and the permeability of the work and home boundary.

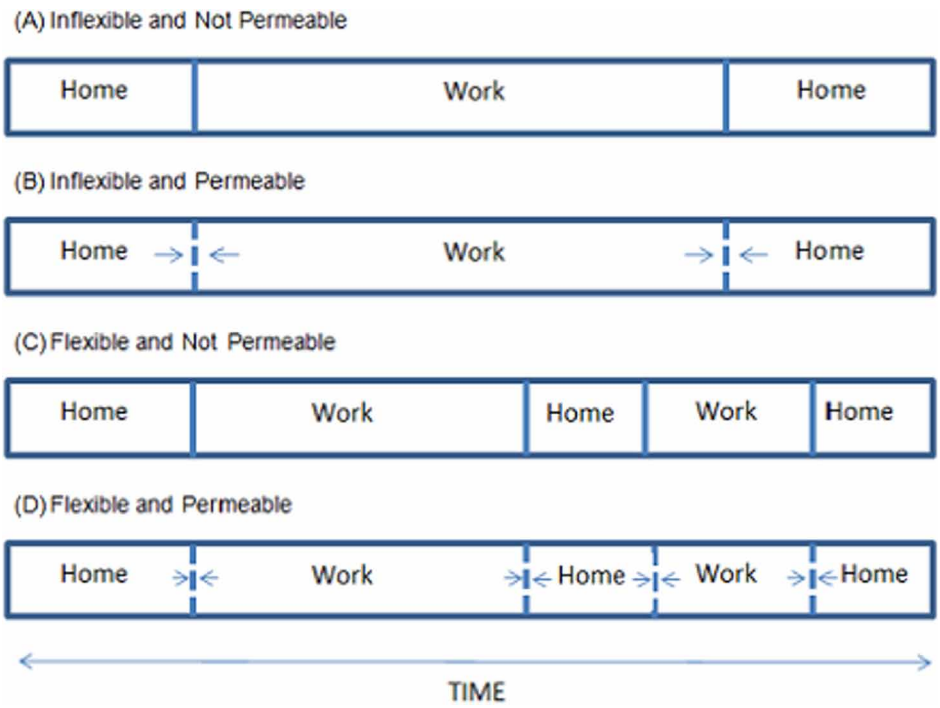
One dimension of the work-life boundary is flexibility. The concept of flexibility is how much control the individual has over when and where work is completed. Work schedule flexibility can be a formal program, such as flex-time or telecommuting, or an informal ability to adjust work hours as needed. Work flexibility has been found to be negatively related to forms of work-family conflict (Carolson, Grzywacz & Kacmar, 2010; Kattehbach, Demerouti & Nachreiner, 2010; Porter & Ayman, 2010) since it allows employees to balance conflicting demands.

Permeability is another dimension of the work-life boundary. Boundary permeability is the extent to which we integrate the obligations of one role when in the other role. Permeable boundaries allow one to be physically located in one domain and psychologically or behaviorally involved in another role (Olson-Buchanan & Boswell, 2006). Mobile technology and the ability to communicate anytime, anywhere has made the work-life boundary even more permeable. Whether responding to a client's email at the school's chorale concert or watching the concert via Skype while in the office, technology offers employees the ability to continually cross boundaries. Researchers have addressed the issue of boundary permeability and have found that using technology to do work outside of the traditional work time to contribute to increased work-family conflict (Boswell & Olson-Buchanan, 2007; Olson-Buchanan & Boswell, 2006). Conversely, individuals with strong (i.e. non-permeable) home and work boundaries experience less work-family and family-work conflict (Hecht & Allen, 2009).

Figure 1 provides a graphical depiction of four combinations of flexible and permeable boundaries. Scenarios A and B represent inflexible borders between the work and home domain. In these scenarios there is a set, defined time for work that cannot be altered. From day to day, these employees know when they need to be in their work role and cannot readily alter their schedule. There is, however, a difference in the permeability of the borders. In Scenario A the borders between work and home are not permeable; there is little to no personal contact or tasks during work time and, likewise, little to no work contact or tasks during personal time. Conversely, in Scenario B while the work and home hours are set, there is a significant amount of communication or tasks that infringe from the other domain. Scenarios C and D represent flexible boundaries between the work and home domain. In these scenarios individuals have some control on when work is done. Called split-shift or flextime, employees can take time during the day to meet personal or family obligations and then make that time up, whether at work, home or an alternate location, at another time. In Scenario C the boundary between work and personal time are not permeable. So although the timing of work and personal tasks may shift, when engaged in one role, there are boundaries in place to limit the interference from the other role. Scenario D represents the flexible and permeable boundaries depicted by Ashford, et al. (2000) which constitutes a high level of integration. The timing of work and personal tasks may shift and due to the permeable boundaries, individuals can change their focus from one role to another.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Figure 1. Combinations of flexible and permeable boundaries



The number of scenarios increases when we consider that there can be directionality to boundaries. Boundary flexibility is not directional. When the work boundary shifts it, by definition, shifts the non-work boundary as well. But permeability can be established for both home and work boundaries (Eagle, Icenogle, Maes and Miles, 1998; Kasper, Meyer & Schmidt, 2005). Having a work permeable boundary but a non-permeable home boundary, or vice versa, adds a layer of complexity to the scenarios depicted in Figure 1. Instead of the four scenarios, there are actually eight possible combinations of boundary flexibility and work/home boundary permeability. Table 1 presents the eight combinations of boundary flexibility and work and home permeability and offers descriptions, illustrative examples and potential mobile technology usage to support those boundaries.

EXAMINING THE EFFECT OF BOUNDARY FLEXIBILITY AND PERMEABILITY

Mobile technology offers workers the benefit of flexibility in completing work, which can be viewed as having positive outcomes on stress and satisfaction. But mobile technology also allows for work to intrude during personal time and for personal issues to intrude during work time. This conflict can cause stress and have a negative impact on satisfaction. This research examines the impact of boundary flexibility and home/work boundary permeability on technology usage, work-family conflict, job satisfaction and life satisfaction.

Work-family conflict (WFC) is when the stress or demands from one role interferes with the other and is comprised of three dimensions: time, psychological and behavioral. Our examination includes both the directionality and dimensions of this construct. The time based dimension of WFC is when

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 1. Overview of boundary configurations with regard to flexibility and work/home permeability

	Description	Illustrative Example	Potential Technology Usage to Support Border Flexibility and Permeability
Inflexible, home and work non-permeable	At the far extreme, work and personal life are compartmentalized and work and personal times are set. Work is not done during personal time and personal demands are not met during work time	A knowledge worker has set working hours. When s/he is working, s/he does not engage in personal tasks such as personal calls/emails/texts or social media. Likewise, when not working, s/he does not engage in work activities such as work calls/emails.	Because work and non-work times are set and rarely change, it is likely someone with an inflexible boundary would maintain separate work and personal calendars. Due to non-permeable boundaries, it is likely this person maintains separate email and mobile devices for work and home. Work devices would be shut off during personal time and vice versa.
Inflexible, home not permeable, work permeable	Work and non-work times are set and rarely altered. Home life is considered sacrosanct. While personal needs may be addressed during work time, generally work is not done during personal time.	A manager has set hours for working. Personal demands, such as a phone conference with a teacher, shopping for a birthday gift or scheduling personal appointments may happen during work time. When s/he arrives home, s/he does not check work email nor engage in work activities.	Separate work and personal calendars (see above). The home boundary is not permeable so it is likely someone with this boundary has a separate work phone/mobile device which can be turned off when not working. The work boundary is permeable so work email address may be used for personal correspondence and/or personal accounts/devices are checked while working.
Inflexible, home permeable, work not permeable	Work occurs during scheduled time. Work life is protected with a non-permeable border. While work may intrude on personal time, the opposite does not happen.	A surgeon has set hours when s/he must be at the hospital and does not deal with personal issues while at work. Work demands may intrude during personal/family time	Separate work and personal calendars (see above). Because the home boundary is permeable, this employee may use their personal email or mobile device for work communication or checks their work device while not working. Because the work boundary is not permeable, personal email/communication likely does not come to work accounts/devices.
Inflexible, work and home permeable	Work and non-work times are set and rarely altered. Permeable boundaries for both work and home means that work activities are sometimes done at home and personal activities are sometimes done at work.	A supervisor may be required to be at the work location M-F from 8a – 6p. Permeability in boundaries means s/he can perform personal tasks such as a phone conference with a teacher, shopping for a birthday gift or scheduling personal appointments during work time. Likewise, work task can be done during personal time.	Separate work and personal calendars (see above). Because both the work and home boundaries are permeable, someone with these boundaries may use one mobile device and email account for both work and personal needs.
Flexible, home and work not permeable	Work and personal life are compartmentalized but the timing of work can be shifted to meet changing demands. Although time may shift, when working only work tasks are done and when not working only non-work tasks are done.	A manager can leave the office at 3 to attend after school sports but can make up those hours by working in the evening. (This is sometimes referred to as a split shift.) The work and home boundaries are not permeable, so the employee is neither responding to work emails when at the sporting event nor watching the game online while in the office.	Because work and non-work time can shift, it is likely that someone with flexible boundaries would use an integrated calendar. Because work and non-work tasks are compartmentalized, this employee may have separate work and personal email accounts as well as separate mobile devices. Personal emails/texts are not dealt with when working and work emails/texts are not dealt with when not working.
Flexible, home not permeable, work permeable	The time when work is done may shift but the home boundary is firm and work is not done during personal time. The work boundary is permeable so personal tasks may be done at work.	A manager can leave the office at 3 to attend after school sports but can make up those hours by working in the evening. S/he would not check work email while at the sporting event but may follow a youth sporting event online while in the office.[1]	Integrated calendar (see above). The home boundary is not permeable so it is likely someone with this boundary has a separate work phone/mobile device which can be turned off when not working. The work boundary is permeable so work email address may be used for personal correspondence and/or personal accounts/devices are checked while working.
Flexible, home permeable, work not permeable	The time when work is done may shift but the work boundary is firm. While work tasks may be done during personal time, personal tasks are not done during work time.	This is perhaps the category for the stereotypical workaholic. A manager can leave the office at 3 to attend after school sports but can make up those hours by working in the evening. Because the home boundary is permeable, s/he would check work email while at the sporting event. The work boundary is not permeable to s/he would not follow a youth sporting event online while in the office.	Integrated calendar (see above). Because the home boundary is permeable, this employee may use their personal email or mobile device for work communication or checks their work device while not working. Because the work boundary is not permeable, personal email/communication likely does not come to work accounts/devices.
Flexible, home and work both permeable	This combination offers the most work-life integration. The timing of work can shift and demands from one role are allowed to intrude when in the other role.	A real estate agent has flexibility as to when work is done. But having permeable boundaries means work calls are taken during family time (like dinner or a concert) and family needs (like homework help or scheduling/carpool coordination) are dealt with while working.	Integrated calendar (see above). Because both the work and home boundaries are permeable, someone with these boundaries may use one mobile device and email account for both work and personal needs.

there are pressing demands that must be met during the same time. Researchers have suggested that work-family conflict should be looked at from both sides of the relationship, the extent to which work interferes with family (work→family conflict) and the extent to which family interferes with work (family→work) (Frone, Russell & Cooper, 1992; Judge, Boudreau & Bretz, 1994). This was not done in this study for the time dimension of work-family conflict. The very concept of schedule flexibility negates directionality in this time based dimension because it assumes that there is a structured work time and non-work time. Directionality implies that a family commitment during the eight hours per day in which the employee works is family→work conflict and work commitments during "non-work" time (nights and weekends) is work→family conflict. Mobile computing and flexible scheduling allows employees to be very flexible concerning when work is completed. With the elimination of the 8-hour "shift", it is much harder to establish directionality. This research will examine the time dimension of work-family conflict but will not look at directionality of this measure.

Another dimension of work-family conflict, psychological interference, can be more insidious since it is not as obvious or as easily managed. Psychological interference is when you are physically present in one role but are distracted or consumed with needs from the other role. This conflict, which we will call the strain dimension of work-family conflict, taps into the permeability of borders and the ability to control the interference from one role when you are in the other role. The strain dimension of work-family conflict will consider the directionality of conflict, work interfering with family (work→family conflict) and family interfering with work (family →work conflict).

The third dimension of work-family conflict has to do with the different ways be behave in our work and home lives. For example, the decision-making style used in the workplace may be different from the one employed for personal decisions. While the blurring of work and home boundaries may cause increase the speed of transition, it would not eliminate it. This dimension has received much less attention in the literature and was not examined in this research.

Work-family conflict has been shown to be a contributor to many negative outcomes including depression (Frone, et al., 1992), low organizational commitment (Greenhaus & Beutell, 1985) and poor physical health (Carlson, Grzywacz & Kacmar, 2010). Since we are examining the impact of boundaries on the conflict between work and personal lives, we will also examine the resulting impact on job and life satisfaction.

Boundary flexibility refers to the degree to which the time boundary between work and personal roles can shift. Employees who maintain flexible boundaries are able to change when and where they do their job. As offered in illustrative examples in Table 1, it is likely that someone with a flexible work-life boundary would maintain one integrated calendar so that time can be managed holistically.

H1: Respondents who have flexible boundaries will use one, integrated calendar.

Researchers have found that the ability to vary work time is negatively related to work-nonwork conflict (Bulger, et. al. 2007; Carlson, et. al, 2010; Kattenbach, Demerouti & Nachreiner, 2010). Porter and Ayman (2010) found work flexibility to be negatively correlated with work interference with family measure, which is the extent to which work demands conflicted with family life. Diaz, Chiaburu, Zimmerman and Boswell (2012) found that mobile technology offered more flexibility which contributed to reduced work to life conflict. While flexibility provides agility in reducing time-based work-family conflict, it can also contribute to less strain-based work-family conflict. Knowing that we can adjust the timing and location of work to meet personal needs reduces the stress we would encounter with structured,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

set time boundaries. Boundary control is positively correlated with the ability to balance work and family and negatively correlated with psychological stress (Kossek, et.al, 2012). Thus, our expectation is that boundary flexibility will contribute to the reduction in the three studied forms of work-family conflict.

H2a: Respondents who have flexible boundaries will have less time based work-family conflict than those who have inflexible boundaries.

H2b: Respondents who have flexible boundaries will have less strain based work→ family work-family conflict than those who have inflexible boundaries.

H2c: Respondents who have flexible boundaries will have less strain based family→ work-family conflict than those who have inflexible boundaries.

When we're not in balance and the strain of not meeting needs in one domain conflict with another, we tend to be dissatisfied with both our job and our life (Netemeyer, Boyles & McMurrian, 1996). As prior research has supported, reduced work-family conflict contributes to other positive outcomes such as higher work and life satisfaction (Carlson, et al., 2010).

H2d: Respondents who have flexible boundaries will have higher job and life satisfaction than those who have inflexible boundaries.

Flexibility is about when and where work is completed but permeability is about the integration of work and home. As presented in Table 1, employees can maintain different levels of permeability for work and home. If an employee is interested in keeping firm boundaries, s/he would be more likely to have separate work and personal cell phones and email accounts so that those domains can be kept separate. Conversely, employees who want to integrate their work and personal life would be more likely to use one cell phone and email account for both work and personal needs.

H3: Respondents who have permeable boundaries will use one, integrated cell phone and email account.

Generally, when employees are able to establish barriers or limits between work and family, they experience less work-family conflict (Hecht and Allen, 2009) and more integration results in greater work-family conflict (DeSrochers, Hilton & Larwood, 2005). Prior research has not addressed how permeability could impact the components of work-family conflict (time, strain work→ family and strain family→ work) differently. While we hypothesized that schedule flexibility is what allows employees to minimize time-based work family conflict, perhaps permeability has an impact as well. The ability to communicate to meet a personal need, such as talking to a doctor or emailing a teacher, during traditional work time may be seen as helping to alleviate the time-based work-family conflict. While flexibility provides the ability to go somewhere during traditional work time, permeability provides the ability to communicate during traditional work hours. Because employees are able to communicate in a timely manner (i.e. not waiting until after work to return a call), they may feel a reduction in their time-based work-family conflict.

H4a: Respondents who have a permeable work boundary will have less time based work-family conflict than those who have a non-permeable work.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

However the potential benefit of permeability comes at a price. Generally, integration is seen as stressful. Greater work-family integration, interruptions of one domain when in the other domain, has been associated with greater work-family conflict (Desrochers, et. al, 2005; Kossek at al., 2012) and stress (Koay, Soh & Chew, 2017). Moving from one role to another involves a rite of transition (Ashford et al., 2000). Traditionally, the commute to work or home is the transition time in which we decompress and 'change channels' from the role we are leaving to the one we are entering. Those with permeable boundaries are not afforded the time to make these transitions and must move from one role to another quickly. Hecht and Allen (2009) used a measure called boundary strength which was, in essence, the concept we are calling boundary permeability. They examined both the strength of the boundary that "protected" work from outside interference and found greater work boundary strength was related to less family→ work conflict.

H4b: Respondents who have a permeable work boundary will have more strain based family→ work conflict than those who have a non-permeable work.

When the work boundary is permeable, personal demands can intrude during work time, this leads to more strain based family→ work conflict. Increased work-family conflict is associated with negative impacts on job (Diaz, at. al, 2012) and life satisfaction (Eagle, et al., 1998).

H4c: Respondents who have a permeable work boundary will have lower job and life satisfaction than those who have a non-permeable work.

When the home boundary is permeable, work demands can intrude during non-work time. Again, while boundary flexibility is hypothesized to allow for scheduling to reduce this conflict, it is possible boundary permeability can also address the time dimension of work-family conflict. By allowing work to integrate during personal time, the employee may be able to have more personal time. For example, if there is a conference call that needs to occur on the weekend, perhaps it is better to accept that call from home (and enjoy as much of the weekend as possible) rather than scheduling time in the office and losing even more time due to commuting.

H5a: Respondents who have a permeable home boundary will have less time based work-family conflict than those who have a non-permeable work.

But the potential benefit in scheduling is likely lost when considering the strain-based dimension. Just as we argued for the permeable work boundary, when the home boundary is permeable work is allowed to intrude during non-work time. This intrusion during home time can be even more damaging because of the impact it may have on family members. Demands from a spouse or children to be engaged in family life, not just physically present, may contribute to additional strain and reduced job and life satisfaction. Hecht and Allen (2009) examined the boundary strength that "protected" home from work interference and found home boundary strength was related to less work→family conflict. Likewise, home boundary permeability had a positive impact on work-to-life conflict (Olson-Buchanan & Boswell, 2006)

H5b: Respondents who have a permeable home boundary will have more strain based work→ family conflict than those who have a non-permeable work.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Again, since we are hypothesizing home boundary permeability to result in more strain work→family conflict, we would also expect the resulting decrease in job and life satisfaction.

H5c: Respondents who have a permeable home boundary will have lower job and life satisfaction than those who have a non-permeable work.

As outlined in Table 1, there are eight combinations of boundary flexibility and work/home boundary permeability. The first and last combinations represent the segmented and integrated extremes studied by (Ashford, et. al. 2000). The other six boundary combinations have not been empirically studied.

RESEARCH METHOD

This research sought to examine the digital boundaries of professional knowledge workers making the sampling of business alumni an appropriate sampling frame. Through LinkedIn and email, the undergraduate and graduate alumni from a northeastern university were contacted and asked to complete an online survey. Of the 103 responses, 35 were eliminated due to incomplete answers, resulting in a sample of 68 professional employees. Three additional individuals were dropped because they were not full time employees leaving the final sample at 65. A summary of the demographics of the sample are presented in Table 2. While the sample size is small, it was deemed acceptable for the exploratory nature of this research.

Measures

Boundary Flexibility

Boundary flexibility was assessed with a five-point likert scale (1=strongly disagree to 5=strongly agree) on five statements regarding the individual's control over whether work could be completed at different times or on different days. Statements included 'I have flexibility regarding when I complete my work.' and 'Generally, I can control the hours I work.' The responses were coded such that a higher value represents more boundary flexibility (α=70).

Boundary Permeability

Boundary permeability was assessed with a five-point likert scale (1=strongly disagree to 5=strongly agree) on a total of 16 statements regarding how strongly the individual segments or separates their work and personal life. The items were drawn from Hecht and Allen's (2009) work-nonwork boundary strength scales as well as literature recommending work-life balancing strategies (Cousins & Robey, 2015; Friedman & Westring, 2015; Golden & Geisler, 2007; Zheng, Molineux, Mirshekary & Scaparo, 2015). Eight of the items focus on the boundary that protects an employee's home or personal life from work interference, such as 'I often deal with work related issues during my non-work time' and 'I rarely turn off my mobile device so I can be available during work' (α=79). The other eight items focus on the boundary that protects work from interference from personal/home life. Statements are a mix of permeable boundaries such as 'My friends and family contact me when I am working' and non-permeable

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 2. Demographics of total sample

	Total Sample (n=65)
Gender	Female – 31 (48%) Male – 32 (49%) Not reported – 2 (3%)
Age	20-29 yrs – 6 (9%) 30-39 yrs – 16 (25%) 40-49 yrs – 26 (40%) 50-59 yrs – 16 (25%) 60+ yrs - 1 (2%)
Marital Status	Married – 57 (88%) Divorced – 4 (6%) Widowed – 1 (2%) Single – 3 (5%)
Spouse/ Partner Work Status	Full time – 43 (66%) Part time high (20-40 hrs/wk) – 8 (12%) Part time low (<20 hrs/wk) – 2 (3%) Not employed – 4 (6%)
Parental Status	Parent – 54 (86%) Not a parent – 9 (14%)
Youngest Child	No children - 9 (14%) Infant/baby – 6 (9%) Toddler – 7 (11%) Preschooler – 3 (5%) Elementary age – 10 (15%) Middle school age – 13 (20%) High school age – 6 (9%) College age – 7 (11%) Grown/Indep – 4 (6%)
Eldercare Status	None – 44 (68%) Minimal (1-2 hrs/wk) – 13 (20%) Some (3-6 hrs/wk) – 6 (9%) Substantial (7-10 hrs/wk) – 0 (0%) Major (11+ hrs/wk) – 1 (2%) Not reported – 1 (2%)
Organizational Tenure	11.10 years (9.04 std dev)
Job Tenure	7.33 years (7.24 std dev)
# of Cell phones	1.12 (.31 std dev)
# of Email Accounts	2.75 (1.02 std dev)
# of Calendars	2.02 (.89 std dev)

boundaries such as 'I rarely deal with personal matters when I am working.' (α=78). All items were coded such that higher scores represent a more permeable boundary.

Work-Family Conflict

This research addresses three types of work-family conflict: time work family conflict (8 items), strain work→family conflict (5 items) and strain family→work conflict (5 items). The measures used to examine these dimensions were developed by Kopelman, Greenhaus and Connolly (1983). Time-based work family conflict is when there are pressing demands from both work and family that must be dealt with

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

at the same time (α=79). Sample items include 'My work keeps me from spending the amount of time I would like to on family related activities' and 'My home life interferes with my work responsibilities, for example starting work on time or traveling'. The strain-based component of work-family conflict arises from interference when you are physically present in one role but are distracted or consumed with needs from the other role. Stain-based work family conflict was examined with five items that addressed work→family conflict (α=80) and four items that addressed family→ work conflict (α=79). Examples include 'I am often preoccupied with my job when I am not working' and 'My family life is so demanding that I find myself thinking about family matters while working.'

Job Satisfaction

Job satisfaction was operationalized by a three-item scale developed by Hackman and Oldham (1975). Each item asked respondents to indicate their agreement or disagreement on a five-point scale ranging from (1) strongly disagree to (5) strongly agree. The items were averaged into a composite score with higher scores reflecting greater job satisfaction (α=77).

Life Satisfaction

As others have done (Carlson, et. al, 2010), the life satisfaction measures were modeled after the job satisfaction items. Life satisfaction was assessed by a three-item scale with respondents asked to indicate their agreement or disagreement on a five-point scale ranging from (1) strongly disagree to (5) strongly agree. The items were averaged into a composite score with higher scores reflecting greater life satisfaction (α=76).

Control Variables

This research sought to understand the demographic characteristics and outcomes of knowledge workers with various types of boundaries between work and home. The included demographic variables were directed by prior research and include gender (Carlson, Grzywacz & Kacmar, 2010; Powell & Craig, 2015; Tremblay & Genin, 2008), age (Zheng, et. al, 2015), and family characteristics such as marital status, spouse's work status, parental status, age of youngest child (Tremblay & Genin, 2008) and eldercare responsibilities (Friedman & Greenhaus, 2000). Additionally, job and organizational tenure (in years) were assessed so that we might examine whether boundary alignment varies with job or organizational experience.

RESULTS AND DISCUSSION

Due to the exploratory nature of this research, before addressing the proposed hypotheses, we first sought to examine whether there were differences in the demographic characteristics of those respondents who reported different boundaries. We first examined boundary flexibility. For the total respondents the average reported boundary flexibility was 3.58 with a 3.60 median. The median point was used to split the respondents into low vs. high flexibility groups. There were 40 (62%) respondents considered to have flexible boundaries and 25 (38%) who are considered to have inflexible boundaries. Once grouped into

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

flexible and non-flexible boundaries, we examined whether there were differences in the demographic characteristics. As presented in Table 3, the flexible and non-flexible respondents were similar on gender, age, marital status, spouse work status and youngest child. In fact, the only categorical variable in which there was a significant difference for flexible vs. non-flexible boundary respondents was parental status and eldercare responsibilities. Those employees with less flexible boundaries were more likely to be parents and reported less eldercare responsibilities. There was not a significant difference in the job or organizational tenure of those who reported flexible boundaries and those who reported inflexible boundaries nor were there any significant differences on number of cell phones, email accounts or calendars.

Table 3. Demographics based on boundary flexibility

	Flexible Boundary (n= 40)	**Non-Flexible Boundary (n= 25)**	**Sig**
Gender	Female – 19 (48%) Male – 20 (50%)	Female – 12 (48%) Male – 12 (48%)	No significant difference
Age	20-29 yrs – 5 (13%) 30-39 yrs – 7 (18%) 40-49 yrs – 16 (40%) 50-59 yrs – 11 (28%) 60+ yrs - 1 (3%)	20-29 yrs – 1 (4%) 30-39 yrs – 9 (36%) 40-49 yrs – 10 (40%) 50-59 yrs – 5 (20%) 60+ yrs - 0 (0%)	No significant difference
Marital Status	Married – 33 (83%) Divorced – 3 (8%) Widowed – 1 (3%) Single – 3 (8%)	Married – 24 (96%) Divorced – 1 (4%) Widowed – 0 (0%) Single – 0 (0%)	No significant difference
Spouse/ Partner Work Status	Full time – 24 (60%) Part time high – 5 (13%) Part time low – 1 (3%) Not employed – 3 (8%)	Full time – 19 (76%) Part time high – 3 (12%) Part time low– 1 (4%) Not employed – 1 (4%)	No significant difference
Parental Status	Parent – 32 (80%) Not a parent – 8 (20%)	Parent – 24 (96%) Not a parent – 1 (4%)	*
Youngest Child	Infant/toddler – 6 (15%) Preschooler – 2 (5%) Elementary age – 7 (18%) Middle/HS age – 10 (25%) College/ Indep – 7 (18%)	Infant/toddler – 7 (28%) Preschooler – 1 (4%) Elementary age – 3 (12%) Middle/HS age – 9 (36%) College/Indep – 4 (16%)	No significant difference
Eldercare Status	None – 23 (58%) Minimal – 12 (30%) Some – 4 (10%) Substantial – 0 Major – 0 (0%)	None – 21 (84%) Minimal – 1 (4%) Some – 2 (8%) Substantial – 0 Major – 1 (4%)	**
Org Tenure	11.59 yrs (8.86 std dev)	10.32 yrs (7.80 std dev)	No significant difference
Job Tenure	7.03 years (5.99 std dev)	7.80 yrs (9.01 std dev)	No significant difference
# of Cell phones	1.11 (.31 std dev)	1.10 (.30 std dev)	No significant difference
# of Email Accounts	2.73 (1.01 std dev)	2.65 (.77 std dev)	No significant difference
# of Calendars	2.03 (.89 std dev)	2.05 (.89 std dev)	No significant difference

NOTE: Percentages do not always total 100% due to non-responses.

* Significant at the .10 level; ** significant at the .05 level; *** significant at the, 01 level

Eldercare Status: Minimal (1-2 hrs/wk), Some (3-6 hrs/wk), Substantial (7-10 hrs/wk), Major (11+ hrs/wk) – 1 (3%)

Spouse/ Partner Work Status: Part time high = 20+ hrs/wk and Part time low < 20 hrs/wk

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

While the flexibility of boundaries is not directional, boundary permeability is directional. An employee could maintain a non-permeable work boundary (not letting personal tasks interfere during work time) but a permeable home boundary (letting work responsibilities intrude during non-work time). Therefore boundary permeability was assessed separately for both work and home. For the total respondents the average reported work boundary permeability was 3.29 and a 3.50 median and the average reported home boundary permeability was 3.46 with a 3.63 median. The median point was used to split the respondents into low vs. high permeability groups. Thirty six (55%) respondents are considered to have a permeable work boundary and 30 (46%) are considered to have permeable home boundary.

Once grouped into permeable and non-permeable for work and home boundaries, we examined whether there were differences in the demographic characteristics and technology usage. A comparison of the demographic characteristics of the respondents based on the permeability of their work boundary is presented in Table 4a and home boundary is presented in Table 4b.

Conventional wisdom might suggest there is a difference in the way men and women choose to integrate work and family demands. While there was no difference in the gender composition of flexible vs. inflexible boundaries or permeable vs. non-permeable home boundaries, there is a gender difference with regard to the permeability of the work boundary. Given that women are frequently characterized and depicted as multi-taskers (Powell & Craig, 2015) it was a bit surprising to find those who maintain a non-permeable boundary protecting work time are more likely to be women.

There was also a significant difference in the age of youngest child. While there was no difference on whether they had children or not, those employees who maintain a permeable work boundary tended to have younger children with 31% having a preschooler or younger compared to only 17% for the non-permeable work boundary employees. This may be because once children reach school age the structure of the school day does add a pseudo parent-child boundary. Aside from the occasional illness or school communication, the school day segments the child's day from the parent's. This separation may not occur for younger children who are not in school, thus requiring more work boundary permeability.

We should note there was not a significant difference in the respondents spouse/partner work status. It would seem likely that people who maintain a firm boundary between work and personal demands are able to do so because they have a spouse/partner who is able to deflect those demands. This was not found in the reported sample as there was no difference in the work status of a spouse/partner for those with a permeable versus non-permeable work boundary.

There was also a slight significant difference in the average organizational tenure between the two groups. Those employees who reported having less work boundary permeability have worked for their organizations longer, 13.26 years compared to 9.36 years for the work permeable boundary group. While we cannot assert any type of causality, those employees who keep a firmer boundary between work and their personal lives, were employed longer with their current organization.

As suggested in the vignettes in Table 1, technology can assist employees integrate or separate their work and personal lives. Centralizing all communication on one cell phone number, email account and calendar would be the epitome of integration with both work and home life managed seamlessly. The other extreme would be the setting up digital firewalls by maintaining separate work and home cell phones, email accounts and calendars. It was therefore somewhat surprising to see that there were no significant differences in the use of these technologies based on permeability of the work or home boundary. Neither of the hypotheses regarding the use of technology to support flexible (H1) or permeable (H3) boundaries were supported.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 4a. Demographics Based on Permeability of Work Boundary

	Work Boundary Permeable (n= 36)	**Work Boundary Non-Permeable (n= 29)**	
Gender	Female – 13 (36%) Male – 21 (58%)	Female – 18 (62%) Male – 11 (38%)	*
Age	20-29 yrs – 5 (15%) 30-39 yrs – 11 (31%) 40-49 yrs – 14 (39%) 50-59 yrs – 5 (14%) 60+ yrs - 1 (3%)	20-29 yrs – 1 (3%) 30-39 yrs – 5 (17%) 40-49 yrs – 12 (41%) 50-59 yrs – 11 (38%) 60+ yrs - 0 (0%)	No significant difference
Marital Status	Married – 30 (83%) Divorced – 2 (6%) Widowed – 1 (3%) Single – 3 (8%)	Married – 27 (93%) Divorced – 2 (7%) Widowed – 0 (0%) Single – 0 (0%)	No significant difference
Spouse/ Partner Work Status	Full time – 24 (67%) Part time high – 5 (14%) Part time low – 0 (0%) Not employed – 1 (3%)	Full time – 19 (66%) Part time high – 3 (10%) Part time low – 2 (7%) Not employed – 3 (10%)	No significant difference
Parental Status	Parent – 29 (81%) Not a parent – 7 (19%)	Parent – 27 (93%) Not a parent – 2 (7%)	No significant difference
Youngest Child	Infant/toddler – 9 (25%) Preschooler – 2 (6%) Elementary – 3 (8%) Middle/HS – 13 (36%) College/Indep – 2 (6%)	Infant/toddler – 4 (14%) Preschooler – 1 (3%) Elementary – 7 (24%) Middle/HS – 6 (21%) College/Indep – 9 (31%)	**
Eldercare Status	None – 27 (75%) Minimal – 5 (14%) Some – 3 (8%) Substantial – 0 (0%) Major – 1 (3%)	None – 17 (59%) Minimal– 8 (28%) Some– 3 (10%) Substantial– 0 (0%) Major– 1 (3%)	No significant difference
Organizational Tenure	9.36 years (7.75 std dev)	13.26 years (7.99 std dev)	*
Job Tenure	6.02 years (5.54 std dev)	8.95 years (8.75 std dev)	No significant difference
Number of Cell Phones	1.12 (.31 std dev)	1.10 (.31 std dev)	No significant difference
Number of Email Accounts	2.75 (1.02 std dev)	2.62 (.77 std dev)	No significant difference
Number of Calendars	2.02 (.89 std dev)	2.08 (.88 std dev)	No significant difference

NOTE: Percentages do not always total 100% due to non-responses.
* Significant at the .10 level; ** significant at the .05 level; *** significant at the, 01 level
Eldercare Status: Minimal (1-2 hrs/wk), Some (3-6 hrs/wk), Substantial (7-10 hrs/wk), Major (11+ hrs/wk) – 1 (3%)
Spouse/ Partner Work Status: Part time high = 20+ hrs/wk and Part time low < 20 hrs/wk

The first set of hypotheses address whether there are differences in the levels of work-family conflict, job satisfaction and life satisfaction for employees who have flexible boundaries versus those who have non-flexible boundaries. As presented in Table 5, there is no statistical difference between the flexible and non-flexible groups on the examined dimensions of work-family conflict. Despite our belief that flexibility would allow employees to better balance their work and family demands, there does not appear to be evidence that the flexible boundary type reduced any form of work-family conflict. We have

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

no support for Hypothesis 2a, b or c. There was, however, a significant difference in job satisfaction. Those employees who have flexible boundaries were significantly more satisfied with their jobs than employees who did not have flexible boundaries. There is partial support for H2d since flexibility was associated with higher job satisfaction but there was no difference for life satisfaction.

Table 4b. Demographics based on permeability of home boundary

	Permeable (n= 30)	**Non-Permeable (n= 35)**	
Gender	Female – 13 (43%) Male – 15 (50%)	Female – 18 (51%) Male – 17 (49%)	No significant difference
Age	20-29 yrs – 2 (7%) 30-39 yrs – 7 (23%) 40-49 yrs – 14 (47%) 50-59 yrs – 6 (20%) 60+ yrs - 1 (3%)	20-29 yrs – 4 (11%) 30-39 yrs – 9 (26%) 40-49 yrs – 12 (34%) 50-59 yrs – 10 (29%) 60+ yrs - 0 (0%)	No significant difference
Marital Status	Married – 26 (87%) Divorced – 3 (10%) Widowed – 0 (0%) Single – 1 (3%)	Married – 31 (89%) Divorced – 1 (3%) Widowed – 1 (3%) Single – 2 (6%)	No significant difference
Spouse/ Partner Work Status	Full time – 21 (70%) Part time high – 2 (7%) Part time low – 1 (3%) Not employed – 2 (7%)	Full time – 22 (63%) Part time high – 6 (17%) Part time low– 1 (3%) Not employed – 2 (6%)	No significant difference
Parental Status	Parent – 26 (87%) Not a parent – 4 (13%)	Parent – 30 (86%) Not a parent – 5 (14%)	No significant difference
Youngest Child	Infant/toddler – 4 (13%) Preschooler – 3 (10%) Elementary – 4 (13%) Middle/HS – 11 (37%) College/Indep – 4 (14%)	Infant/toddler – 9 (26%) Preschooler – 0 (0%) Elementary – 6 (17%) Middle/HS – 8 (23%) College/Indep – 7 (20%)	No significant difference
Eldercare Status	None – 19 (63%) Minimal – 6 (20%) Some – 3 (10%) Substantial – 0 (0%) Major – 1 (3%)	None – 25 (71%) Minimal – 7 (20%) Some – 3 (9%) Substantial – 0 (0%) Major – 0 (0%)	No significant difference
Organizational Tenure	11.99 years (7.88 std dev)	10.43 years (8.20 std dev)	No significant difference
Job Tenure	7.97 years (6.39 std dev)	6.78 years (7.95 std dev)	No significant difference
Number of Cell Phones	1.17 (.32 std dev)	1.11 (.32 std dev)	No significant difference
Number of Email Accounts	2.75 (1.04 std dev)	2.71 (.94 std dev)	No significant difference
Number of Calendars	2.02 (.89 std dev)	2.03 (.90 std dev)	No significant difference

NOTE: Percentages do not always total 100% due to non-responses.
* Significant at the .10 level; ** significant at the .05 level; *** significant at the, 01 level
Eldercare Status: Minimal (1-2 hrs/wk), Some (3-6 hrs/wk), Substantial (7-10 hrs/wk), Major (11+ hrs/wk) – 1 (3%)
Spouse/ Partner Work Status: Part time high = 20+ hrs/wk and Part time low < 20 hrs/wk

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 5. Differences in study variables based on boundary flexibility

	Flexible Boundary (n= 40)	**Non-Flexible Boundary (n= 25)**	
Time Based Work Family Conflict	2.48 (.72)	2.54 (.59)	No sig diff
Strain Work→Family Conflict	2.63 (.75)	2.80 (.73)	No sig diff
Strain Family→Work Conflict	1.93 (.50)	2.14 (.66)	No sig diff
Job Satisfaction	3.79 (.76)	3.28 (.73)	**
Life Satisfaction	3.83 (.81)	3.72 (.54)	No sig diff

Mean (standard deviation)
* Significant at the .10 level; ** significant at the .05 level; *** significant at the, 01 level

The next set of hypotheses dealt with the permeability of the work boundary. It was hypothesized that individuals with permeable work boundaries would have less time work-family conflict but more strain-based family→work conflict. The strain component was thought to be so great it would impact both job and life satisfaction. As presented in Table 6, we found that employees with permeable work boundaries did have significantly less time based work-family conflict but there was not a significant difference for strain family→ work nor job and life satisfaction. Hypothesis 4a was supported but there was no support for Hypothesis 4b or c.

Table 6. Differences in study variables based on work boundary permeability

	Work Boundary Permeable (n= 36)	**Work Boundary Non-Permeable (n= 29)**	
Time Based Work Family Conflict	2.35 (.65)	2.69 (.58)	**
Strain Family→Work Conflict	2.05 (.57)	1.96 (.58)	No sig diff
Job Satisfaction	3.67 (.80)	3.49 (.77)	No sig diff
Life Satisfaction	3.88 (.62)	3.67 (.80)	No sig diff

Mean (standard deviation)
* Significant at the .10 level; ** significant at the .05 level; *** significant at the, 01 level

The final set of hypotheses dealt with the permeability of the home boundary. It was hypothesized (H5a) that having a permeable home boundary would decrease the time dimension of work-family conflict. Not only was this not the case, the opposite was significant. Those respondents who reported having a permeable home boundary also reported experiencing higher time-based work-family conflict. We also hypothesized (H5b) that having a permeable home boundary would increase the strain work → family conflict which was supported. As presented in Table 7, despite the increased time and strain work→ family conflict for those with a permeable home boundary, there was not a significant difference in their reported job or life satisfaction, thus there was no support for Hypothesis 5c.

This research posits that flexibility and permeability should be examined as distinct constructs. As summarized in Table 8, we found limited support for the proposed hypotheses. However, the hypotheses failed to address the various combinations of boundary flexibility and permeability. We found that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 7. Differences in study variables based on home boundary permeability

	Home Boundary Permeable (n= 30)	**Home Boundary Non-Permeable (n= 35)**	
Time Based Work Family Conflict	2.80 (.59)	2.25 (.57)	***
Strain Work→Family Conflict	2.95 (.71)	2.55 (.71)	**
Job Satisfaction	3.62 (.87)	3.57 (.72)	No sig diff
Life Satisfaction	3.64 (.75)	3.91 (..66)	No sig diff

Mean (standard deviation)

* Significant at the .10 level; ** significant at the .05 level; *** significant at the, 01 level

respondents did report having flexible but not permeable boundaries and vice versa. In fact, of our 65 respondents, we had at least five in each of the eight combinations of flexible, work permeable and home permeable boundary category. ANOVA was used to examine whether there are differences in the three types of work family conflict over the eight boundary combinations. As presented in Table 9, there are significant differences. An examination of the three dimensions of work-family conflict based upon combinations of flexibility and work and home permeability doesn't point to a clear winner but does highlight a losing combination. Individuals who have an inflexible boundary but maintain both permeable work and home boundaries reported experiencing significantly more time-based work-family conflict and strain based family→work conflict. There was also bad news for individuals who have an inflexible boundary but maintain a permeable home boundary and non-permeable work boundary. They reported experiencing significantly more time-based work-family conflict and strain based work→ home conflict. When the home boundary is permeable and work is allowed to intrude, this appears to cause conflict. Conversely, those respondents who have the most separation between their work and home roles by having no flexibility and neither permeable work nor home boundaries, reported the lowest amount of strain work → home and home → work conflict.

ANOVA was also used to examine whether there are differences in job satisfaction and life satisfaction over the eight boundary combinations. The results are presented in Table 10. Despite the significant differences in the studied variants of work-family conflict, there is not a significant difference in the job or life satisfaction based on the eight combinations of flexible and permeable boundaries. Given the amount of prior research that has found such a strong negative impact of work family conflict on satisfaction (Cloninger, Selvarajan, Singh and Huang, 2015; Frone, Russell & Cooper, 1992), this result was unexpected.

DISCUSSION

Like Kreiner, Hollensbe and Sheep (2009), the belief that the work-home boundary is a social construct that can be controlled and reshaped by the individual is the most appealing research question. Understanding boundary types and how their usage may contribute to the work and personal outcomes is the first step in helping employees consciously shape their boundaries to find the elusive work-life balance. While prior research has generally found flexibility to be positive but permeability to be negative, this research posits that flexibility, home boundary permeability and work boundary permeability are distinct

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 8. Summary of hypotheses

	Result
H1: Respondents who have a flexible boundary will use one integrated calendar.	Not supported
H2a: Respondents who have flexible boundaries will have less time based work-family conflict than those who have inflexible boundaries.	Not supported
H2b: Respondents who have flexible boundaries will have less strain based work→ family work-family conflict than those who have inflexible boundaries.	Not supported
H2c: Respondents who have flexible boundaries will have less strain based family→ work-family conflict than those who have inflexible boundaries.	Not supported
H2d: Respondents who have flexible boundaries will have higher job and life satisfaction than those who have inflexible boundaries.	Partially supported Support for job satisfaction but not life satisfaction
H3: Respondents who have permeable boundaries will use one, integrated cell phone and email account.	Not supported
H4a: Respondents who have a permeable work boundary will have less time based work-family conflict than those who have a non-permeable work.	Supported
H4b: Respondents who have a permeable work boundary will have more strain based family→ work conflict than those who have a non-permeable work.	Not supported
H4c: Respondents who have a permeable work boundary will have lower job and life satisfaction than those who have a non-permeable work.	Not supported
H5a: Respondents who have a permeable home boundary will have less time based work-family conflict than those who have a non-permeable work.	Not supported The opposite was found. Permeable home boundary report significantly higher time based WFC
H5b: Respondents who have a permeable home boundary will have more strain based work→ family conflict than those who have a non-permeable work.	Supported
H5c: Respondents who have a permeable home boundary will have lower job and life satisfaction than those who have a non-permeable work.	Not supported

constructs and should be examined as such. While few of our hypotheses were supported, this research does offer evidence that boundary flexibility and work/home permeability result in different experiences. Although flexibility did not seem to have an impact on the examined dimensions of work-family conflict or life satisfaction, the ability to have some control over when and where work is completed did result in higher job satisfaction.

The findings concerning boundary permeability were a bit surprising. As hypothesized, having a permeable work boundary was associated with less time based work-family conflict however having a permeable home boundary was associated with higher time based work-family. Addressing personal issues during work time allows individuals to balance their time demands however addressing work issues during personal time contributed to more time stress. Similarly, a permeable work boundary did not contribute to more strain based family→work conflict but a permeable home boundary did contribute to more strain based work→ conflict. It appears that the greater source of stress comes from permeability of the home boundary. It should be noted that we examined whether boundaries were permeable but did not measure the frequency or intensity of non-role interference. It is possible that personal interferences during work time, such as a call with a teacher, were less frequent or required less time than the type of work interferences during personal time. In addition to examining work and home boundary permeability as separate constructs, future research should examine the frequency and intensity of the intervening activity.

Although the sample was small, we were able to examine differences in the eight combinations of flexibility, work permeability and home permeability boundaries. Those respondents with inflexible and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Table 9. ANOVA results on work-family conflict differences based on flexible and permeable boundaries

	*** Time based Work-Family Conflict	** Strain Work → Home Conflict	** Strain Home → Work Conflict
Not Flexible Home – Not permeable Work – Not permeable (n=11)	2.33	2.20	1.79
Not Flexible Home – Not permeable Work – Permeable (n=12)	2.00	2.33	2.03
Not Flexible Home –Permeable Work - Not permeable (n=8)	2.98	3.33	2.13
Not Flexible Home – Permeable Work – Permeable (n=9)	3.13	2.78	2.75
Flexible Home – Not permeable Work – Permeable (n=5)	2.11	2.43	1.67
Flexible Home –Not permeable Work - Not permeable (n=8)	2.61	3.13	2.00
Flexible Home –Permeable Work - Not permeable (n=6)	2.83	3.03	1.91
Flexible, Home – Permeable Work – Permeable (n=6)	2.52	2.76	2.16

* Significant at the .10 level; ** significant at the .05 level; *** significant at the ,01 level
Lowest two are boxed and highest two are circled.

Table 10. ANOVA Results on Job and Life Satisfaction Based on Boundaries

	Job Satisfaction	Life Satisfaction
Not Flexible, Home – Not permeable Work – Not permeable (N=11)	3.92	3.88
Not Flexible, Home – Not permeable Work – Permeable (N=12)	3.67	4.11
Not Flexible, Home – Permeable Work - Not permeable (N=8)	3.58	3.50
Not Flexible, Home – Permeable Work – Permeable (N=9)	3.96	3.67
Flexible, Home – Not permeable Work – Permeable (N=5)	3.53	3.70
Flexible, Home –Not permeable Work - Not permeable (N=8)	3.42	3.65
Flexible, Home – Permeable Work - Not permeable (N=6)	3.17	3.33
Flexible, Home – Permeable Work – Permeable (N=6)	3.00	4.22

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

both permeable work and home boundaries reported experiencing the highest time and strain home→work conflict. Those respondents who resist the boundary breeching offered by mobile technology and have neither flexibility nor permeability in their home and work boundary reported some of the lowest strain-based work→family and family→work conflict.

While this research offers evidence that flexibility and work/home permeable boundaries result in different outcomes, the limited sample size negated more in-depth analysis regarding boundary configurations. Surprisingly, technology use in the form of number of cell phones, email accounts and calendars did not vary by flexible or permeable boundary. Future research should examine the actual technology usage and the technology fit of individuals with these boundary configurations. In addition to replicating this research with a larger sample, researchers may also want to incorporate the extent to which an individual's particular boundary fits their boundary preference. While an employee may prefer work-home segmentation, their job, supervisor or organizational culture may demand a level of integration, which may contribute to negative outcomes. Other researchers have addressed boundary fit (Adkins & Premeaux, 2014; Daniel & Sonnentag, 2016; Derks, Bakker, Peters & van Wingerden, 2016; Kreiner et al. 2009; Piszczek, 2017) but have not used the expanded boundary constructs suggested in this research. Future research should address boundary fit and the impact on work and personal outcomes.

This research suggests that future work on work-home boundaries should incorporate both the permeability of the home and work boundary as a separate construct from flexibility. Permeability can also be further refined. Integrating work and home can be in the form of multi-tasking (handling tasks simultaneously) or time fragmentation (switching between tasks) (Powell & Craig, 2015) and theses forms may contribute to different stress outcomes for different individuals.

While this study and the vast majority of the boundary research has focused on the individual, there are also organizational, legislative and regulatory dimensions to the work-home interface (Piszczek & Berg, 2014). While employees may have preferences for boundary controls, their role, organization, supervisor and/or customers may have different expectations. While practitioners have given flexibility attention, the organizational perspective on permeable boundaries has not been examined. Whether through policy, cultural norms or training, organizations have the potential to help individuals use technology in a way that helps them balance work and personal responsibilities.

Mobile technology has changed the way we work and live. By eliminating temporal and physical boundaries, it is up to employees to manage their own psychological boundaries. This exploratory research offers a new work-home boundary framework. Unlike prior research, we need to think of both flexibility and permeability in our boundaries and recognize that permeability may vary for work and home. Although there were limited differences in the demographics of professionals with different boundary types, there were significant differences in their work-family conflict. Understanding and consciously choosing to right boundary configuration is a critical area of inquiry in a mobile world. The eight configurations of flexibility and work/home permeability identified in this paper should help direct future research and our continuing quest for work-life balance.

REFERENCES

Ashford, B., Kreiner, G., & Fugate, M. (2000). All in a Day's Work: Boundaries and Micro Role Transitions. *Academy of Management Review*, *25*(3), 472–491.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Boswell, W. R., & Olson-Buchanan, J. B. (2007). The Use of Communication Technologies After Hours: The Role of Work Attitudes and Work-Life Conflict. *Journal of Management*, *33*(4), 592–610. doi:10.1177/0149206307302552

Bulger, C. A., Matthews, R. A., & Hoffman, M. E. (2007). Work and Personal Life Boundary Management: Boundary Strength, Work/Personal Life Balance, and the Segmentation-Integration Continuum. *Jounral of Occupational Health Pscyhology*, *12*(4), 365–375. doi:10.1037/1076-8998.12.4.365 PMID:17953495

Carlson, D. S., Grzywacz, J. G., & Kacmar, K. M. (2010). The Relationship of Schedule Flexibility and Outcomes via the Work-Family Interface. *Journal of Managerial Psychology*, *25*(4), 330–355. doi:10.1108/02683941011035278

Cloninger, P. A., Selvarajan, T. T., Singh, B., & Huang, S. (2015). The Mediating Influence of Work-Family Conflict and the Moderating Influence of Gender on Employee Outcomes. *International Journal of Human Resource Management*, *26*(8), 2269–2287. doi:10.1080/09585192.2015.1004101

Cousins, K., & Robey, D. (2015). Managing Work-Life Boundaries with Mobile Technologies. *Information Technology & People*, *28*(1), 34–71. doi:10.1108/ITP-08-2013-0155

Daniel, S., & Sonnetag, S. (2015). Crossing the Borders: The Relationship Between Boundary Management, Work-Family Enrichment and Job Satisfaction. *International Journal of Human Resource Management*, *27*(4), 407–426. doi:10.1080/09585192.2015.1020826

Den-Nagy, I. (2014). A Double Edged Sword? A Critical Evaluation of the Mobile Phone in Creating Work-Life Balance. *New Technology, Work and Employment*, *29*(2), 193–211. doi:10.1111/ntwe.12031

Derks, D., Bakker, A. B., Peters, P., & van Wingerden, P. (2016). Work-Related Smartphone Use, Work-Family Conflict and Family Role Performance: The Role of Segmentation Preference. *Human Relations*, *69*(5), 1045–1068. doi:10.1177/0018726715601890

Desrochers, S., Hilton, J. M., & Larwood, L. (2005). Preliminary Validation of the Work-Family Integration-Blurring Scale. *Journal of Family Issues*, *26*(4), 442–466. doi:10.1177/0192513X04272438

Diaz, I., Chiaburu, D. S., Zimmerman, R. D., & Boswell, W. R. (2012). Communication Technology: Pros and Cons of Constant Connections to Work. *Journal of Vocational Behavior*, *80*(2), 500–508. doi:10.1016/j.jvb.2011.08.007

Eagle, B. W., Icenogle, M. L., Maes, J. D., & Miles, E. W. (1998). The Importance of Employee Demographic Profiles for Understanding Experiences of Work-Family Interrole Conflicts. *The Journal of Social Psychology*, *138*(6), 690–709. doi:10.1080/00224549809603255 PMID:9872064

Friedman, S., & Greenhaus, J. (2000). *Work and Family - Allies or Enemies?: What Happens When Business Professionals Confront Life Choices*. Oxford University Press. doi:10.1093/acprof:oso/9780195112757.001.0001

Friedman, S., & Westring, A. (2015). Empowering Individuals to Integrate Work and Life: Insights for Management Development. *Journal of Management Development*, *34*(3), 299–315. doi:10.1108/JMD-11-2012-0144

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Frone, M. R., Russell, M., & Cooper, M. L. (1992). Antecedents and Outcomes of Work-Family Conflict: Testing a Model of the Work-Family Interface. *The Journal of Applied Psychology*, *77*(1), 65–78. doi:10.1037/0021-9010.77.1.65 PMID:1556042

Golden, A. G., & Geisler, C. (2007). Work-Life Boundary Management and the Personal Digital Assistant. *Human Relations*, *60*(3), 519–551. doi:10.1177/0018726707076698

Greenhaus, J., & Beutell, N. (1985). Sources of Conflict Between Work and Family Roles. *Academy of Management Review*, *10*(1), 76–89.

Greenhaus, J., & Powell, G. (1985). When Work and Family are Allies: A Theory of Work-Family Enrichments. *Academy of Management Review*, *31*(1), 72–92. doi:10.5465/AMR.2006.19379625

Hackman, J., & Oldham, G. (1975). Development of the Job Diagnostic Survey. *The Journal of Applied Psychology*, *60*(2), 159–170. doi:10.1037/h0076546

Hecht, T. D., & Allen, N. J. (2009). A Longitudinal Examination of the Work-Nonwork Boundary Strength Construct. *Journal of Organizational Behavior*, *30*(7), 839–862. doi:10.1002/job.579

Judge, T., Boudreau, J., & Bretz, R. (1994). Job and Life Attitudes of Male Executives. *The Journal of Applied Psychology*, *79*(5), 767–782. doi:10.1037/0021-9010.79.5.767 PMID:7989277

Kasper, H., Meyer, M., & Schmidt, A. (2005). Mangers Dealing with Work-Family Conflict: An Exploratory Analysis. *Journal of Managerial Psychology*, *20*(5), 440–461. doi:10.1108/02683940510602978

Kattenbach, R., Demerouti, E., & Nachreiner, F. (2010). Flexible Working Times: Effects on Employees' Exhaustion, Work-Nonwork Conflict and Job Performance. *Career Development International*, *15*(3), 279–295. doi:10.1108/13620431011053749

Koay, K., Soh, P., & Chew, K. (2017). Do Employees' Private Demands Lead to Cyberloafing? The Mediating Role of Job Stress. *Management Research Review*, *40*(9), 1025–1038. doi:10.1108/MRR-11-2016-0252

Kopelman, R., Greenhaus, J., & Connoly, T. (1983). A Model of Work, Family and Interrole Conflict: A Construct Validation Study. *Organizational Behavior and Human Performance*, *32*(2), 198–215. doi:10.1016/0030-5073(83)90147-2

Kossek, E. E., Ruderman, M. N., Braddy, P. W., & Hannum, K. M. (2012). Work-Nonwork Boundary Management Profiles: A Person-Centered Approach. *Journal of Vocational Behavior*, *81*(1), 112–128. doi:10.1016/j.jvb.2012.04.003

Kreiner, G., Hollensbe, E., & Shee, M. (2009). Balancing Borders and Bridges: Negotiating the Work-Home Interface via Boundary Work Tactics. *Academy of Management Journal*, *52*(4), 704–730. doi:10.5465/AMJ.2009.43669916

McCloskey, D. (2016). Finding Work-Life Balance in a Digital Age: An Exploratory Study of Boundary Flexibility and Permeability. *Information Resources Management Journal*, *29*(3), 53–70. doi:10.4018/IRMJ.2016070104

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Methot, J. R., & LePine, J. A. (2016). Too Close for Comfort? Investigating the Nature and Functioning of Work and Non-Work Role Segmentation Preferences. *Journal of Business and Psychology*, *31*(1), 103–123. doi:10.100710869-015-9402-0

Netemeyer, R. G., Boles, J. S., & McMurrian, R. (1995). Development and Validation of Work-Family Conflict and Family-Work Conflict Scales. *The Journal of Applied Psychology*, *81*(4), 400–410. doi:10.1037/0021-9010.81.4.400

Olson-Buchanan, J. B., & Boswell, W. R. (2006). Blurring Boundaries: Correlates of Integration and Segmentation Between Work and Nonwork. *Journal of Vocational Behavior*, *68*(3), 432–445. doi:10.1016/j.jvb.2005.10.006

Piszczek, M. (2017). Boundary Control and Controlled Boundaries: Organizational Expectations for Technology Use at the Work-Family Interface. *Journal of Organizational Behavior*, *38*(4), 592–611. doi:10.1002/job.2153

Piszczek, M., & Berg, P. (2014). Expanding the Boundaries of Boundary Theory: Regulative Institutions and Work-Family Role Management. *Human Relations*, *67*(12), 1491–1512. doi:10.1177/0018726714524241

Porter, S., & Ayman, R. (2010). Work Flexibility as a Mediator of the Relationship Between Work-Family Conflict and Intention to Quit. *Journal of Management & Organization*, *16*(3), 411–424.

Powell, A., & Craig, L. (2015). Gender Differences in Working at Home and Time Use Patterns: Evidence from Australia. *Work, Employment and Society*, *29*(4), 571–589. doi:10.1177/0950017014568140

Tremblay, D.-G., & Genin, E. (2008). Permeability between Work and Non-Work: The Case of Self-Employed IT Workers. *Canadian Journal of Communication*, *33*(4), 701–720. doi:10.22230/cjc.2008v33n4a1994

Zheng, C., Molineux, J., Mirshekary, S., & Scarparo, S. (2015). Developing Individual and Organisational Work-Life Balance Strategies to Improve Employee Health and Wellbeing. *Employee Relations*, *37*(3), 354–379. doi:10.1108/ER-10-2013-0142

This research was previously published in Innovative Applications of Knowledge Discovery and Information Resources Management; pages 1-28, copyright year 2018 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 98
Future of Education in Industry 4.0:
Educational Digitization – A Canadian Case Study

Rania Mohy El Din Nafea
Seneca College, Canada

Esra Kilicarslan Toplu
Seneca College, Canada

ABSTRACT

With the developments in technology and innovation, the manufacturing, workforce, training, and educational systems were affected. Facing the fourth industrial revolution, academics are researching the possible changes that might arise in education and skills of the future workforce. As the workplace develops, new competencies will surface. With this context in mind, the authors initiated this research. A detailed questionnaire was prepared as a pilot study to comprehend students' views on the use of technology in classrooms and its impact on their learning experience and engagement. Knowledge of their views allowed the authors to draw inferences as to the skills and competencies of future students and whether they would match Industry 4.0. Furthermore, a gap analysis was conducted, whereby the existing situation at a Canadian higher educational institution was compared to the desired situation, and recommendations were put forward.

INTRODUCTION

Industrial revolutions were affected by the developments in technology and innovation. The 1st revolution was caused by mechanization, the 2nd was caused by the usage of electrical energy, and the 3rd industrial revolution was caused by electronics and automation (Benešová and Tupa, 2017, p.2195-2196). With these industrial revolutions not only were manufacturing systems affected, but also the workforce, training & educational systems.

DOI: 10.4018/978-1-7998-7297-9.ch098

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Currently, industry is transforming to a fully digitized manufacturing system, and we are facing the 4th industrial revolution, Industry 4.0. With this new industrial revolution, the workforce and the training & educational systems will be impacted. This led academics to research the possible changes that might arise in the education and skills of the future workforce. Future workforce who are today's students will encounter a more globalized, automated, virtualized and networked world (Motyl et al., 2017, p.1502). As the workplace changes rapidly, new competencies will surface, rendering them essential skills for student competitiveness and employability in the near future. With this context in mind, the authors decided to initiate this study, whereby those new competencies and skills will be researched, and recommendations given as to the required changes in the higher educational system.

INDUSTRY 4.0

Developments in both technology and innovation are the main factors affecting industrial revolutions, and these revolutions have brought about significant changes in our way of working and living. Throughout history there have been three industrial revolutions and we are currently undergoing a transformation towards the fourth industrial revolution.

Industry 1.0 exchanged the human power with the power of steam. When James Watt introduced the steam engine in the 18th century, with the mechanization, production and the transportation systems transformed. Consequently, there was an important increase in productivity.

Industry 2.0 was caused by the electrical energy and the mass production about a hundred years later. When Henry Ford introduced the assembly line, with the mass production and the usage of electrical energy, there was a significant decrease in costs and a further increase in productivity.

Industry 3.0 was in the 1960s and came with the introduction and usage of computers, which introduced the world to a faster and more capable form of processing capability. This marked the beginning of the information technology era for industry.

Industry 4.0 refers to the next developmental stage in the manufacturing industry, and was first introduced by the initiative made by academics, industrials and the German Government. Its aim is 'to strengthen the competitiveness of manufacturing industry in the country by computerization' (Baena et al., 2017, p.74).

With this high-tech strategy, which converges the industrial production and information and communication technology (ICT), industry is going through a transformation to full digitization and intelligent production. In this concept, the Internet of Things (IoT), the 'Industrial Internet', 'Cloud-based Manufacturing' and 'Smart Manufacturing' are stated as the drivers of Industry 4.0 (Erol et al., 2016, p.13).

Hermann et al. (2016) defined Industry 4.0 as: "Industry 4.0 is a collective term for technologies and concepts of value chain organization."He further explains that; within the smart factories of Industry 4.0, cyber physical systems (CPS)will monitor the processes, and make decisions while communicating and cooperating with other cyber physical systems and humans in real time. In addition, with the Internet of Services (IoS), both internal and cross organizational services will be utilized by participants of the value chain (Rossit et al., 2018, p.1).

Similarly, Gilchrist stated that "businesses will build global networks to connect their machinery, factories, and warehousing facilities as cyber-physical systems, which will connect and control each other intelligently by sharing information that triggers actions" (Gilchrist, 2016, p.195). These cyber-physical systems will then generate the enhancements in the manufacturing processes as a whole, through engi-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

neering, material usage, supply chains and product lifecycle management which is called the horizontal chain. According to Gilchrist; "the vision held is; embedded horizontal systems are integrated with the vertical business processes, (sales, logistics, and finance, among others) and associated IT systems" (Gilchrist, 2016, p.196). As such, Industry 4.0 will not only change the manufacturing processes, but also the entire value chain, including the suppliers, the manufacturers, and the associated workforce.

Erol et al. (2016) advises that to identify their actions or projects in order to adapt to the changing environment, companies need to know where they are, identify their current situation with regard to Industry 4.0, but companies usually face problems in determining their state. Based on different research sources, there are some models and roadmaps that have been suggested. Schumacher et al, (2016) discussed the German Government's model for assessing Industry 4.0. There are nine dimensions which include; strategy, leadership, customers, products, operations, culture, people, governance and technology. Additionally, as Tortorella and Fettermann (2018) quoted from Chukwuekwe et al. (2016), the vital drivers of Industry 4.0 are suggested as; cloud computing, 3D printing technology, CPS, Internet of Things (IoT), Internet of Services (IoS) and big data. To move forward with Industry 4.0, companies should comprehend what these concepts mean to their business and how they might lead to a total transformation through a step-by-step analytical approach.

Now, there is worldwide effort and progress to improve the efficiency and productivity in manufacturing processes by integrating the latest developments in information and communication technology (ICT). Initiatives to link the ICT in the industrial manufacturing systems are being carried out in some of the most advanced economies (Baena et al., 2017, p.75). Despite all of Industry 4.0's promise, a highly skilled workforce has been the key factor to countries' and companies' success for decades, whereby significant challenges are being faced in hiring and retaining the necessary skilled workforce. Organizations understand that the changes that are associated with Industry 4.0 also alter the competency requirements of the highly skilled workforce. Many government institutions have started to evaluate the impact of adopting the aforementioned technologies on their countries. The result is a concern for the many challenges and changes in the future training needs and education of the workforce.

SKILLS NEEDED IN INDUSTRY 4.0

When talking about the 4th industrial revolution, it is said that factories are becoming more intelligent and flexible, and different sub-systems will be linked to each other (Wermann et al., 2015, p.1). Machines will be connected to the factory IT systems, which will in turn be linked to other parts of the value chain such as plants, fleets, networks and human beings, and will continually share information about the level of stocks, troubles, difficulties or faults encountered, and/or modifications in the orders. This means there will be full traceability which will bring about the possibility of improving the overall product and service quality (Deloitte, p.8).

Based on the changes in the manufacturing processes, various jobs will disappear and many new jobs will emerge. Industry will face the extinction of physically demanding positions as these jobs will be replaced by machines (Benešová and Tupa, 2017, p.2200-2201).Erol et al. stated that future employees will focus on creative, innovative and communicative activities rather than routine activities, as routine activities including monitoring duties, will all be performed by machines (Erol et al., 2016, p.14). Consequently, the key factor in the success of these intelligent factories will be the skills and the qualifications of their workforce.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Hecklau et all. categorized the competencies in Industry 4.0 into four main groups; (i) technical competencies (state-of-the-art knowledge, technical skills, process understanding, media skills, coding skills, understanding IT security), (ii) methodological competencies (creativity, entrepreneurial thinking, problem solving, conflict solution, decision making, analytical skills, research skills, efficiency orientation), (iii) social competencies(intercultural skills, language skills, communication skills, networking skills, teamwork skills, negotiation skills, ability to transfer knowledge, leadership skills) and (iv) personal competencies (flexibility, ambiguity tolerance, motivation to learn, ability to work under pressure, sustainable mindset, compliance) (Hecklau et al.,2016, p.4).

Motyl et al. categorized the skills of engineers into two categories; (i) hard skills (including numerical and higher mathematical knowledge; problem solution skills, creativity and design skills; researching and experimenting skills, information processing, computer programming, and know-how of using specific software, awareness of industry standards, and comfortable with using computers) and (ii) soft skills (strong analytical thinking, communication, teamwork and leadership skills)(Motyl et al., 2017).

According to Erpenbeck and Rosenstiel, Erol et al. categorized the workforce competencies for the future production systems like; (i) personal competencies (solution-oriented attitude; creativity, out-of-the-box thinking), (ii) social/interpersonal competencies (teamwork skills; negotiation skills, role taking and making skills), (iii) action-related competencies (problem analysis and solving; data analysis and interpretation; method, tool selection and use) and (iv) domain-related competencies (application of lean thinking and methods in manufacturing; application of conceptual modeling methods, e.g. data flow, material flow and process modeling; application of Information and Communication Technology for material tracking and worker tracking) (Erol et al., 2016, p.14-17).

In the World Economic Forum (WEF) "The Future of Jobs" report, ten key skills which will be in demand by future companies were listed. The qualifications were not classified but most of them are soft skills, the skills listed are: complex problem-solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgement and decision-making, service orientation, negotiation and cognitive flexibility(WEF, 2017).

Moreover, as technological developments are evolving at a very high-speed, it is certain that digital literacy will be the key skill that everyone should consider as an asset in the era of Industry 4.0. As a matter of fact, in addition to all these skills and qualifications listed, many researchers have stated that digital literacy will be an essential and primary skill for the future workforce (Motyl et al., 2017, p.1502-1503).

Digital literacy consists of all the skills that are related to the digital world. After a review of existing literature, Do & Huynh (2017) described digital literacy as "capabilities ranging from technical skills (such as those used in coding), to digital citizenship, to the ability to identify fake news". Cain & Waller (2018) also suggested that future workforce must have 'digital dexterity' which is defined as 'the ability and desire to use existing and emerging technologies for better business outcomes'. While the digital literacy and digital dexterity demanded from the workforce will certainly differ across the sectors and the professions, as people have been the heart of all digital business transformations, only the most digitally dexterous will thrive.

Rapid digitization has made digital literacy essential for today's and tomorrow's workforce. This means that both current workers whose jobs will be automated and may become obsolete, and also today's students who will be the future workforce will be affected. Many new jobs will be generated and many will adjust to include a greater degree of interaction with digital technologies. It is anticipated that a basic level of digital literacy will be necessary for the majority of the workforce, and demand for advanced level of digital literacy will rise (Huynh & Do, 2017, p.9).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In a time of precipitous change due to heightened technological developments, Huynh and Do further explain that, digital literacy can be recognized as an economic necessity (Huynh & Do, 2017, p.9). Developments in technology are leading industries to redesign their operations, their markets, their products, and their way of doing business, and even for low-level jobs, a basic level of digital literacy will be expected.

There is an increasing reliance on digital technologies across a wide range of industries, which will result in a broad range of career paths for the qualified workforce equipped with technical and digital skills.

According to all the researches and studies, it is definite that Industry 4.0 is more than the technology it is bringing. As workforce is a critical element in digital transformation, the skills and qualifications of the human capital will become increasingly eminent. Today's students, which will be the future workforce and the human capital for companies, will be working in a more globalized, automated, virtualized and networked world (Motyl et al., 2017, p.1502), and their digital literacy and dexterity will be the main mechanism that will empower organizations to utilize these critical digital developments.

As stated above, because the key factor will be the skills and the qualifications of the workforce, organizations will compete to hire the best and strive to find the right people with well-suited skills. The demand for these skills and qualifications will undeniably be higher when compared to the present. This will result in the need for changing and adapting the existing curricula and the tools used in the existing educational system to create a new format (Benešová & Tupa, 2017, p.2196) or blueprint, which will equip students with the essential employability skills required to remain competitive in industry 4.0.

FUTURE OF EDUCATION

Education is regarded as an essential prerequisite and a foundation to reforms in any country (Nafea & Kilicarslan Toplu, 2018, p.156). Education evolves in response to changes in both society and industry, providing the valuable human capital that organizations need to thrive in the future. As such, upgrading and modernising educational systems through revisiting the essential employability skills is imperative. Interestingly enough, this upgrade is long overdue and has been called for since the late 90s when researchers realized that school systems, public and private, are lagging behind the transformation in learning that is evolving outside them (Ives & Jarvenpaa, 1996, p.33).

Analyses and predictions about the future of work mostly put forward the impact of automation and new types of jobs, and not just routine jobs, both blue-collar and white-collar jobs will be affected and redesigned by an automated workplace. Apparently, today's students should be prepared for the careers that do not exist yet. This means that with new challenges arising in a changing environment, there will be proliferating demand for new skills and qualifications (Enke et al., 2018, p.272). As Erol et al. stated in the last decade, lean management was the most prominent subject that was taught, however, for the future prospective digitalized and intelligent production systems' focus should be on the demanded skills and qualifications (Erol et al., 2016, p.13). In order to meet the qualifications and skills of Industry 4.0, educational systems need to evolve, and consider several promising trends like Elbestawi et al. listed: "opportunities to learn at diverse times and places; personalized learning based on student's capabilities; use of new learning devices, tools and resources; remote engineering labs; implementation of project-based and problem-based learning approaches; use of experiential and collaborative learning; student involvement in curriculum design; and increased mentoring approaches" (Elbestawi et al., 2018, p.252).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

With the new improvements and developments in technology and the expected changes in the workplace, there is also a shift toward more practical and skills-based education. Many higher education institutions try to prepare their students for the change through emphasizing the ability to use theoretical knowledge in practice by bringing real-world experience into the higher education experience and by providing access to the tools, environments and work methods that students will use when they graduate and start working (Morgan & Thayer, 2018). Yet the question remains, is this theoretical knowledge sufficient to induce the required change and instil the needed skills?

When Industry 4.0 is taken into consideration, future engineers need to enhance their professional, social, methodical and personal competencies. According to Simons et al. "they need an interdisciplinary understanding of systems, production processes, automation technology, information technology, ergonomic principles and business processes" (Simons et al., 2017, p.83). While future engineers will have a broad view and comprehensive knowledge about complex production systems, they also need to develop the skills needed for cooperation and communication in interdisciplinary groups. Although there are different approaches like seminars, business games and case studies where students meet the managers to solve existing problems, learning factories have been advised by many researchers (Enke et al., 2018, p.267-268; Chryssolouris, 2016, p.46-47; Mavrikios et al., 2013, p.475-478; Schallock et al., 2018; p.28).

Learning factories can be accepted as forms of real factories which are used for education and training purposes. When the possibilities of practical application of manufacturing principles are evaluated, learning factories have been a vital facility for educating students and professionals. As Baena et al. (Baena et al., 2017, p.74) quoted, learning factories are highly complex learning environments, which allow the advancement of competences (Tisch et.al, 2015), that are linked to training, education and research in favour of Industry 4.0 (Abele et al., 2015).

The aim of learning factories has been stated as modernizing the learning process and bringing it closer to industrial practices. They are an important way to practice technical knowledge and have been used for educational purposes, training and research. They allow learning of the fundamentals of industry 4.0 such as cyber-physical systems, smart factories, robotics, artificial intelligence, and internet of things (IoT) (Elbestawi et al., 2018, p.250). As technological developments speed up, learning factories are being used at a more rapid rate by higher educational institutions that are constantly struggling to find new ways of connecting theoretical knowledge to practical implications by using real cases and onsite technology (Mourtzis et al., 2018, p.130).

As an example; the learning factory at the W. Booth School of Engineering Practice and Technology at McMaster University in Canada provides students, industry employees, and researchers; an experiential learning laboratory that allows and empowers its users to understand, learn and apply modern manufacturing approaches such as Industry 4.0, IoT, and additive manufacturing (Elbestawi et al., 2018, p.254).

Education and training the workforce for industry 4.0 is something that has to be addressed across all levels of education. As technology is rapidly shifting the way industries and companies interact and function, higher education institutions should also alter the way they train and teach students in preparation for the future. Instead of focusing on theory, educational practices should emphasize application and experiential learning. The competences required to succeed in industry 4.0 should become part of vocational education. Also, it can be expected that degree apprenticeships and co-op programs with internships will become more and more attractive in the future. Higher education institutions at large are urged to respond much more quickly to the pressing need of preparing tomorrow's workforce (WEF-2017, p.8-9).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Having said that, according to recent studies, although there are many skills that have been put forward by many researchers, the most vital and primary skill seems to be digital skills. Future workforce must be highly proficient in digital literacy skills in order to understand, manage and work in the system. The future workplace will require extensive and continual encountering with technology. With this in mind, technology should be embedded throughout the educational experience. Besides the basic digital literacy skills, educational institutions should aim to go the extra mile and coach students on how to apply and innovate using technology so they can play an active role in shaping the tools of the future (WEF-2017, p.8-9).

Preparing the future workforce for the digital world with advanced knowledge and requisite skills must be the future plan for all educational institutions across the world. Canada's continued economic growth will also require a digitally literate workforce for both technical and non-technical jobs. That's why the Information and Communications Technology Council (ICTC) defined five key technologies which will steer change in the Canadian economy: (i) virtual and augmented reality, (ii) fifth-generation mobile technology, (iii) 3D printing, (iv) blockchain, and (v) AI. Citing from ICTC 2017, Walker et al. (2018) stated that many of these mentioned, recent technologies are well on their way to transforming industries like transportation, financial services, manufacturing, retail, robotics and e-commerce etc. (Walker et al., 2018, p.5154).

Technological advancements are leading industries to change their operations, their markets, their products, and their ways of doing business. In order to adapt Canadian graduates to work effectively across these industries, equipping them with a range of digital skills is critical.

RELATIONSHIP OF TECHNOLOGY TO WORKPLACE READINESS

Literature suggests that there is a strong relationship between technology and workplace readiness. Several countries have realized this connection and have been preparing their students accordingly for the past decade now. In a research based in the USA by Piliouras et al., the authors wrote about their experiences that they learned by using and teaching technology at the Academy of Information Technology (AITE) High School. AITE is a public high school that offers its students a technology-rich learning environment. The researchers refer to a large-scale survey of employers conducted by the US. Department of Labour in 1989 to find the most important workplace skills and competencies. They identified three skill types and five attributes as essential competencies. These attributes included technology proficiency, which they defined as "the ability to use a variety of technologies to solve problems, and to select, use, troubleshoot and maintain technology related software, hardware and systems". Using these results, the authors expanded their research model to include Information Literacy, Media Literacy and Information and Communication Technology (ICT) literacy. Based on the directives released by the US Secretary of Education in 2010, the report identified five goals that need to be addressed at a national level to recreate the education system. One of those cornerstones was "infrastructure: access and enable, which states that all students and educators must have access to a comprehensive infrastructure for learning when and where they need it" (Piliouras et al., 2014).

The article (Piliouras et al., 2014), goes on to provide empirical evidence on the use of technology as a learning tool in a high school in Stanford, Connecticut that serves around 650 students. The school provides a dynamic preparative environment that incorporates 21st century learning expectations based on the National Education Technology Plan (NETP) of the USA. The research documents teacher's and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

students' experiences with the use of technology throughout high school and concludes with a series of 'key lessons' including that technology is essential because it helps students access information in a faster and quicker way, making them more efficient and effective. It can also aid students in choosing future careers and envisioning possibilities in technology-related disciplines. It can "significantly improve communications between teachers and students." Finally, they concluded that "when directed towards a common goal, technology experiences can help students develop soft skills – such as helping others, teamwork, collaboration, and group research. Peers can teach each other difficult subject matters using strategic learning [and] schools can encourage learning after-hours by supporting technology clubs and activities that develop technology and work readiness skills".

The research also stresses the importance of having a learning management system (LMS) from an early age and its role in facilitating the on-going assessment of learning outcomes. More importantly, LMS provides a virtual learning environment that makes it easier to reach a larger and more diverse audience, thereby creating a respectful online culture, which allows students to express themselves freely and without judgement. This has several advantages when compared with the traditional, physical setting, where students are more conscious of their surroundings and each other's behaviors, which may present a distraction to their learning process. Although the paper supports the use of technology in education and provides evidence that this model is followed by other high schools in the US as steps are being taken to achieve the National Education Technology Plan, it fails to outline how technology is used by students with certain disabilities and if measures are being taken for their accommodation.

In Germany, the situation is slightly different. A research conducted in the University of Oldenburg to gain an understanding of the situation in Higher Education institutions is presented. Bond et al. (2018), have examined student's (n=200) and teacher's (n=381) perceptions on the use of digital tools, in light of the importance of digitization recognized by German policy makers. Bond et al., state that nearly all (99.4%) of German school students have a computer at home. On average weekdays, students spend 114 minutes using technology at home, but they only spend 14 minutes using technology at school per day, which is lower than the OECD average. The authors provide evidence that the German government seems committed to the digitization of the Higher Education sector through their allocation of a hefty budget and commitment to a national digital agenda from 2014 to 2017. Authors also inform that digitization is accepted as a way to facilitate knowledge sharing and innovation in science by the federal government. In addition, the federal government also expects its citizens to be digitally literate to fully participate in education and society (Bond et al., 2018).

The university being researched was established in 1973 and houses over 15,600 students and more than 1,900 faculty. University top management believe in an institution-wide implementation of digitization to enhance on campus learning. The researchers used two separate surveys addressing the same issues to collect data from both students and teachers. Similar to our research, the results were descriptive in nature and were not compared statistically. The teacher research was conducted over 6 different faculties / colleges using a Likert scale similar to ours. Results showed that the use of learning management systems and related discussion forums was the predominant form (80%) of technology used on campus. Other tools, including, collaborative reference management software (61%), video-conferencing tools (52%) and institutional cloud storage (62%) were moderately used. On the other hand, student perception showed a different truth… Use of computers off campus and Stud.IP on a daily basis accounted for 84% of students. Yet, other tools, such as instant messaging and lecture recording were found to be used rather irregularly. According to the authors this shows that; tools like virtual seminars, online exams and professional networks are not used frequently. They also state that; with the data collected, it is not

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

possible to say why these tools are not being used. It may be because of not wanting or not being able to use the tools (Bond et al., 2018). Findings show that the use of technology is centered around the use of 'logistics in university study' rather than content creation or collaboration activities. Students were found to be ill-prepared for working in collaborative environments.

This aligns with findings from another study by Margaryan et al. (2011), which focused around the use of educational technology by university teachers in the UK. The results reveal three main issues: "a lack of digital skills, systematic problems, and a reluctance to change". Accordingly, recommendations in both researches seem to be similar… Ongoing professional development sessions must be made available to faculty to learn and experiment with the applications and benefits of new technology. Forums should be held where faculty members can discuss their experiences with new tools, learning lessons and tricks. This will encourage knowledge transfer between faculty members and create a network of shared experiences and best practices. This can also be done through the creation of forums where constant, on-going, unfacilitated discussions can take place. Finally, educational institutions need to provide incentives for the use of technology tools in classrooms to create a more advanced and digitized learning experience for students. Finally, top management support is imperative for these initiatives to succeed. Digitization needs to be part of the strategic outlook of colleges and universities. It needs to be transformed into the core competency of higher educational institutions.

RESEARCH ANALYSIS AND FINDINGS

With the afore-mentioned literature in mind, it was obvious that the external stakeholders of educational institutions including industry partners and suppliers are demanding a more digital and competent workforce. As such, it was imperative that the authors understand and gauge the viewpoints of the internal stakeholders of the educational process – namely students. Accordingly, a detailed questionnaire was prepared as a pilot study to comprehend students' views on the use of technology in classrooms and its impact on their learning experience and engagement. Knowledge of their views can allow the authors to draw inferences as to the skills and competencies of future students and whether they would match industry 4.0. Furthermore, a gap analysis between the employability skills and the current situation can be conducted, whereby the existing situation at Canadian educational institutions can be compared to the desired situation and recommendations can be put forward.

Parts of the questionnaire used were extracted from the 'Technology Implementation Questionnaire'. This questionnaire is part of a project conducted by the Centre for the Study of Learning and Performance (CSLP) at Concordia University in Montreal, Quebec in collaboration with the Eastern Townships School Board and the Sir Wilfred Laurier School Board. Studying classroom processes in cooperation with the teachers, the students and the administrators, is one of the goals of the CSLP.

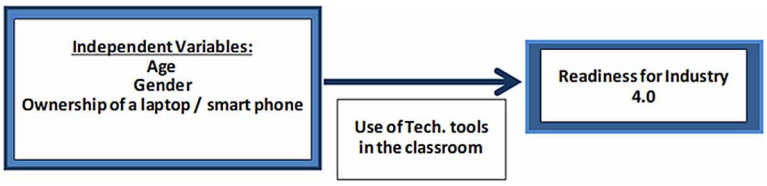
The questionnaire compiled by the researchers was distributed to 112 students in a higher educational institution in Toronto, all pursuing a 4-year bachelor program in the area of International Business or Commerce. The sampling method used was a convenient sample since the population sampled was accessible by the authors given their profession as university / college professors in Toronto, Canada. Nevertheless, there was minimal interference by the researchers in the data collection phase. A detailed information letter, and consent form were prepared for student review and approval. Participants were made aware that participation was on an anonymous and voluntary basis. The questionnaires were linked

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

with an alpha-numeric code to a master list safekept with one of the primary researchers. All data was transformed into digital format and hard copies have been destroyed for security and anonymity reasons.

The questionnaire was divided into two parts. The first part was designed to collect some primary information about the respondents including their age and gender, followed by four questions designed to gauge the respondent's familiarity with the use of different types of computer and information technology hardware and software as well as some terms associated with technology. Since this is a pilot study that might be redefined in the future based on the results of the current questionnaire, the authors have decided to use 'Readiness for Industry 4.0'as the only dependent variable to be studied with the use of technology tools in the classroom as the moderating variable and three main independent variables as shown in Figure 1.

Figure 1.



The age of the respondents ranged between 20 – 40, with 67% (75 students) of the participants within the age of 20 – 30 years and 33% (37 students) between 30 – 40. The gender distribution of the convenient sample was 72% women (80 students) and 28% males (32 students), which may be an indicator that females are more proactive and seize the opportunity to get their voices heard. More inferences will be made between gender and age and the moderating and dependent variables mentioned above as the questions are analyzed in detail. The first question asked students to indicate which of the given devices (desktop or laptop; smart phone; tablet; e-book reader; MP3 player; video game console; other) they owned. It was important to understand the level of technology students and millennials deal with on a daily basis and are exposed to. This will give us an indication as to their comfort level with technology.*90% of participants (100 students) indicated they owned a desktop / laptop, 100% of students own a smart phone, 36% (40 students) own tablets, only 9% (10 students) indicated that they owned readers and finally 24% (27 students) indicated their ownership of a video console game of some sort. It is worth noting that all 27 students were males!* No female participants indicated ownership of a video console.

Following this knowledge, participants were asked which activities they perform regularly by checking all that apply. Activities were listed as: Sending an e-mail; Using Office applications (Word, Excel, PowerPoint, …); Reading and downloading documents from the web; Doing web/ internet research; Managing a website, wiki or blog; Using collaborative and sharing application like Google drive, Dropbox, Skype; Using social networks (Facebook, Twitter,…); Other (please specify one or more activities).

According to a report issued by Contact North in November 2015, understanding the current and future dynamics of the higher education system is important, especially for those leading the system or developing the policies which guide it. The report discusses seven trends and patterns which will impact the future for colleges and universities by 2030. The report discusses changes in Canadian higher education in the context of changing global education trends as student recruitment and retention pat-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

terns change and become more competitive. According to David Agnew, current President of Seneca College, and Chair of Colleges Ontario, one of the factors impacting the shift in higher education is the enhanced implementation of technological developments. In his speech, he identified that in the past "the barrier to accelerated adoption of such technologies was the willingness of faculty members and instructors to utilize them", while now there is a competitive necessity that students are exposed to such forms of technology for their survival as well as the institution's. *All 112 students indicated that they regularly perform all of the above activities except managing a WIKI, Blog or Website, where only 22% (25 students) indicated they engage in this activity.*

Since we are focusing on industry 4.0, the researchers added a few more questions to discern the importance of technology for participants. As such, questions 3 and 4 addressed the level of importance participants attribute to interaction with their teachers, even during class, using personal digital devices. *90% of students felt it was very important, while the remaining 10% chose important*. The final question pertaining to section 1 included a list of 15 "digital innovations", where students had to identify, using a five-point Likert scale (Yes, often; Sometimes yes; Seldom; Very Rarely; Never), if they had ever heard about these terms before. The terms asked were: Virtual Realty; Augmented Reality; Mixed Reality; Rapid Prototyping; 3D Printing; FABLAB; Industry 4.0; Smart factories; Artificial Intelligence; Internet of Things; Industrial Internet; Cloud-based Manufacturing; Augmented Reality; Cyber-physical Systems (CPS); Big Data and Analytics.

These innovations are in line with President Agnew's speech, where he stated that technology will continue to evolve in such a way to make learning more personal, affordable, effective and accessible. In the future, institutions will respond by more rapid adoption in line with student behaviour. *It is important to note that all students stated that they had heard of 8 of the above terms 'often'*. This is imperative when one examines Ontario employability skills #6 and #7, to locate, select, organize and document information using appropriate technology and information systems; to analyze, evaluate, and apply relevant information from a variety of sources respectively. For students to be competitive in a dynamic world, their education needs to provide a solid foundation for them to discover, learn and grow.

The aim of the above question was to ensure students were current and had heard of some / majority of the above terms in school, whether it was through class lectures and discussion or perhaps assigned class readings. *It is worth mentioning that the 2 terms that were marked as 'very rarely' or 'never' heard by everyone were FABLAB and Cyber-physical systems*. Perhaps this was due to the technical nature of the terms and the fact that they were more related to the engineering / manufacturing disciplines as opposed to the business field. In a paper titled "Effective communication in higher education", the author discusses some of the problems faced in communicating with the millennial generation. Howard states that since the millennial generation is entering the workforce, this specific group will be looked upon as a possible reason communication in higher education is lacking at the moment (2014, p.3). Howard explains that students have grown accustomed to dealing with technology and a virtual world that they may lack the proper etiquette when communicating with others in an organizational setting. She postulates that this may lead to organizational culture issues in the future and may also be the reason why communication in higher education institutions is not where it should be today.

The latter reason is an interesting observation. From personal experience, educators feel that millennials have a false sense of 'entitlement'. Although their education style is different and more advanced compared to 20 years ago, technology has facilitated the education process and made information available 'on demand'. Accordingly, most students do not dedicate enough effort and commitment to their educational experience and simply 'cruise by'. This is why the researchers included questions 5-32 to

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

investigate the use of technology in classrooms and draw some conclusions about its impact on the educational process and its readiness for education 4.0 through a gap analysis.

The questions were divided into three distinct sets, and a five-point Likert scale (strongly agree, slightly agree, neutral, slightly disagree, strongly disagree) is used. The first set pertains to student opinions regarding the effectiveness of computer technology as a tool in the classroom including its impact on factors such as academic achievement, collaboration, communication, instruction and value. These factors should be compared to the Essential Employability Skills (EES) dictated by the Ministry of Higher Education and Skills Development as skills that should be reliably demonstrated by the end of a student's program that are essential for success in the workplace, everyday living, and for lifelong-learning. The employability skills have been divided into six main skill categories; namely communication, numeracy, critical thinking and problem solving, information management, interpersonal and personal.

We can see from below, that the first set of questions relates to communication (questions 4, 5 & 6), critical thinking and problem solving (questions 1, 2 &3), information management (questions 2 & 7), personal (question 8), interpersonal (question 4). Questions are:

The use of technology in the classroom…

1. Increases academic achievement (e.g. grades).
2. Results in students neglecting important traditional learning resources (e.g., library books).
3. Is effective because I believe I can implement it successfully.
4. Promotes student collaboration.
5. Makes classroom management more difficult.
6. Promotes the development of communication skills (e.g., writing and presentation skills).
7. Is a valuable instructional tool.
8. Is too costly in terms of resources, time and effort.

Interestingly enough, the results for all of the above questions, except for 2 and 8 *show that 70% (79 students) of participants agree with the above statements while only 30% (33 students) slightly agree*. These results are in line with the generational differences chart (http://www.wmfc.org/uploads/GenerationalDifferencesChart.pdf), which outlines millennials as a technologically savvy generation who are individualistic yet simultaneously group oriented. The above results show that participants value academic achievement in addition to collaboration and peer interaction. The chart also characterizes millennials, otherwise named 'Generation Y', as high achievers that like personal attention, which is why most of them agree that technology makes classroom management more difficult. They understand that although technology gives them an edge and additional skills before joining the workforce, it deprives them of a more focused attention by virtue of larger class sizes. Students mostly agreed that they can implement technology successfully (question 3) because they are 'a techno generation and high-speed stimulus junkies' that need to constantly be engaged and challenged in order to perform.

Question 2 seemed to provide a controversy, whereby 50% (56 students) responded that they strongly / slightly agree, 15% (17 students) were neutral, while 35% (39 students) seemed to strongly / slightly disagree with the statement. The researchers think that the difference in answers to this question stem from 2 factors… culture / ethnicity and gender. Culture is NOT a factor included in this research and will require further probing in future research, where ethnic origin is identified in the research parameters. Yet, since this is a convenient sample, the researchers hypothesize that students from Eastern origins are more accustomed to using traditional learning resources, perhaps due to their educational systems or the

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

lack / delay in a technology infrastructure as opposed to Western nations. In terms of gender, analysis shows that 60% of those that slightly / strongly disagree with this statement are females. This might be associated with females having a greater attention to detail and hence their desire to read books / notes in further detail than males. *Question 8 shows that 100% of participants slightly / strongly disagree with the fact that technology is expensive in terms of time and / or effort*. If we relate this to the characteristics of millennials in the workplace, it seems to agree with their sense of entitlement, their need for creativity and flexibility and their willingness to take risks and make mistakes. If we cross-examine this with characteristics of technology at large, we will find a perfect fit. The use of technology in classrooms allows for flexibility since it entails working alone and in groups. It also allows room for error since it is based on 'learning by doing'.

The second set of questions focuses on the stakeholders involved in the use of technology – students, teachers and parents. Questions are:

The use of technology in the classroom…

1. Is successful only if teachers have access to a computer at home.
2. Makes teachers feel more competent as educators.
3. Is successful only if there is adequate teacher training in the uses of technology for learning.
4. Gives teachers the opportunity to be learning facilitators instead of information providers.
5. Is successful only if technical staff regularly maintains computers.
6. Demands that too much time be spent on technical problems.
7. Is successful only if there is the support of parents.
8. Is an effective tool for students of all abilities.
9. Is unnecessary because students will learn computer skills on their own, outside of school.
10. Enhances my professional development.
11. Is effective if teachers participate in the selection of computer technologies to be integrated.

For questions 1 to 6, 90% (101 students) of participants indicated that they strongly / slightly agree with the proposed statements, while the remaining 10% (11 students) either slightly disagree or are neutral. It is worth noting that there is a gap between the desired situation as indicated by students and the current reality. Given that both researchers are professors in the Ontario College system, it must be noted that a majority of instructors do not have adequate technology training, in large part due to their age and due to the lack of time dedicated to new technology training. With a heavy administrative and teaching course load, instructors are not always well prepared for the use of technology, which might explain why students agree that too much time is spent on technical problems. Although a large budget is spent on IT funding in Ontario Colleges, the influx of students is large, which sometimes causes the system to slow down. This justifies why students agree that technical staff need to regularly maintain and update computers.

Question 7 asks students about the support of parents in their technological education. Although parents are an important stakeholder in the educational process, given the financial support they provide and their role as secondary / primary decision makers in the schools and/or programs chosen by their children, it seems that participants do not feel that they have an impact when it comes to technology. *55% of participants (62 students) either slightly / strongly disagreed with this statement, while 45% (50 students) were neutral*. It is worth noting that gender did not have a bearing on the results of this question. It is worth noting that all participants in the convenient sample did not have any learning disabilities /

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

difficulties, hence the researchers feel that the answers to question 8 are not representative and would be best tested in further detail with a larger, more inclusive sample. *100% of participants indicated that they either strongly / slightly agree with technology being an effective tool for all participants*. As College educators, the researchers disagree with this since most of the technology used is not customized to students with learning difficulties, this includes basic tools such as office, MS project and more complex tools such as simulations. All of the aforementioned are not designed according to inclusive learning and universal design standards. This includes simple add-ons such as captioning, audio guides, larger fonts etc. Hence, it is safe to say that there is a large gap in this regard.

When asked about the importance of technology in classes and whether or not it is a skill that can be acquired outside, participants' responses varied. 35% (39 students) indicated that they strongly / slightly agree, 10% (11 students) felt neutral, while 55% (62 students) stated that they strongly / slightly disagree. Given this disparity in responses, we analyzed the role of gender to find that of the 62 students that agreed with this statement, 53 were females (66% of the female sample). This correlates with the results of question 2 in the first set of questions when students were asked if technology would result in the neglect of traditional learning resources. *Researchers can draw a preliminary conclusion that females are believers in the traditional educational institution with the role of teachers and learning resources, be it technology and / or books, in providing new knowledge and laying the foundation of learning*.

Questions 10 and 11 show overwhelming agreement with the statements; 100% of participants strongly agree that the use of technology enhances their professional development. This is line with the characteristics of millennials, which indicates that Gen Ys prefer to learn in networks and teams using multimedia and digital media. They are also characterized as entrepreneurs with a high sense of responsibility, which explains why participants unanimously think that teachers should choose the technology to be integrated in their classrooms and courses. This is directly related to questions 1, 2 and 3 pertaining to teacher's competence, training and ease with the technology chosen.

The final question set, comprised of nine questions, deals with student's learning and interpersonal skills, as part of the Essential Employability Skills. Questions are:

The use of technology in the classroom…

1. Helps accommodate students' personal learning styles.
2. Motivates students to get more involved in learning activities.
3. Could reduce the number of teachers employed in the future.
4. Promotes the development of students' interpersonal skills (e.g., ability to relate or work with others).
5. Will increase the amount of stress and anxiety students experience.
6. Is effective only when extensive computer resources are available.
7. Is difficult because some students know more about computers than many teachers do.
8. Is only successful if computer technology is part of the students' home environment.
9. Improves student learning of critical concepts and ideas.

Questions 1 and 2 are important topics around which there has been a lot of buzz in the past decade. According to Dunn& Griggs (2000), "a learning style is the way students begin to concentrate on, process, internalize and remember new and difficult academic information". It is "a biologically and developmentally determined set of personal characteristics" grounded in cognitive style theory and brain lateralization theory". According to the VARK learning model, there are four main ways by which stu-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

dents learn – Visual, Aural, Read-Write and Kinesthetic. Technology falls into the kinesthetic domain, whereby students learn by doing. This includes real-life scenarios, case studies, group presentations (using office) and simulations. Technology is also part of the visual category, which includes maps, charts, graphs, diagrams, brochures, flowcharts, highlighters, different colors, pictures, and different spatial arrangements. The use of a variety of learning styles in class and during assessments motivates students to get more involved in learning activities. *100% of participants indicated that they strongly / slightly agree with both statements*. Although this is theoretically valid, the real-life situation in saturated classrooms, with no support provided from teaching assistants, is different. Teachers often do not have time to integrate different activities in their classes, rendering them dull and monotonous. As such, there has been an increase in the amount of complaints to higher management about teacher's performance, as millennials seek a challenging and dynamic educational environment. In this regard, there is a gap between the actual and desired situation.

Question 3 can be considered one of the concluding questions of this research. As a result of the use of technology and new instructional models such as hybrid and online courses, participants are asked whether they think technology could reduce the number of teachers employed in the future. Interestingly enough, the answers to this question were varied. *35% (39 students) of participants indicated that they either strongly / slightly agreed, 25% (28 students) felt neutral, while 40% (45 students) strongly / slightly disagreed with the idea.* Accordingly, the responses were analyzed based on gender. Again, of the 45 students that disagreed with the statement, 40 were females, which accounts to 50% of the surveyed female population. This finding seems to support our previous conclusion about female believers in traditional education.

Questions 4, 6 and 9 showed that 100% of participants either strongly / slightly agreed to all statements. Students feel that technology promotes the development of student's interpersonal skills, which may be related to the characteristics of millennials discussed earlier and their strive for independence. Question 6 relates to Employability skill #6 'Locate, select, organize, and document information using appropriate technology and information systems' part of the information management skill set where students expect the abundant existence and accessibility to computers. This is required to apply their knowledge and practice newly acquired concepts. This is related to question 9, which states that technology improves student learning of critical concepts and ideas. This is similar to Employability skill #7 'Analyze, evaluate, and apply relevant information from a variety of sources.' In a dynamic, global environment students expect immediate access to technology. It is worth noting that there is a gap between the actual and desired situation. Although Ontario Colleges have an abundance of computer labs and advanced infrastructure, this competitive advantage is currently under depletion with the increase in class sizes and cuts to education funding, causing a strain on technological resources. This sometimes causes students to access their learning management systems, simulations and assignments through their smart phones, which although convenient, may not be conducive to the learning process.

Finally, when asked if technology will increase the amount of stress and anxiety students experience 90% (101 students) of participants indicated that they strongly / slightly agree, while only 10% (11 students) indicated that they strongly / slightly disagree. Question 7 is related to teacher training and their confidence and practice with the technology used in class (questions 1, 2 & 3 of set 2). *It is worth noting that the answers showed a similar distribution, with 100% of participants indicating that they either strongly / slightly agree with the statement*.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

CONCLUSION

Industry 4.0 is more than the technology it is bringing. As workforce is a critical element in digital transformation, the skills and qualifications of the human capital will become increasingly eminent. There are many skills and qualifications that will be needed in the era of Industry 4.0, but as stated in the literature review, digital literacy and digital dexterity will be essential and primary skills for the future workforce. Digital literacy is defined as "capabilities ranging from technical skills (such as those used in coding), to digital citizenship, to the ability to identify fake news", digital dexterity is defined as 'the ability and desire to use existing and emerging technologies for better business outcomes'.

Today's students' digital literacy and dexterity will be the main mechanism that will empower organizations to utilize upcoming critical digital developments. The demand for these skills and qualifications will undeniably be higher when compared to the present. This will result in the need for changing and adapting the existing curricula and the tools used in the existing educational system which will equip students with the essential employability skills required to remain competitive in industry 4.0.

In the research, a detailed questionnaire was prepared as a pilot study to comprehend students' views on the use of technology in classrooms and its impact on their learning experience and engagement. Knowledge of their views allowed the authors to draw inferences as to the skills and competencies of future students and whether they would match industry 4.0. Parts of the questionnaire used were extracted from the 'Technology Implementation Questionnaire'. Research results show that that there is a gap between the existing situation in the Ontario College in which the research was conducted and the desired situation where employability skills are adhered to and technology savvy graduates are populating the workforce.

Although the research findings are all preliminary and need to be retested within a larger sample, including several Ontario colleges in multiple locations, it seems that the results do confirm the original hypothesis. 'There seems to be a gap between the desired employability skills and the current situation within Ontario Colleges'. This may be due to a variety of factors including large class sizes, the inability to train teachers on the use of new technology given large administrative and course loads and teacher's age.

Age does not seem to be a variable impacting the adoption of technology by students. Yet, gender does have a bearing on the results of this research. Preliminary results show that females are more traditional learners and believe in the traditional brick and mortar learning institution, including the role of teachers in disseminating knowledge. Given the fact that not all employability skills are being achieved, it seems that students are not ready for industry 4.0. For students to be better prepared for the future workplace and the use of technology, the higher educational sector needs to be streamlined with a more rigorous approach towards teacher training, student accessibility to technology, reducing class sizes and dedicating a hefty budget to technological infrastructure and tools. If this is done, the employability skills will fall into place, leading to a technology savvy workforce.

The Canadian Ministry of Higher Education seems dedicated to the use of employability skills as a determinant for graduates' workplace readiness. Although this is unique to Canada, other countries, including the USA and Germany, presented in this chapter as comparable examples, have not identified the skill set / competencies that graduates need to possess. This raises an important question… Are employability skills the correct means to gauge workplace readiness? Should they be substituted by another indicator / set of indicators? The researchers feel that both employers and teachers are important stakeholders in this decision. They should have an opinion as to their employees' performance and readiness for further challenges / promotions in the workplace. Hence, based on the above research and our recommendations

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

for the future, employers should be a definite part of the cycle. Since we have determined that students *think* they are ready for industry 4.0, but colleges are failing in their preparation, employers need to be added as a moderating factor / variable.

Since colleges are focused on providing applied knowledge to their students, it is important to engage employers who can shed additional light on required skills that they see necessary from work within their specific industries / fields. This may include knowledge of specific ERP systems, project management systems or simple tools. This will entail hiring teachers with this knowledge, updating and revamping the existing curricula to include these subject matters and other technology / non-technology skills, and making sure that the course learning outcomes are updated and well-written to match all of the above. Again, this is all linked to teacher's readiness to do this extra work with the existing workload, increasing class sizes and decreased funding dedicated to education and colleges. This shows that this is a vicious cycle in which all the variables are interrelated. With the rise of globalization and graduates aspiring to be mobile, this model has been adopted in some countries with a smaller workforce like the Nordic block. Yet, in Canada this is not the case. This is where this research proves essential since it raises multiple questions that need to be answered and tries to bridge a gap in the theoretical data available about the education industry in Canada – Ontario.

FUTURE RESEARCH

The research findings stated above are all preliminary and need to be retested within a larger sample to ensure generalizability, perhaps as a joint initiative within Ontario colleges in multiple locations. It would be considered as a multi-site project, in which data from business schools in Ontario Colleges would be collected. As a further step, one could also look into the use of the questionnaire in other schools as well including early childhood education, engineering, aviation, etc… This would provide a wealth of data, which could be used to determine with accuracy the readiness of Ontario College students to industry 4.0 and whether or not they possess the necessary employability skills. As a further initiative, Colleges could contact their graduate Alumni who can answer questions regarding their experience with industry 4.0 and if they feel they had been prepared in colleges enough for the workplace. Not only would this require a different questionnaire, but also a large-scale research which involves multiple researchers and commitment from Ontario Colleges to answer the hypothesis at hand.

On another level, if the research results from Ontario were then compared to other provinces across Canada, one could end up with statistics from across the country. These findings could then be submitted to the government as recommendations for the Ministry of Higher Education and Training. If Canada wants to be competitive in the field of Higher Education to attract foreign students to its higher education institutions, it must ensure the employability of its graduates compared to other developed countries, including the USA and Germany that have found evidence to support the importance of technology skills as a prerequisite to workplace readiness. Hence, investing heavily in this area, not only in higher education, but also since school years.

Finally, for this research to be truly effective, a comparison with other cultures might add an additional lens to the research. It would provide the researchers with a wealth of data to compare if the issues outlined above are universal or unique to the Canadian higher education sector in specific. Moreover, it would answer questions like 'does culture impact the propensity to use technology', 'does culture value

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the use of technology in the higher education system'. These are imperative questions which should be answered to comprehend the readiness of Generation Y worldwide to industry 4.0 in light of globalization.

REFERENCES

Abele, E., Metternich, J., Tisch, M., Chryssolouris, G., Sihn, W., ElMaraghy, H., ... Ranz, F. (2015). Learning Factories for research, education, and training. *Procedia CIRP.*, *32*, 1–6. doi:10.1016/j.procir.2015.02.187

Baena, F., Guarin, A., Mora, J., Sauza, J., & Retat, S. (2017). Learning Factory: The path to industry 4.0.7th Conference on Learning Factories, CLF 2017. *Procedia Manufacturing, 9*, 73-80. DOI: 10.1016/j.promfg.2017.04.022

Benešová, A., & Tupa, J. (2017). Requirements for education and qualification of people in Industry 4.0. 27th International Conference on Flexible Automation and Intelligent Manufacturing. *Procedia Manufacturing, 11*, 2195-2202.

Bond, M., Marin, V., Dolch, C., Bedenlier, S., & Zawacki-Ritcher, O. (2018). Digital transformation in German higher education: Student and teacher perceptions and use of digital media. *International Journal of Educational Technology in Higher Education.*, *15*(48). doi:10.118641239-018-0130-1

Chryssolouris, G., Mavrikios, D., & Rentzos, L. (2016). The teaching factory: A manufacturing education paradigm. *CIRP-CMS 2016, 49th CIRP Conference on Manufacturing Systems*, 57, 44-48. 10.1016/j.procir.2016.11.009

Chukwuekwe, D., Schjølberg, P., Rødseth, H., & Stuber, A. (2016). Reliable, robust and resilient systems: towards development of a predictive maintenance concept within the Industry 4.0 environment. *Proceedings of EFNMS Euro Maintenance Conference*. Retrieved from: https://contactnorth.ca/sites/default/files/pdf/external-presentations/future_of_higher_education_and_learning_0.pdf

Deloitte Report. (n.d.). Retrieved from: https://www2.deloitte.com/il/en/pages/consumer-industrial-products/topics/industry_4.html

Do, A., & Huynh, A. (2017). *Hello World! Working in a digital era*. Retrieved from: https://brookfield-institute.ca/commentary/hello-world-working-in-a-digital-era/

Dunn, R., & Griggs, S. A. (2000). *Practical approaches to using learning styles in higher education*. Westport, CT: Bergin & Garvey.

Elbestawi, M., Centea, D., Singh, I., & Wanyama, T. (2018). SEPT Learning factory for Industry 4.0 education and applied research. *Procedia Manufacturing, 23*, 249-254.

Enke, J., Glass, R., Kre, B. A., Hambach, J., Tisch, M., & Metternich, J. (2018). Industrie 4.0 – competencies for a modern production system. *Procedia Manufacturing, 23*, 267-272.

Erol, S., Jäger, A., Hold, P., Ott, K., & Sihn, W. (2016). Tangible Industry 4.0: a scenario-based approach to learning for the future of production. *Procedia CIRP, 54*, 13-18. DOI: 10.1016/j.procir.2016.03.162

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Erol, S., Schumacher, A., & Sihn, W. (2016). Strategic guidance towards Industry 4.0 - a three-stage process model. *Proceedings of International Conference on Competitive Manufacturing (COMA16)*. Retrieved from: http://www.wmfc.org/uploads/GenerationalDifferencesChart.pdf

Gilchrist, A. (2016). *'Industry 4.0 – The industrial internet of things*. Apress. doi:10.1007/978-1-4842-2047-4

Hadziristic, T. (2017). *The state of digital literacy in Canada – A literature review*. Brookfield Institute Working Paper.

Hecklau, F., Galeitzke, M., Flachs, S., & Kohl, H. (2016). Holistic approach for human resource management in Industry 4.0. *Procedia CIRP, 54*, 1-6. DOI: 10.1016/j.procir.2016.05.102

Hermann, M., Pentek, T., & Otto, B. (2016). Design principles for Industries 4.0 scenarios. *49th Hawaii International Conference on System Sciences (HICSS)*, 3928–3937. 10.1109/HICSS.2016.488

Howard, M. (2014). *Effective communication in higher education - Individual applied research thesis*. Academic Press.

Huynh, A., & Do, A. (2017). Digital literacy in a digital age – A discussion paper. Brookfield Institute.

Ives, B., & Javenpaa, S. (1996). Will the internet revolutionize business education and research? *Sloan Management Review*, *37*(3), 33–41.

Margaryan, A., Littlejohn, A., & Vojt, G. (2011). Are digital natives a myth or reality? University students' use of digital technologies. *Computers & Education*, *56*(2), 429–440. doi:10.1016/j.compedu.2010.09.004

Mavrikios, D., Papakostas, N., Mourtzis, D., & Chryssolouris, G. (2013). On industrial learning & training for the factories of the future: A conceptual, cognitive & technology framework. Journal of Intelligent Manufacturing. *Special Issue on Engineering Education.*, *24*(3), 473–485.

Morgan, G., & Thayer, T. L. (2018). *The future of work will demand changes to higher education*. Gartner. Retrieved from: https://www.gartner.com/document/code/349433?ref=grbody&refval=3870503

Motyl, B., Baronio, G., Uberti, S., Speranza, D., & Filippi, S. (2017). How will change the future engineers' skills in the Industry 4.0 framework? A questionnaire survey. *Procedia Manufacturing, 11*, 1501-1509.

Mourtzis, D., Vlachou, E., Dimitrakopoulos, G., & Zogopoulos, V. (2018). Cyber-physical systems and education 4.0 – the teaching factory 4.0 concept. *Procedia Manufacturing, 23*, 129-134.

Nafea, R., & Kilicarslan Toplu, E. (2018). Knowledge sharing in Ontario Colleges: the way to sustainable education. *Journal of Management and Sustainability, 8*(1).

Piliouras, T., Yu, R., Villanueva, K., Chen, Y., Robillard, H., Berson, M., … Attre, M. (2014). *A deeper understanding of technology is needed for workforce readiness – playing games, texting, and tweets aren't enough to make students tech-savvy*. Doi:10.1109/ASEEZone1.2014.6820656

Rossit, D. A., Tohmé, F., & Frutosad, M. (2018). Industry 4.0: Smart scheduling. *International Journal of Production Research*, 1–12. doi:10.1080/00207543.2018.1504248

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Schallock, B., Rybski, C., Jochem, R., & Kohl, H. (2018). Learning Factory for Industry 4.0 to provide future skills beyond technical training. *Procedia Manufacturing, 23*, 27-32.

Schumacher, A., Erol, S., & Sihn, W. (2016). A maturity model for assessing Industry 4.0 readiness and maturity of manufacturing enterprises. *Procedia CIRP.*, *52*, 161–166. doi:10.1016/j.procir.2016.07.040

Tisch, M., Hertle, C., Abele, E., Metternich, J., & Tenberg, R. (2015). Learning factory design: A competency-oriented approach integrating three design levels. *International Journal of Computer Integrated Manufacturing*, 1–21.

Tortorella, G. L., & Fettermann, D. (2018). Implementation of Industry 4.0 and lean production in Brazilian manufacturing companies. *International Journal of Production Research*, *56*(8), 2975–2987. doi:10.1080/00207543.2017.1391420

Walker, V., Bowkett, G., & Duchaine, I. (2018, November). All companies are technology companies: Preparing Canadians with the skills for a digital future. *Canadian Public Policy*. doi:10.3138/cpp.2018-011

WEF – World Economic Forum. Global Challenge Insight Report. (2016). *The Future of Jobs-Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. Author.

Wermann, J., Kliesing, N., Colombo, A. W., & Moraes, E. C. (2015). Impact of new ICT trends for the educational curriculum in the area of Industrial Automation and Engineering. *IECON2015-Yokohama*, 3643-3648. 10.1109/IECON.2015.7392667

KEY TERMS AND DEFINITIONS

Digital Dexterity: Is a student's/employee's ability and desire to use existing and emerging technologies for better business outcomes.

Digital Literacy: Is a student's/employee's ability to find, analyze, and present clear and concise information, either through writing or the use of technology tools.

Essential Employability Skills (EES): These are skills compiled by the Canadian Ministry of Higher Education in Ontario. They include a list of 11 skills divided into 6 categories, which include numeracy, communication, critical thinking and problem solving, information management, interpersonal and personal skills.

Future Skills: Skills that Generation Y are expected to possess to ensure their employability. These constitute/are synonymous with essential employability skills.

Future Workforce: Generation Y millennials that are expected to hit the workforce within the next decade. They are the technology-savvy graduates that will cause the industrial revolution 4.0.

Higher Education: Refers to post-secondary education. This is education following high school of grade 12 in several countries.

Learning Management System (LMS): A technology tool launched within the last decade where students and teachers can communicate. The system is a logistical hub, allowing teachers to share notes, slides, and assignments, create tests, forums, and discussions with students.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Technology in Education: The ability to use technology tools in education. These include, but are not limited to, Microsoft Office, simulation, ERP systems, wikis, discussion boards, forums, and learning management systems.

VARK Learning Model: Research that postulates that students learn/absorb information in different ways including visual, auditory (listening), read-write, and kinesthetic (learning by doing).

Workplace Competencies: Key skills and attributes required to secure a position in the workplace. These may include technology skills, critical thinking, and analytical skills.

This research was previously published in Business Management and Communication Perspectives in Industry 4.0; pages 267-287, copyright year 2020 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 99
Liquid Workforce:
The Workforce of the Future

Manish Gupta
IBS, IFHE University, India

ABSTRACT

The main objectives of this chapter are to define liquid workforce, describe its characteristics, and outline its implications. This chapter would help readers understand the need for studying liquid workforce and appreciate its importance in the contemporary world. Moreover, it provides a detailed outline of the ways and means that organizations can use to build such a workforce. It highlights the steps an organization can take to enhance the effectiveness of its liquid workforce. In addition, it explores certain best practices in the industry to illustrate how well the fluidity of the workforce can be managed without compromising on organizational goals.

INTRODUCTION

Creating an efficient and effective workforce has been the top priority of the HR function for decades (Sidibé & Campbell, 2015). However, to catch-up with the ever-changing business needs and dynamic corporate environment, the ways of managing workforce have undergone a sea-change since the pre-classical era (Hoang, 2015). Organizations in the modern era are digital, extremely competitive, global, and highly result oriented. In such a scenario, managing the workforce effectively is the best way to retain competitive edge and remain globally relevant (La Rosa, 2016). Whereas the digitization of most of the HR activities has made HR function simpler and efficient, it has also necessitated a turn-around of the current HR practices to address the dynamism in today's workforce (McFarland & Jestaz, 2016). This chapter mainly describes the concept of liquid workforce and how organizations can embrace the dynamic work environment by using their workforce.

DOI: 10.4018/978-1-7998-7297-9.ch099

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Need for New HR Practices

A survey report 'Technology Vision 2016' by Accenture using a sample of more than 3,100 business and IT executives revealed that 33% of the participants feel that the world economy is already affected by digital revolution (Accenture, 2016). It also reported that 86% of the respondents predict a sharp rise in the pace of technological changes over the next three years and organizations are increasingly investing in the tools that help organizations adapt to the dynamism of the digital era. Automation is increasingly taking over manual tasks and a whole lot of millennial are changing the current workforce with their digital insights (Zaino, 2005). Some startling facts also reaffirm the urgent need for embracing these changes. For example, around 43% of the current US workforce is likely to be freelance by the end of 2020 (Neuner, 2013). Practitioners across the globe find its remedy in developing liquid workforce which has certain inherent ability to adjust itself to the highly dynamic business environment. Four major reasons behind the rise of liquid workforce including a steep rise in the number of freelancers, increasing automation of mundane activities, improving the rate of innovation, and entry of 'millennial' into the workforce (FastTrack Press Room, 2016). These reasons are summarized below:

- Increasing automation of mundane activities: There are certain activities in any job that are too repetitive and labor intensive that can be carried out by the machines. Reducing human intervention in such activities is not only cost effective for the organization but also beneficial to the employees as it helps employees utilize their talent in more productive activities. A recent example is of India's ICICI bank introducing software robotics in 2016 with a target of automating 20% of its transactions by the end of the year 2016. The level of digital war can be smelled from the very fact that this decision by the ICICI bank was preceded by an announcement by HDFC bank that it would use physical robots at its branches (Nair & Gaur, 2016).
- A steep rise in the number of freelancers: As the economies are embracing digitization, there is a growing demand of freelancers who are easily available to work on contract. Hiring a freelancer is a win-win decision for the organization and the freelancer. It is because while freelancer can focus his/her attention only on the particular job mentioned in the contract, the organization would only have to pay for the limited time the freelancer worked and needs not to bear the amount that a full-time employee would otherwise take. Several websites such as 'https://www.freelancer.in' bridge the demand-supply gap between the organizations and the freelancers.
- Improving the rate of innovation: It is no longer sufficient for employers to limit themselves to innovations. Instead, they need to go a step ahead and enhance the pace of innovation to survive and thrive in the intense competition. Recently, cognizant carried out a survey on the future of talent and digital skills using a heterogeneous sample of 422 European and U.S. executives (Cognizant, 2016). The findings revealed that majority of executives believe that there is a digital skills gap from "moderate" or "severe." This gap restrains their organizations from realizing their digital dreams. The report also suggests that innovation can be fostered by linking proprietary platforms to 'talent clusters'. It is the transient workforce that can quickly adapt and add value to business reinvention. The company management needs to come forward to junk the old big-sized talent clusters to lean and small clusters that serve a niche.
- Entry of 'millennial' into the workforce: The term 'millennial' or more specifically 'millennial workforce' generally refers to a set of people which entered the workforce 2005 onward. According to a PWC survey 'Millennial at work: Reshaping the workplace' in the year 2011 using a sample

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

of 75 countries, the changing the workplace is all set to change because millennial generation matters (PWC, 2011). It is because the millennial generation is more tech savvy, self-oriented rather than job-oriented, socially connected, anxious for rapid progression, flexibility seeking, and willing to scale new highs. Google and Apple are the pioneers in attracting and retaining most talented millennial because these companies believe in encouraging the employees to think out of the box. To retain such a workforce, processes need to transparent, targets need to appropriate, the doors of opportunities in participating strategic decision making must be opened, strategies should be millennial specific, and regular feedback about the current position and how it can be improved must be preferred over negative feedback (Gilbert, 2011).

It is evident that the way employees work is all set to change yet again. Gig economy, a kind of work environment in which most of the jobs are on short-term contracts, is swiftly taking over the present situation (Goodwill, 2016). Thus, it is of paramount importance to know how the shift from the present 'static' to the next generation 'dynamic' workforce would take place (Simons, 2016). Such shifts are captured in five points including business function to formal online crowd funding platform alignment, ad-hoc to continuous training, segregated to end-to-end workforce management, concentrated to participative innovation, and low to high collaboration as described below:

- From business function to formal online crowd funding platform alignment: Crowd funding is an online collaborative funding from peers. The importance of this platform has also been highlighted by the Forbes magazine, "Unless you've been living in a remote island for the last few years, you've heard about crowd funding or stories of people raising thousands or millions of dollars online" (Barnett, 2013). Some of the crowd funding websites includes Kickstarter, Indiegogo, Rocket Hub, FundRazr, and GoGetFunding (Taylor, 2013).
- From ad-hoc to continuous training: 'Ad-hoc' is a Latin word which means 'for this'. Instead of ad-hoc training which focuses on shaping an employee's knowledge, skills, and abilities for a particular project or job, the dynamism of the demands requires training on enhancing skills that can enable employees to adapt to the changing environment. Giving continuous training is beneficial to the company in many ways. First, it helps employees manage their daily tasks. Second, it makes employee productivity almost immune to the changes in the external environment. Third, it enhances the self-confidence of the employees. Fourth, it helps employees achieve their goals. Continuing Professional Development (CPD) offered by Chartered Institute of Personnel and Development (CIPD) is a flexible process that trains and provides employee feedback online continuously.
- From segregated to end-to-end workforce management: While traditional management tools rely on fragmented workforce management such as tracing the number of hours an employee works and adjusting the pay accordingly, evaluating the availability of staff members and their qualifications for several related HR activities including preparing or revising schedules and distributing these schedules, handling leave applications, and preparing annual HR reports. Such fragmented activities mostly prove to be erroneous, costly, and time consuming. Consequently, it is hard to work on one specific area or issue without any assistance from a tool or management solution. Nevertheless, installing a comprehensive workforce management solution that helps the HR managers to track a particular strand or a sequence of related activities seamlessly from beginning to end without compromising on the efficiency (Amodio, 2013).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

- From concentrated to participative innovation: Generation Y (the millennial generation) believes in contributing fresh ideas that can in some way add to the digital revolution. It would be extremely discouraging for this generation if innovative ideas are invited only from a particular department. This generation asks: 'Why not us?' The youngsters want to take part in shaping the company's future. It is something that boosts their self-esteem, makes them happy and gets them the feel of being valuable (Emelo, 2011; Kramer, 2010). The underlying concept is to allow any employee to submit, review, and rank an idea. Companies can encourage participative innovation, for instance, by facilitating a physical / online suggestion box for new ideas (Phillips, 2010). It is equally important for the concerned manager to go through those ideas and appreciate or reward the best one. Not only corporate sector but also governments are increasingly recognizing the potential of participative innovation. For example, a recent initiative of the Government of India to invite innovative ideas through public participation online is: 'https://mygov.in'.
- From low to high collaboration: Businessmen agree that collaboration is the need of the hour as it increases the productivity due to synergetic effects. One way to increase collaboration is by introducing electronic meeting systems (EMS) in the company (Rittgen, 2010). These systems decrease the requirement of attention and increase performance. The two advantages of e-meeting systems over face-to-face meeting are: (1) simultaneity which allows multiple people share their ideas simultaneously and (2) anonymity which means the utterances are not attributed to a particular speaker. Both these qualities coupled with reduction in the hassle of arranging a conventional meeting gives more room to the members to share their ideas which would not have been shared otherwise. With an improvement of 55 percent in group performance, the implementation of EMS in IBM has helped it make better use of its teams (Grohowski, McGoff, Vogel, Martz, & Nunamaker, 1990). IBM found that anonymity was beneficial, number of participants in the meeting increased, the engagement level of participants also increased, and fewer meetings over less time were required, and focus of the participants on the task increased. However, it needs special attention in some areas such as increased importance to pre-meeting planning, distribution of the minutes of the meeting and proceedings after the meeting, requirement of tech-savvy users, flexibility of the software to meet the group application variety, etc.

WHAT IS LIQUID WORKFORCE?

IBM coined the term 'liquid workforce' where "people are hired on an "as-needs" and "just-in-time" basis, for specific projects activities, whether for days, weeks, or months. Beyond, the conventional contractor model, the liquid workforce is underpinned by crowd sourcing, drawing together skills of freelance workers and the task need of organizations" (Bakhtiyari, Barros, & Stewart, 2014, p. 18).

Industry needs a workforce that can be 'seasonally' attached and detached without with ease as per the contingent strategic and operational needs. To deal with contingent requirements, contingent workers can be a critical tool to face the stiff competition and optimize business profits. The underlying idea behind the concept of liquid workforce originates from the belief that technology not only disrupts but enables business transformation. It converts a rigid and docile firm into a change-ready and agile firm. To illustrate, General Electric has recently introduced 'Fast Works', a technique for entrepreneurs for developing "The Lean Startup" (Power, 2014). It focuses on products that ensure fast learning and quick deliverables. It provides more autonomy to the users to swiftly alter direction on projects. Apparently,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

liquid workforce which is also termed as 'fluid workforce' is the need of today and the future. To gain further insights, the next section narrates some of its differentiating features.

THE KEY CHARACTERISTICS OF LIQUID WORKFORCE

Like any workforce, liquid workforce does have a set of defining features. Some of these characteristics are diversity in terms of composition, mobility in terms of workplace, flexibility in terms of working hours, accommodative in terms of inviting different skill-sets, open mindset in terms of embracing change, and ability to quickly learn, multitask, and adjust itself to meet the organizational objectives (Ethos BeathChapman, 2016; Pegasystems, 2016). These are detailed below:

- Diverse in terms of composition: The workforce has variety. Here, variety means different types of workers are included. In other words, the liquid workforce is inclusive as it includes employees other than the full-time staff. These could be part-timers, causal workers, and freelancers. A combination of these diverse types of workers helps companies accommodate dynamism in project demands. At the same time, such heterogeneity increases its efficiency.
- Mobile in terms of workplace: Another defining feature of such a workforce is the flexibility with which work can be handled from anywhere. The work can be completed beyond the boundaries of the office. Mobility of work helps employees strike a balance between their work and their personal life. Recently, ICICI bank has launched the program wherein work from home is allowed. It is beneficial to the company as it reduces a lot of company's office expenses.
- Flexible in terms of working hours: Flexibility in work timing is what millennial want. They would like to enjoy in the free time and work whenever they are like too. Forcing them to work from 9 to 5 does not work.
- Accommodating nature in terms of inviting different skill-sets: The liquid workforce is not rigid and is willing to work with people of diverse skill-sets. It is also an opportunity for the members to adopt their skills as they also need to exhibit multi-task behavior.
- Mindset in terms of embracing change: Members of liquid workforce are highly curious. It is in their blood to continuously learn from the dynamic environment and keep themselves open to extensive learning.
- Ability to quickly learn, multitask, and adjust itself to meet the organizational objectives: All the above qualities makes liquid workforce quick to change and re-direct its efforts towards renewed goals flawlessly.

DEVELOPING THE LIQUID WORKFORCE

Only because liquid workforce relies more on contingent employees does not imply that the management of the company can choose to be rigid and less-responsive to the changing environment. Transformation of conventional workforce into the liquid workforce is a strategic decision and full support from the management is needed to facilitate the process.

Though there could be different ways to develop a fluid workforce, Accenture prescribes a global procedure that can be followed by any type of organization. The specifics of this procedure can be decided

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

by the organization based on the resources available at their disposal. Accenture offers this procedure in the package of 100 and 365-day plans (Accenture, 2016; McGuigan, 2016).

The focus of the 100-day five-step plan is on highlighting the need for change as well as on providing evidence that it works. Each of these five steps is described below -

Step 1: Conducting A Skill - Gap Analysis: The open roles need to be reviewed by the HR. Also, it is important to identify the roles on high priority that are still seeking suitable talent.

Step 2: Formulating A Renewed Training Strategy: A proper strategy needs to be put in place to ensure that organization's training capabilities can be enhanced. For this, the management of the company must decide on the investment required for providing the employees with consistent and effective training across the organizational hierarchy.

Step 3: Developing A Renewed Engagement Strategy: Because millennial have unique requirements, the organization needs to develop a proper engagement plan. The plan must give room to these millennials to work on what they are most passionate about and provide sufficient autonomy to boost their morale. If their roles complement their knowledge, skills, and abilities, the productivity of the employee is likely to improve and the talent can be engaged more efficiently.

Step 4: Preparing Strategy For Engaging The Freelancers: Apart from the full-time employees, the part-time employees (mostly freelancers) also need to be engaged. Therefore, a strategy which distributes the work clearly between these two types of workforce is of paramount importance. The strategy should ensure that there is proper communication between the short and long-term employees wherever necessary.

Step 5: Piloting A Fresh Liquid Project: Transforming the workforce from conventional to liquid is expensive. Therefore, it is advisable for the organizations to predict the possible impact of such kind of transformation on the productivity and explore the possible contingencies to reduce the amount of operational risk involved. In order to conduct a pilot test, a company needs to choose one of the liquid groups and assign it a project that has autonomy and necessary resources for meeting the objective of the project. The results of this step would provide the necessary foundation for the complete workforce transformation.

Unlike the 100-day plan, the focus of 365-day plan is on implanting the pilot liquid project across the organization. The 365-day plan is followed once the 100-day plan is successful and it also espouses five steps. These steps are discussed in the following paragraphs:

Step 1: Putting The New Training Strategy To Work: Analyze the result of the pilot test conducted in the 100-day plan to select the optimum combination of training the different sources such as personalized training, MOOCs, or boot camps. The combination depends on the context a company operates in.

Step 2: Using The Experience Of The Pilot Group: By now, the company has tasted the results of the pilot test and has discovered an optimal combination suitable to its context. The next step is to formulate a plan specific to extending the practices followed during the pilot liquid project exercise across the organization. For this, the company needs to meticulously look into the strengths and weaknesses of the pilot projects, learn from the mistakes, and build a robust plan that can face the dynamic external environment to a greater extent.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Step 3: Planning To Scale Your Liquid Project Practices Across The Whole Company: It is important for the companies to know those areas, ways, and means that can benefit the most from crowd sourcing. In order to accomplish this objective, the company needs to start three projects simultaneously. Each of which has a focus on a different area that can be addressed well by the crowd. The companies should rely on the results of these projects for sanctioning the crowd sourcing projects for the rest of the company or those parts of the company that are likely to be benefitted the most.

Step 4: Integrating HR Analytics With The Organization: The next step is to integrate all the HR activities such as, recruitment, selection, promotion, compensation, retirements etc of the company with the liquid workforce. It can be done with the help of data scientists who can apply HR analytics to gain new insights from these conventional activities. All the gaps must be bridged to attract and retain talent.

Step 5: Formally Introducing Predictive Analytics To One Area Of People Management Strategy: The company should strive hard to develop a proper plan to understand how predictive analytics could enhance existing HR practices. This plan needs to be comprehensive and foolproof to the extent possible.

Aligning Liquid Workforce With Business Strategy

Organizations often find it difficult to face challenges arising out of the mismatch between business strategy and a giant operational shift. It is essentially because of not following a fool-proof alignment procedure that can ensure that the strategic shift turns out to be a success. Specifically, the organization must change on certain parameters before turning its workforce to a liquid workforce. These are as follows (Wells, 2016):

- **Introducing Context Specific Training Across the Organization:** As per the report published by Accenture, the next generation work would be flexible or fluid workforces and to align such a workforce with the business strategy would require business projects with embedded training. This training should not only be relevant to meeting the objective of the project but also of some relevance to the individual learner. For instance, if the company hires an external expert say a freelancer, the company would want to prepare a training program that focuses not only on unique organizational processes but also on industry material. In this way, alignment of the organizational specific processes can be done with the industry. Another important way could be seamless distribution-and redistribution of data and information among the concerned teams or members. For this, the company must grant leverage to how the exchange of content is conventionally done. The company needs to explore cloud-based options to store, retrieve, and exchange data from anywhere by any of the concerned team member. It would reduce a lot of redundancy. Such kind of training is provided by third parties such as Mind flash.
- **Ensuring Collaboration in the Distributed Workforce:** It is indeed difficult to ensure that all the team members cooperate, coordinate, and collaborate to accomplish a common goal. It becomes more challenging when the collaboration has to be done in real-time. The possible way out is to facilitate right communication among the members using right tools. There needs to be dedicated slack channels and spaces for that. Though it would require initial capital investment, a lot of money relating to commuting can be saved once such system is developed and is fully

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

functional. The company can also opt to outsource this activity of keeping all connected to each other and providing the team members a common platform to collaborate.

- **Measuring Team and Project Effectiveness in Frequent but Short Meetings:** Finally, it is equally significant to appreciate the importance of feedback and develop mechanisms to capture and analyze it quickly. It directs the team on time so that efforts and resources are not wasted. It can be done by following 'Agile Scrum framework'. Scrum is a framework that details how a product can be managed. It relies on the philosophy that customers' demands are volatile. This initiative coupled with a 15-minute team meeting on daily basis in which even distantly related or peripheral project objectives can be discussed and the pre-set milestones can be refined further as per the need of the situation. If handled with utmost care and given support from the top management can prove to be a game-changer for the company. Such meetings are called as micro meetings as the time period for each meeting is too small to get bored. A company can also choose to integrate its cloud-based content and learning management system with its customer relationship management (CRM) system. There are companies that implement such high-tech solutions. For example, TruAssets, a national property management company has integrated its course work relating to contractors and results of the quizzes with its CRM portal. Consequently, the company can now trace, handle, and assess its training related results for its several external vendors. General Electric is another big company that has formed Fast Works teams to make the use of liquid workforce. The details of the same are provided in the next section.

LEARNING FROM THE BEST PRACTICES

Though the concept is interesting and has promising outcomes, only a few organizations took the risk of implementing it and others chose to wait-and-watch. One of the few organizations that have set benchmarks of building a liquid workforce successfully is General Electric as detailed in the subsequent paragraphs:

The Case Of General Electric (https://hbr.org/2014/04/how-ge-applies-lean-startup-practices)

Brad Power, a well-known consultant, narrates the story of General Electric. According to him, the company, General Electric (GE), is one of the first companies that begin tapping the potential of agile and fluid workforce. In case of this company, the initiative to align with the dynamic requirements of the customers was taken in the form of 'Fast Works'. It is a framework that helps entrepreneurs develops 'The Lean Startup', an approach for developing fresh products that come out of supple software development and ensure swift deliverables and quick learning. Interestingly, it is not for an information technology (IT) activity. Since GE is a manufacturing company, it wanted to match its operational activities with the quick learning cycles of the customers. In a way, the company wanted to milk its appliances fully before these get obsolete in the minds of the customers and enter in the dog phase for the company. It was a bold decision by the top management to re-formulate the operations strategy completely to suit the requirement of the customers.

GE is a pioneer in taking giant and mostly risky steps to adapt itself to the external world. For example, in the year 2008, GE invested USD 1 billion to transform its existing plants, buy new ones, and recruiting 3,000 new employees. In the year 2013, the Chief Executive Officer (CEO) of the company,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chip Blankenship, challenged his newly formed cross functional team by saying: "You're going to change every part the customer sees. You won't have a lot of money. There will be a very small team. There will be a working product in 3 months. And you will have a production product in 11 or 12 months." What the team was allowed to do is interesting and inspiring.

The team members were given a separate room so that the boding among them can be improved. As a result, it became a tight group. The members used to go down to the factory floor an build the products collectively. Unlike the conventional approach in which the customer or market requirements are given by the sales force, this team was in direct and constant touch with GE customers. The customers were also the participants in the development of the products throughout. Hearing the feedback about the product directly from the horse's mouth (the customers) was a refreshing and exciting experience for the engineers who otherwise work in the back office. However, receiving customer feedback directly was also a challenging task. The team had to bounce ideas and product prototypes off of retail salespeople who wanted to know about GE's products in Louisville, GE's training centre. It also had to visit several product design centers located in Chicago as well as in New York.

The objective of visiting these centers was to learn the details of the products for the respective clients. The feedback wasn't a sweetener to the team members' ears but it laid a concrete foundation of change. The team soon came out with a new idea 'minimum viable product'. The product was a refrigerator with fresh styled doors that is, it opens from the middle. Started in January 2013, the product went through several rounds of corrections based on customer feedback relating to the darkness of the steel, lighting, etc. It was only by August, 2013 that customers actually started liking the refrigerator which was version 6. The team readily started working on the next version i.e. version 7 and decided to come out with improved version every year. It was a radical shift in the strategy of GE as the company earned its fame by introducing a revised product in the market every five year. Till the launch of the revised product, the new product features used to be kept secret. Kevin Nolan was quick to say, "With Fast Works we're learning that speed is our competitive advantage. How do we become much more open and collaborative with the customer base? You can't do that if you want to be secretive."

The company made several changes so that Fast Works can actually function. The company re-worked majorly on three areas namely supplier relations, finance, and roles and responsibilities. Each of these is described below in short:

Supplier Relations: Since GE is a manufacturing company; the suppliers play an important role in delivering the required product to the customer on time. The team was well aware about this fact and decided to approach the suppliers and make them understand what exactly they are doing and how it would affect the supply chain. As expected, the suppliers were extremely grateful to the company that they were given a chance to participate and get involved in such a major exercise.

Finance: In the words of Vic Roos, Lead Purchasing Program Manager: *"We let a finance guy in the room. He helped us challenge the big company mentality. At times we moved much faster than the company would normally allow. At times it drove the materials manager crazy."* It shows the kind of autonomy granted to the finance person and the open-mindedness with which the suggestions of the finance person were heard. Certain findings were shocking such as the company needed to have annual or bi-annual payback but that kind of model cannot survive in the situation when the things are extremely dynamic and the future demands of the customers are uncertain. Obviously, it is extremely difficult to evaluate the cost of such a project. When the company first evaluated the ongoing project, the financial numbers looked really bad. But the team manager decided not

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

to worry about what the investments or expenses incurred on the entire program for calculating payback. This take of the manager relieved the team members from financial pressure and they could focus on the execution of the project rather than worrying about the cost it may incur. The opportunity costs relating to speed are not assessed by the traditional financial systems. Such costs are incurred due to not tapping the potential customer who could have otherwise purchased the product if delivered on time.

Roles and Responsibilities of the Leader: Of course, there was a full support not only the financial support but also moral support from the top management. There were instances when there was a mismatch between the expected and actual speed of the project. At that time, the CEO conducted a meeting and resolved the issue. Also, a lot of autonomy was granted to the team in terms of freedom from taking several approvals for pivots. Full autonomy was given to the team to take such decision on its own.

The outcome of this entire exercise has been fruitful to the company. The findings indicate that it could cut the program cost to only a half and could double the program speed. Moreover, the product started selling at more than the double rate of the normal rates. The company is now working on extending these practices to other appliance manufacturing units as well. For instance, GE Appliances hosted 7080 young GE high potentials. Furthermore, 80 coaches were trained and were dedicated exclusively to Fast Works. Around a thousand GE executives were exposed to Lean Startup and another giant step was the launch of over 100 Fast Works projects worldwide.

DIGITIZATION FUELS LIQUID WORKFORCE

Thanks to the last global recession, the companies have realized that keeping only full-time permanent employees is not a sustainable model. It is because liquid workforce facilitates faster change compared to the illiquid one. Not surprisingly, the market of freelancers, part-time employees, and casual workers is all set to thrive. Increased level of digitization across the globe is boosting the prospects of freelancers. It is a way to create one's own job. There are several examples of such freelancing digital marketplaces. These include Fiverr, Etsy, UBER, Threadless, Kaggle, Firefox, Toptal, HourlyNerd, Tispr, Teach Me Now, Engineer it etc. (https://innovationlab.net/blog/freelance-economy-liquid-workforce)

CONCLUSION

Now that the world is increasingly getting digitized, most of the organizations are feeling the need of doing away with the traditional workforce management practices that are no longer relevant and effective. Some of the organizations such as Accenture, Google, and GE have already set the examples of outperforming competition by building liquid workforce, a necessity to build inherent competency of adapting itself as per the dynamic needs of the stakeholders.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Accenture. (2016). *Accenture Technology Vision 2016: People First: The Primacy of People in a Digital Age*. Retrieved from http://goo.gl/JGfQvJ

Amodio, M. (2013, April 08). The Challenges of Workforce Management and How to Triumph Over Them. *Workforcemanagementtoday*. Retrieved from http://www.workforcemanagementtoday.com/articles/333395-challenges-workforce-management-how-triumph-over-them.html

Bakhtiyari, A., Barros, A., & Stewart, G. (2014). *Applying Enterprise Architecture to Business Networks*. Retrieved from http://eprints.qut.edu.au/73012/1/73012.pdf

Barnett, C. (2013). Top 10 Crowd funding Sites for Fundraising. *Forbes.* Retrieved from http://www.forbes.com/sites/chancebarnett/2013/05/08/top-10-crowdfunding-sites-for-fundraising/#3e9d76eb1cfb

Cognizant. (2016). *People — Not Just Machines — Will Power Digital Innovation.* Retrieved from https://www.cognizant.com/whitepapers/People-Not-Just-Machines-Will-Power-Digital-Innovation-codex1850.pdf

Emelo, R. (2011). What if millennial ran your mentoring program. *Chief Learning Officer*, *10*(5), 32–36.

Ethos BeathChapman. (2016, July 19). *The liquid workforce: A well of innovation.* Retrieved from http://ethosbc.com/industryinsights/theliquidworkforceawellofinnovation

FastTrack Press Room. (2016, July 14). *How can you facilitate the liquid workforce?* Retrieved from https://www.fasttrack.com.au/blog/howcanyoufacilitatetheliquidworkforce

Gilbert, J. (2011). The Millennial: A new generation of employees, a new set of engagement policies. *Ivey Business Journal*, *75*(5), 26–28.

Goodwill. (2016). *Gig Economy Provides New Options to "Liquid Workforce"*. Retrieved from http://www.goodwill.org/blog/newsupdates/gigeconomyprovidesnewoptionstoliquidworkforce

Grohowski, R., McGoff, C., Vogel, D., Martz, B., & Nunamaker, J. (1990). Implementing electronic meeting systems at IBM: Lessons learned and success factors. *Management Information Systems Quarterly*, *14*(4), 369–383. doi:10.2307/249785

Hoang, M. H. (2015). New models of human resource management in China and India. *Asia Pacific Business Review*, *21*(4), 560–562. doi:10.1080/13602381.2014.976976

Kramer, L. W. (2010). Generational diversity. *Dimensions of Critical Care Nursing*, *29*(3), 125–128. doi:10.1097/DCC.0b013e3181d24ba9 PMID:20395729

La Rosa, M. (2016). Interview with Michael Rosemann on The Role of Business Process Management in Modern Organizations. *Business & Information Systems Engineering*, *58*(1), 89–91. doi:10.100712599-015-0419-8

McFarland, W., & Jestaz, D. (2016). Talent development in the digital age: A neuroscience perspective. *Industrial and Commercial Training*, *48*(2), 74–79. doi:10.1108/ICT-09-2015-0062

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

McGuigan, E. (2016). *Liquid workforce: building the workforce for today's digital demands.* Telegraph. Retrieved from http://www.telegraph.co.uk/sponsored/business/digitalleaders/futureseries/12161816/liquidworkforce.html

Nair, A., & Gaur, V. (2016, September 10). *ICICI Bank introduces software robotics*. Retrieved from: http://economictimes.indiatimes.com/industry/banking/finance/banking/icici-bank-introduces-software-robotics/articleshow/54258671.cms?utm_source=facebook.com&utm_medium=referral&utm_campaign=ETFBMain

Neuner, J. (2013). *40% of America's workforce will be freelancers by 2020*. Retrieved from http://qz.com/65279/40-of-americas-workforce-will-be-freelancers-by-2020

Pegasystems. (2016). *Liquid Workforces Will Let Businesses Put Customers at the Center the digital age is forcing companies to be more fluid about organizational frameworks.* Retrieved from http://digitalevolution.eiu.com/liquidworkforceswillletbusinessesputcustomersatthecenter

Phillips, J. (2010). Open innovation typology. *International Journal of Innovation Science*, *2*(4), 175–183. doi:10.1260/1757-2223.2.4.175

Power, B. (2014, April 23). How GE Applies Lean Startup Practices. *Harvard Business Review*. Retrieved from https://hbr.org/2014/04/how-ge-applies-lean-startup-practices

PWC. (2011). Millennial at work: Reshaping the workplace. *Price Waterhouse Coopers.* Retrieved from https://www.pwc.com/m1/en/services/consulting/documents/millennials-at-work.pdf

Rittgen, P. (2010, June). Success factors of e-collaboration in business process modeling. In *Proceedings of the International Conference on Advanced Information Systems Engineering* (pp. 24 - 37). 10.1007/978-3-642-13094-6_4

Sidibé, M., & Campbell, J. (2015). Reversing a global health workforce crisis. *Bulletin of the World Health Organization*, *93*(1), 3–3. doi:10.2471/BLT.14.151209 PMID:25558098

Simons, M. (2016, April 22). *Transforming the Workforce in the Digital Era*. Retrieved from http://www.cio.co.uk/it-leadership/transforming-workforce-in-digital-era-3638972

Taylor, K. (2013). *6 Top Crowd funding Websites: Which One Is Right for Your Project?* Retrieved from http://www.forbes.com/sites/katetaylor/2013/08/06/6-top-crowdfunding-websites-which-one-is-right-for-your-project/#668be67265f8

Wells, D. (2016, May 9). If you're not tapping into the Liquid Workforce, You're Not Innovating. *Inc.com*. Retrieved from http://www.inc.com/donna-wells/if-you-re-not-tapping-into-the-liquid-workforce-you-re-not-innovating.html

Zaino, G. (2005). Freelance Workers: Individual and Corporate Perspectives. *Stcwdc.org*. Retrieved from http://wdcb.stcwdc.org/wp-content/PDF/Individual_and_Corporate_Perspectives.pdf

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

KEY TERMS AND DEFINITIONS

Ad-Hoc Training: A customized training that is given only to serve a very specific and unique need.

Crowd Funding: A process in which a large project or venture is funded by raising or pooling money from masses.

Gig Economy: A type of work setting in which positions are mainly temporary in nature and jobs are on contracts that are applicable only for a short-term engagement.

Liquid Project: A platform that work on the idea of facilitating work within society rather than walled offices by providing connectivity to those who look for new projects, inspiration, and insights.

Liquid Workforce: A type of tech-savvy workforce characterized by high flexibility, agility, collaborative spirit, sensitivity to the environmental changes, and inherent ability of adapting itself continuously as per organizational requirements.

Millennial: A term used to refer those people who reached their young adulthood around this millennium that is year 2000.

Predictive Analytics: A type of data mining that predicts occurrence of an event in the future by establishing trends from the past data.

This research was previously published in Radical Reorganization of Existing Work Structures Through Digitalization; pages 1-17, copyright year 2018 by Business Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 100
Distributed Work Environments: The Impact of Technology in the Workplace

Edwiygh Franck
The Greatest You Yet!, USA

ABSTRACT

Technology is making the traditional workplace obsolete. Companies are taking advantage of the myriads of digital resources available to make their processes leaner, cut costs and have a larger presence in the global market through the concept of distributed work environment. In this chapter, the author provides an overview of the distributed work environment, as well as the impact it has on the human condition in the workplace. Although this technology driven work concept can be beneficial, companies have to ensure that it is the right business model for them and their employees. The author looks at different factors that companies need to consider in deciding to adopt a distributed work environment model. Several companies, over 125 of them, have successfully implemented the concept and the author shares some examples on how they were able to achieve success and employee satisfaction.

INTRODUCTION

Technology has had a significant impact on how humans live their lives from entertainment, medicine, education, to family life, dating, and social media. Technology has taking center stage in our lives and have allowed us to achieve things that we would not think possible a decade ago. We are sharing and consuming information at lighting speeding due to the availability and capabilities of technology. Technology has allowed for the development of robotic surgery to enhance the preciseness and accuracy of surgery as well as recovery time for patients. The popularity of online learning has increased tremendously as technology has become readily available for students to learn anywhere and at any time. We have self-driving cars on our roads and we can conduct videos chat sessions with anyone around the world by simply using our cellular devices. In other words, we live in a digital and technologically advanced age and almost everything around us is connected by technology, including organizations and their employees.

DOI: 10.4018/978-1-7998-7297-9.ch100

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

As Roper and Kim (2007) stated:

A clear revolution is underway in when, where and how work is accomplished. The workplace of the future will be more physically distributed due to a variety of reasons, such as the high cost of land and buildings in urban areas, air pollution resulting from mass commuting, and changes in the nature of work (p. 103).

In the past two decades the landscape of our workforce has changed dramatically from traditional brick and mortar buildings to distributed work environments because of the advancement of technology. From having all employees in a physical building to having employees spread all over the world in an array of physical locations. By definition, a distributed work environment is an organization structure where "… the vast majority of employees work from wherever they are comfortable and productive. Perhaps most importantly, communication and culture are moved outside the boundaries of a physical location so that everyone is able to be included wherever they live" (Robins, 2014, p. 3). A more technical definition explains the distributed work environment as "… an environment in which a plurality of mobile workers using portable computing devices can gain access to a network via network access stations installed within the work environment" (Cole et al., 2002, p. 1). Both definitions reiterate the idea that traditional company headquarters are gradually changing from one main location to wherever an employee wants it to be.

As we begin to understand the concept of what a distributed work environment is, it is important to also understand what it is not. According to Jeff Robbins (2014), from Lullabot, a strategy, design and development company that has embraced and implemented a distributed work environment for his company, a distributed work environment is not:

- … *One with a prominent central office where the majority of people work most of the time* (Robins, 2014, p. 4)
- *A corporation with multiple locations* (Robins, 2014, p. 4)
- *A company where people are often allowed to work from home* (Robins, 2014, p. 4)
- *A company that takes advantage of outsourcing, freelancers, or subcontractors* (Robins, 2014, p. 4)
- *A co-working space where people freelance on similar projects* (Robins, 2014, p. 4)
- *A single freelancer* (Robins, 2014, p. 4)
- *A department within a large company where most people work from home (for instance, the customer service branch of an airline) – though this may qualify as a distributed team* (Robins, 2014, p. 4)

Robbins (2014) goes on to say that it is also important to understand the difference between a distributed work environment and remote employees. In his words:

…the truth is that in-person communication and activities will always trump virtual/tele/digital communications. After all, humans have been communicating in-person since the beginning of time. It is our default setting. So a company with remote employees begins with the deck stacked against them. It's not an even playing field. It's really going to be a challenge to make remote employees feel like they're

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

part of the team. Resentment and imbalance can build up between those who "get to stay at home" and those who "get to have lunch with the boss every day"(p. 4).

Differentiating between remote employees and a distributed work environment is important, because by confusing them or making them synonymous, the above sentiments begin to be shared by several other companies that are thinking about implementing a distributed work environment. The fear that employees will be disengaged if they are removed from the physical office is real, and it preventing organizations to take the leap forward and try this new concept. However, Robbins (2014) describes what a true distributed work environment is below by saying:

A distributed company doesn't have these problems. Most of its communications happen online and are available for everyone in the company to participate. Whether these are phone conferences, email threads, or message-board and issue-queue posts, it's very easy to be inclusive despite geographical separation (p. 4).

Today's technological advancements are making the traditional brick and mortar headquarters slowly obsolete. Employers are realizing that they have the ability to have a larger top talent pool by having opportunities and presence around the world instead of the country. Josh Kramer (2011), CEO of Full-Stack, a software development company, describes the traditional work environment as a handicap where companies are "Geographically Challenged:"

Your company has probably been operating under a handicap for its whole existence. It's a handicap that has been so common that the vast majority don't even see it as such. The handicap is this: most companies are limited in their ability to find and hire the right people by a fixed geographic radius set up around their central office. We will call these type of companies "Geographically Challenged". Your geographically challenged company may have attempted to overcome this handicap by opening branch offices in multiple cities or paying for a new employee's relocation or maybe even introducing flextime into the mix. Though these steps help the situation, you are only slightly mitigating the root problem (p. 1).

We live a society where we are constantly connected and the cost of staying connected is decreasing everyday due to emerging competitors in the industry. Technology has made it possible for employers and employees to connect with their colleagues across the world in real time to collaborate on projects and expand their business. Employers are catching on to the idea that in order for their employees to perform at their high potential, they need to provide a technological experience in the workplace equivalent to the technological experience that employees have at home. One could further argue that employees have better technology at home than they have in the office, so distributed work environments make sense because employers can take advantage of these advanced technologies by paying for them and decreasing their overhead costs. This sounds like a win-win situation: employees can work wherever they want and be more productive then they would be at the office; and employers are reducing overhead costs and making profits due to the increased level of productivity of the employees and the reduced operating costs. Of course, there are no perfect systems, so this chapter will explore some of the benefits and downfalls of this logic later in the chapter.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THE CONCEPT OF DISTRIBUTED WORK ENVIRONMENT

An Overview

The economy is changing, so it only makes sense that organizations would be looking at strategies to improve and streamline their processes and services to reduce their operating costs and maintain or gain competitive edge. This change is mainly because of the rise and refinement of technology where information is being shared at an unprecedented speed and industries that were once human driven, are now technology driven. Once example of that is the newspaper industry. Long gone are the days of having a paper boy (or girl) ride on a bicycle to deliver newspapers; news is readily available the minute we open our eyes in the morning, on our cellphones, tablets and computers. Due to this technology boom, the nature of running a business has to change in order to keep up with all of these changes. One option many organizations are looking into or implementing is the concept of distributed work environment. Such a work environment is attractive to companies because it yields many benefits such as the rapid growth of affordable telecommunication technology, a decrease in overhead costs, as well as linkage to improved employee retention, more efficient use of office space, improve productivity and greater staffing flexibility (Holman, 2003).

As companies look to examine the landscape of the workforce, more and more they are looking closely at the distributed work environment concept as a way to preserve their existence and sustainability through the use of technology. In a book titled, *The Distributed Workplace: Sustainable Work Environments* (Harrison, Wheeler, & Whitehead, 2004), the authors expressed the concern that most companies have had on their minds in the past decade:

The relationship between sustainability and the build environment has always been a tortuous one: close but not warm. They're an uneasy pair Sustainability with its sometimes conflicting imperatives: ethical, practical, physical, economical. The built environment—a work of will masquerading as a force of nature. Perhaps as clash of fact and value. But at least, in certain key aspects, fixed. No longer (p. 1).

The above phenomenon is faced by companies around the globe and they have to strategically think about how they will tackle this issue as a competitive edge is harder and harder to get due to the changing market and workforce. Harrison et al. (2004) continue on the matter of sustainability by adding:

…Sustainability, once a simple matter for better resource use—difficult but achievable—now claims its rightful place at the shifting centre of all the issues raised by globalization. And the built environment—particularly the work environment- loses its monolithic status to stand revealed as a mercurial participant in the new economy. It is evident that the workplace is evolving in a distributed form to deal with these changed circumstances. It is equally evident that the fluidity of the distributed workplace will set society some urgent problems—not least in the field of sustainability (p. 1).

The authors described the issue that is in most CEO and executive teams' minds and narrows it down to sustainability. Staying relevant in this ever changing economy means that companies have to understand the true meaning of sustainability as it pertains to the barriers that have been broken down by the advancement of technology. Companies have to actively seek out strategies and solutions that

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

will work for their organizations and employees while being financially responsible. As the authors of *The Distributed Workplace: Sustainable Work Environments* (2004) explain:

Sustainability needs to be seen as a dynamic process, not a fixed and attainable state. It is rather like the mathematical concept of a limit—an end point that does not exist as such, and cannot be reached, but represents the hypothetical end point of a tendency (p. 3).

Companies are constantly looking for ways to improve their practices on all aspect of the business: human and operational. Trying to stay ahead of the curve to maintain their competitive edge is a difficult task. As technological advancements continue to happen, and employee needs continue to evolve companies need to respond accordingly or it will cost them in the long run. Many organizations are either taking steps or making provisions to enter the distributed work environment community, or they are thinking about it as a strategic move for them to meet the needs of their talent pool and to ensure their survival. They understand that they are operating in a digital and knowledge age, and the "business as usual" concepts are no longer valid. Organizations need to keep up with the changing work patterns, which can be difficult, and at times, almost impossible to do. In a research paper titled *Successful Distributed Work Arrangements: a Developmental Approach* (2007), the authors explained that, given these economical and workforce circumstances, implementing a distributed work framework can look attractive to organizations, especially large organizations, because of the potential financial benefits; however they need to be sure that it is the right move for their organizations (Roper & Kim, 2007). As executive teams are turning toward distributed work environments, experts suggest that there are four factors surrounding this concepts that companies need to examine to make an informed decision: the organization, the employee, the work, and the support system that is needed to sustain such an environment (Roper & Kim, 2007).

First off, companies have to align their goals, objectives and culture as a whole to determine if a distributed work environment would work for them. They need to ensure that all three of these components are in sync and will not create any disadvantages for all or some of their employees, as well as the organization. In addition, they have to look at their current financial structure to ensure that they have the funds or can strategically locate funds to finance this major change in infrastructure. Further, they have to spend time determining if this change will positively or negatively impact their processes and productivity (Roper & Kim, 2007). Next, they have to examine the work that their companies perform to determine how conducive such an environment would be for that work. Distributed work environments work best with work that requires minimal interaction, such as programming, graphic design copy-writing, etc. (Roper & Kim, 2007). These types of work require only periodic interaction with team members and clients, as opposed to positions that need frequent interactions with others to complete their work: managers, and customer service representatives, as examples. Having a clear understanding of the work that is produced in the organization will guide an educated decision. Lastly, they have to examine how the work is completed. Roper and Kim (2007) referred to the concept of sequential and mutual work processes. Sequential work processes refer to "…process that reflect a one-way work flow and do not need frequent information exchange among workers to accomplish tasks" (Roper & Kim, 2007, p. 106). Mutual work processes refer to a "…work process that has a complex work flow and needs frequent and fast information exchange, frequent coordination and team-work" (Roper & Kim, 2007, p. 106). Understanding these type of processes support the decision making process as organizations can determine whether they can fully, partially or not venture out in the distributed work environment depending on if

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

it makes sound business sense to them. Although technology advances allow for both processes to occur virtually, being comfortable that it will give the organization a competitive advantage is key.

Organizations need to also review the types of employees who are part of their organizations. Although technology can connect us in ways that we could not imagine, employees who need constant interactions with others whether because of the nature of their work, or need assistance in completing their work may not be the best candidates for distributed work environments. If the majority of the organization's employees fit in that category, then this concept may be detrimental to the company instead of helpful. Organizations with self-directed, self-motivated and disciplined employees who hold positions that do not require a high level of interaction would be ideal for the distributed work environment as they would be able to self-manage and thrive. Organizations have to be comfortable with the fact that not all employees are cut out for a distributed work environment. As Roper and Kim (2007) explain that organizations need to look for two attributes when analyzing if their employee base would be a good fit for a distributed work environment.

The two attributes to consider, according to Roper & Kim (2007), are the employees' work setting preferences and their ability to work in a distributed work style. Some employees would welcome the idea of work schedule flexibility, which in turn would allow them to take care of family obligations; on the other hand, there are workers who prefer the consistency of coming to and leaving work at a specific time and working in a specific office location (Roper & Kim, 2007). Organizations also need to look if the employees can effectively handle the level of flexibility and self-directedness that comes with a distributed work environment. Roper and Kim (2007) explained that:

Some workers need a high degree of face-to-face interaction and direct communication to effectively undertake their work, whereas other professional and knowledge workers usually a high degree of choices available to when, where, and how their work is undertaken. The former type of worker might need a permanent work location and the latter type of worker would be better for DWA [distributed work arrangements] (Roper & Kim, 2007, p. 107).

Further, organizations need to assess the level of employee engagement and motivation to determine if a distributed work environment would be beneficial to the employees and the company. Because of the rise of the distributed workplace, companies have had to deal with a concept called cyberslacking (O'Neil, Hambley & Chatellier, 2014). Cyberslacking refers to "…a phenomenon in which employees are distracted by non-work Internet browsing when they should be accomplishing work tasks" (O'Neill, Hambley, & Bercovich, 2014). This is an issue that has been present in the office environment and has transferred over to a larger scale into the distributed work environment due to the flexibility and autonomy provided to employees. This can be caused by the idea that the employees feel less engaged by virtue of being removed from a physical office location (O'Neill, Hambley, Greidanus, MacDonnell, & Kline, 2009). O'Neil et al. (2014) went on to explain that:

…we treat both cyberslacking and engagement as indicators of distributed work effectiveness, given that these are top-of-mind issues for employees and their managers in distributed contexts. Moreover, this suggests that advancing knowledge of the antecedents of distributed work effectiveness could be valuable for theory building and practical application (2014, p. 152).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

As a result, employers need to assess employee personalities to determine if they would thrive or fail in a distributed work environment. The trait activation theory (Tett & Burnett 2003) suggests that employee effectiveness and performance level are high when there is a strong fit between the employee and the job duties that he needs to complete. O'Neil et al. (2014) furthers this concept by stating "specifically, person-job fit theory posits that employee attributes need to match the job environment to create high effectiveness levels, and distributed work may contain unique conditions that affect personality-job fit levels." This suggest that employers need to pay close attention to these traits to either conduct organizational restructuring to place employees in the right fit before moving them into a distributed work environment, or be selective about who participates in a distributed work environment versus who stays in a physical office. The most extreme case, if an employer wants to go 100% in the distributed work space, would be to let go of the employees who are not a great fit and hire new employees to fill the gaps.

Finally, organizations have to ensure that they have the necessary technology and other resources that will support the distributed work environment infrastructure. They have to make sure that workers can easily gain access to equipment and resources to be able to complete their work. The access to important data requires resources such as laptops, internet connectivity, wireless phones, satellite, cable, etc. which are all directly connected to technology (Roper & Kim, 2007). Without the necessary equipment and resources, distributed employees will not be able to perform their work which may be construed as them not doing what they are supposed to be doing, instead of the fact they cannot actually do their work because they do not have the needed tools. Organizations have to take a serious look at their technological infrastructure and assess their capabilities to determine if, in fact, they have the necessary platform to support a distributed work environment.

DISTRIBUTED WORK ENVIRONMENT IMPACT ON THE HUMAN CONDITION

Influencing Factors on the Human Condition

Employment in general has positive and negative impacts on the human condition. On the positive side, it allows employees to earn a living, care for their families, and save for retirement. In contrast, there are instances where employment has interfered with family life, caused undue stress and sickness, and fostered unhealthy environments filled with conflict and lack of trust. Distributed work environments comes with positive and negative impacts as well, some similar to the above listed, but manifested in different ways.

Distributed work environments provide employees with many potential benefits such as: "more flexible working hours, more time for home and family, reduced commuting, greater job autonomy, less disturbance whilst working, and the chance to remain in work despite moving home, becoming ill or taking family care roles" (Holman, 2003). As well, this type of work environment also brings societal benefit which include increases entrepreneurial activities, less pollution, increased community stability, and more efficient use of energy resources (Cascio, 2000).

In contrast, there are some negatives impacts that may emerge in a distributed work environment such as fewer chances for development and promotion, increased conflict between work and home; and social isolation (Holman, 2003.) However, to truly understand the impact of a distributed work environment on the human condition, there are social and individual factors that need consideration. Social factors that may determine the feasibility, success or failure of employees in this type of work environment include:

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

the socialization of distributed workers, communication between distributed workers and traditional office workers, decision making and communication within virtual teams (Holman, 2003). In regards to individual factors, some determinants of feasibility, success or failure of employees include the connection between personality, competencies and the distributed work environment, employee motivation and the psychological contract in which they enter, the connection of job characteristics and the well-being of employees, and the home and work interface (Holman, 2003).

Social Factor 1: Socialization of Distributed Workers

Employees need to be able to socialize with their colleagues and managers in order to build rapport and trust, which in turn fosters highly effective and cohesive teams and a healthy work environment. Distributed workers need this socialization even though they are not physically present in a physical traditional office. These employees do not have the natural opportunities to interact with other employees as they would if they were in the office on a regular basis, which then affects their immersion in the organizational culture. Of course if the organization starts off on a distributed work environment platform, this problem is lessened as no organizational culture has been created with the walls of an officer, but they still need to address this issue. This socialization issue may impact distributed workers differently depending on their level of intra-organizational contact within the organizations. Employees with high intra-organizational contact will have an easier time socializing virtually with other virtual employees or their office counterparts, and employees with low intra-organizational contact will have a harder time dealing with this issue. As Holman (2003) expresses:

…teleworkers with high intra-organizational contact, or who regularly use real-time communication media (e.g. telephone, [instant messaging]) are more likely to be socialized through natural processes. In contrast teleworkers with low intra-organizational contact and that use non-real time telecommunications (e.g. E-mail), are less likely to be socialized through natural means (2003, p. 205).

Therefore, especially for the workers with low intra-organizational contact, organizations who engage in distributed work environments must intervene and ensure that they are putting in place socialization mechanisms, using technology, of which distributed workers can take advantage to stay connected and feel part of the organization. Interventions such as regular virtual weekly meetings, minimum office presence requirements, social programs participation and off-site social events are all good strategies to use and tackle this issue (Holman, 2003) are all good strategies to use to tackle this issue. Such interventions prevent employees, especially the ones with low intra-organizational contact, from feeling isolated from the rest of the organization and begin to be disengaged and de-motivated, which then will lead to larger issues.

Social Factor 2: Communication Between Distributed Workers and Traditional Office Workers

Effective formal and informal communication is key to the success of an organization. It is often difficult to ensure that all lines of communication in an organization are being utilized effectively, and it can be even harder within a distributed work environment where workers are spread across the country and around the globe. The types of communication that occur between employees and managers within

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

one physical office naturally are going to be different from the types of communication that occur with distributed workers. As well, group communication will be higher in the office than in the distributed work environment.

However, organizations have to mimic the office type communications as much as possible for the distributed workers in order to keep them informed and engaged in a timely manner. Using technology, they need to recreate the office communication experience for the distributed workers so that the lines of communication stay open and the distributed employees feel part of the team no matter how far away they are. Technologies such as instant messaging, voice-over IP phones, online meeting platforms, are just a few ways to mitigate this issue. Obtaining these technologies is the first step, but organizations have to ensure that the implementation and communication on the use of these technologies are thorough so that employees understand what, why and how to use them. Such communication integration will help both the employees with high and low intra-organizational contact within the company. Another aspect of communication integration, if these all of these technologies are not accessible, is to be comfortable with a lower level of communication among office workers and distributed workers, and most importantly ensure that employees being assigned to distributed work are comfortable with that level of communication and that it will not hinder their job satisfaction, productivity and quality of work. Holman (2003) summarizes this idea by saying:

Whilst teleworkers with lower intra-organizational communication requirements to perform their work tasks may experience fewer problems with task-related communication … communication can have an important function beyond direct facilitation of work. Therefore, it is important to be sure that managers and co-workers are happy with low levels of intra-organizational communication, a separate "cyberspace" subculture based on mutual support and information sharing may be beneficial to teleworkers (2003, p. 206).

Communication can have a large impact, positive or negative, on distributed workers' engagement and motivation; therefore, it behooves organizations to invest time and technological resources into ensuring that communication is not a barrier for their employees.

Social Factor 3: Decision Making and Communication within Virtual Teams

Decision making is a normal part of the work environment and team members often need to communicate in order to ensure that everyone is on the same page to make decisions on how to approach and complete projects. Although distributed workers are virtually located, they are not exempt from team decision making. In fact, is it crucial that these employees stay in communication with their team members and are included in the decision making process so that they can effectively make their contributions to the projects. Often distributed workers report that the quality of the information that received, related to performance feedback, organizational politics and organizational strategy is reduced (Holman, 2003). This is often due to the subpar quality of the technology infrastructure of the organizations. They are not taking into account the impact of technology, or the lack thereof, can have on the productivity and motivation of employees when it begins to interfere with their work.

As a result, organizations are encouraged to create channels where the virtual employees can participate in the decision making process. Research has shown that opportunities to take part in decisions have decreased for distributed workers due to the remote access of their job, unless they are in high

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

"extra-organizational" positions where they are in constant contact with their office counterparts and/or clients (Holman, 2003). Therefore, companies have to find viable solutions to include these workers in making decisions. Some examples of channels could be attending meetings at the office, online meeting tools with video capabilities, etc. However the organizations choose to address this issue to up to them; but the bottom line is to continue to foster a psychologically healthy work environments, employees need to feel vested in the organization through the decision making process.

Individual Factor 1: Connection between Personality, Competencies and Distributed Work Environment

Not all employees are suited to be distributed workers. Some employees thrive in the traditional office environment, but may not thrive as much in a distributed work environment. The same goes for some people whose performance will increase if they have an opportunity to participate in a distributed work environment, assuming that they have the proper technological resources to effectively completer their work and communicate with their virtual colleagues. One way to determine if an employee would be best suited for the office or a distributed work environment is to analyze employee personalities through the five basic dimensions, also referred to as the "Big Five" (Holman, 2003). These dimensions include extraversion, emotional stability, agreeableness, conscientiousness, and openness to experience (Holman, 2003). Evaluating employees using these dimensions can shed light and give a fairly accurate indication on whether or not they will do well in a distributed environment. If some employees score low on these dimensions, it may be an indication that they would do better in an office environment because they will have the needed interactions to help them develop these dimensions over time. On the other hand, employees who score high on these dimensions may be well-suited, and probably would even perform at a higher level because of their self-directedness and motivation level.

According to Holman (2003), personality plays a big role in making the determination of who would be best suited for distributed work especially in the case of manager feedback. In the distributed work environment manager feedback is either minimal or non-existent. Therefore, if employees require regular feedback to validate their performance, then it is best that they remain in an office environment because they will have direct contact with the manager. Holman (2003) goes further to make the point that:

… the characteristics associated with conscientiousness, such as persistence, care, capacity for hard work, and being responsible have been shown to influence the accomplishment of tasks. We would also expect that people who work with high levels of intra and/or extra-organizational communication are likely to be successful if they are higher on extraversion, agreeableness, and openness to experience (2003, p. 207).

In addition, personality plays a role in the way employees acquire knowledge. In terms of the employees' preferred learning medium, personality can be an indicator of potential success or failure in a distributed work environment. Some employees are not comfortable with using technology to complete their work or to learn new concepts. These employees who are more comfortable and learn better in a classroom environment and would be better suited for the office environment where they can attend training sessions being offered through the organization's training department or attend other outside face-to-face trainings. Their learning preference does not necessarily fit into a distributed work environment platform, as, due to the various locations, distributed workers usually attend online training and

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

courses to further their knowledge. They require minimal supervision and are self-directed to complete the course or training at their own pace, and they are comfortable with using technology as an avenue through which their learning opportunities are administered. Consequently, having high levels of extraversion, openness to experience and conscientiousness would be important to have because they relate to how well people perform in training programs (Holman2003). Research has indicated that intelligence is directly and positively related to work performance, which furthers the idea of learning preferences and also be an indicator of how well employees will perform as distributed workers in terms of success in training programs, knowledge retention and application (Holman 2003).

Finally, personality also affects how individuals interact in teams. Employees in distributed work environments still need to have and practice the traditional teamwork skills such as collaboration, effective communication, performance orientation and goal clarity (Holman, 2003). However, they have to find new ways to perform these skills since they no longer have the office environment where a meeting can be called at any given time and all team members gather in a room to discuss a project. Given this fact, researchers have established the below list of personality competencies that employees should possess in order to be effective distributed team members. The competencies have been grouped into four major categories (Holman, 2003, p. 208):

1. Personal competencies, such as self-discipline, self-direction, self-motivation, capacity for self –assessment, tough-mindedness, tenacity, personal integrity and self-confidence
2. Inter-personal competencies, such as strong verbal and written communication skills, negotiation skills, trusting others and assertiveness
3. Generic task competencies, such as organization skills, practical orientation, basing decisions on facts, flexibility, ability to take independent decision, time management skills, and possessing consistent, productive and organized work habits
4. Technical competencies, such as information and communications technology literacy, and good subject-matter knowledge

Although further research needs to be conducted on the connection of personality, competencies as they relate to a distributed work environment, employers and employees can use the above practices as means to determine fit. Interacting in a distributed work environment is an extensive undertaking; therefore, using all available avenues to make the right decisions is imperative as the impact is great both on the organization and employees in terms of business success, employee engagement and job satisfaction.

Individual Factor 2: Employee Motivation and the Psychological Contract

The landscape of human resources in organization has evolved over the years and has shifted from offering employees stability and predictability in their work to asking employees to be intrinsically motivated and take control of their role in the workplace. Holman (2003) expresses it as such:

…there has been a movement away from the traditional psychological contract where employers have offered career and employment stability. Instead, the emerging psychological contract emphasizes flexibility, mobility, where employees should expect to be flexible in their work practices, be prepared to take responsibility for their own training and career development, and be prepared to move jobs regularly (2003, p. 208).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Due to this shifting philosophy, employee motivation and commitment are affected because they no longer have the guarantee that as long as they perform their job tasks satisfactorily, they will remain stable in their jobs. Such uncertainty pushes employees to always be looking for the next job as they do not know if they will be able to fulfill the future demands of their current jobs. In terms of distributed workers, this can cause problems due to the isolation factor that exists with working virtually. Components such as an office network, counseling services and unions are not readily accessible to them, so they may see it as psychological contract violation on the part of the organization (Holman, 2003). Therefore, to attempt to remedy this issue and promote successful distributed work environments, organizations need to present "…clear career paths and training opportunities [which] may encourage employee retention and motivation without necessarily affecting the establishment of a mutually beneficial flexible psychological contract" (Holman, 2003, p. 208).

Individual Factor 3: Connection of Job Characteristics and Employee Well-Being

Just as traditional work environments can be psychologically healthy or toxic and harmful, distributed work environments are no exception. Researchers have explored this topic and have identified that psychologically healthy jobs generally include …"greater skills use, greater variety of work, greater opportunities for control through task discretion or participation in decisions, balanced demands from work, performance feedback and job security, high clarity concerning tasks, better physical working conditions, higher wages, greater social value accorded to the nature of the work and more support and contact with others" (Holman, 2003). Depending on the type of job within the distributed work environments, it is likely that task discretion, variety in work and skill usage may decrease. For example, this can be in jobs that have low knowledge intensity due to established output control and monitoring mechanisms given the routine nature of the work. In that case task discretion variety and skill usage are decreased, taking away from the psychological health of the job. One way to resolve this issue by allowing distributed workers, whether in low or high knowledge intensity positions, to have the autonomy over their work schedule and task completion. Technology plays a big role in accomplishing this because it has the capabilities to provide the employees with a sense of autonomy and support their success if organizations invest in the right technological resources for these employees. This will give them a sense of ownership and responsibility to the work that they do.

To enhance employee well-being, organizations have to take steps to ensure their distributed workers have psychologically healthy jobs. Researchers have suggested several ways in which employers can accomplish this task. One strategy, is to ensure that the employees have access to all of the technology needed to successfully complete their work, as they would have access in a traditional office. Another strategy is to establish clear goals and objectives for the workers and help them identify the important role that they play (Holman, 2003). Another strategy is to ensure that employees have readily access to information and channels of communication to discuss and clarify the information if needed. This practice can also help in the reduction of the social isolation that distributed workers too often experience due to the non-existent office experience (Holman, 2003). To reduce the risk of poor physical working conditions that may occur in low knowledge intensity jobs due to low wages and the routine nature of the work, companies need to ensure that they are providing the necessary resources to those employees, in addition to sharing information. These employees are more likely to experience isolation and burn out due lack of resources, where they have to perform additional steps to complete tasks that can be

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

streamlined with the proper resources and equipment. Finally, offering appropriate training opportunities to not only training on job function, but on maintaining a healthy distributed work environment. Knowing steps they can take to improve their work conditions promotes autonomy and higher levels of job satisfaction and fulfillment.

Individual Factor 4: Home and Work Interface

Working from home comes with its set of benefits and challenges. As previously mentioned in this chapter, employees enjoy work flexibility and autonomy, as well as more time to spend completing family obligations. However, distributed workers who work from home face certain issues whether or not they have families. For employees without families, they struggle with creating an environment that is conducive to productive work by restricting distraction from neighbors, community activities, friends, and other social activities. For workers with families, they struggle with setting boundaries of work and home especially if there are family members present during their self-set work hours. The idea of separating work from family for a period of time as in a traditional office environment is non-existent for remote workers as their office is also home. The idea of work and family conflict arises and creates a certain level of stress on both the worker and family members (Holman, 2003).

These issues are sure to have an impact on work performance and job satisfaction if not handled appropriately. As organizations work with distributed workers to help them create a healthy and productive work environment, considering and being emotionally intelligent to the family and home demands placed on these workers can help. Training managers to be sensitive to these demands and structuring their work using a project based format with milestones and deadlines may be a positive alternative that supports flexibility and autonomy. In turn, employees' stress level will decrease, and they will be better positioned to deliver quality work and have high levels of job satisfaction and vested interest in the organization.

MANAGEMENT AND DISTRIBUTED WORK ENVIRONMENTS

Distributed workers require a different kind of manager than traditional office employees. To begin with, based on the earlier explanations of social and individual factors associated with distributed work environment, selecting of remote employees and their managers need to be a systematic process that goes beyond just matching job duties to personal candidate characteristics (Omari & Standen, 2000).

Given the nature of distributed work, management style matters in that specific, sometimes non-traditional and unconventional, strategies have to be employed to support the needs of the remote worker. Managing based on outputs may not be the best approach. As stated by Holman (2003) based on the work of Sparrow and Omeeren (2000) "Consequently, the usual adage of managing teleworkers by outputs—in of and by itself—may prove inappropriate for teleworkers, possibly leading to problems such as reduces well-being, reduced trust and low quality work." Holman (2003) suggests that managers need to play close attention to the social aspect of remote work due to the removal of the traditional office, they need to make a conscious effort is developing social networks, support systems, open channels of communication and establish trust in order to create environment where organizational learning can take place (Tregaski & Daniels, 2000). Further, human resources has an important role in identifying the organizational culture that currently exists and ensure that proper matching of managers and employees,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

as well as providing appropriate trainings occur to promote culture integration in the distributed work environment. As summarized by Holman (2003):

…human resource managers should be aware of the cultures and contexts in each area of their organization and should endeavor to ensure that telework schemes, workers and managers suit those cultures and contexts (since changing the cultures and contexts to suit teleworking is a longer-term strategy) (2003, p. 212).

One final important aspect of management involvement in distributed work environment is the training of distributed workers. Training and development of remote workers is just as important, if not more important than traditional office workers due to the added circumstance of distance. Holman (2003) suggests that there are several areas where training can be beneficial to remote workers, such as communication, self-management, corporate values, time management, off-site health and safety requirements, company cyber security policy, legal and tax requirements related to working from home, computer operation and maintenance, and job-specific trainings. Managers need to work with distributed workers to facilitate access to these trainings and create a communication system that will allow them to monitor the application of knowledge gained from these trainings. As well, they need use different methods of training delivery such as face-to-face, online learning, webinars, online instructional manuals, etc. to ensure that the employees have all the resources and training they need to perform at their highest potential. In addition, managers of distributed workers also need to attend trainings to prepare them for the different aspects of distributed work compared to the traditional office environment, as well as company policies and procedures of distributed work, communication and socialization needs, and support systems (Tregaskis & Daniels, 2000).

Properly selecting and preparing managers to support distributed workers is a crucial function, as they can determine the success or failure of the remote work process. If understanding, empathy and mutual trust and respect do not exist between managers and employees, then the odds of a positive, productive and long term working relationship are slim to none.

EXAMPLES OF IMPLEMENTING DISTRIBUTED WORK ENVIRONMENTS USING TECHNOLOGY

In researching the popularity of distributed work environments, over 125 companies have adopted this method of doing business, some of them are in their first or second year in the adoption, and others have been employing this method for over 14 years, and from the looks of it seems to be working for them. A company named FlexJobs, which provides services to candidates seeking flexible schedules, telecommuting, freelance and part-time jobs and as well as a distributed work environment company itself, keeps track of other companies that have fully or partially adopted the distributed work environment (Shin, 2016). The list of companies that they provide has grown 26 companies in 2014 to 76 companies in 2015, and in 2016 the list grew to 125 companies (Shin, 2016). These companies range for HR/recruiting and education to IT/computer. Based on these increases, Flexjobs is estimating that by the year 2020, 50% of employees will work remotely (Shin, 2016). Included in that list are:

Articulate which is a company that develops web, mobile, and desktop applications for online learning space that are rapidly growing, and for which it has won awards. Articulate has been a distributed work

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

environment company for over 14 years, and the management team has found the method successful for both their employees and the business. According to their founder and CEO, Adam Schwartz, all 150 employees work 100 percent of the time from home and their productivity level and quality of work is exemplary. Schwartz (Reynolds, 2015) added "We've always been fully distributed, so it's in our DNA. Because working remotely requires a lot of trust, you have to put people front and center. Ours are smart, kind, fun, and results-oriented, which makes Articulate a pretty magical place to work." Schwartz further expressed ""Being able to choose where and when we work empowers us to be more productive, more engaged, and more balanced in every aspect of our lives. After 14 years as a fully remote company, we're convinced a distributed environment isn't just good for our employees. It's also one of the key reasons we've been so successful as a company" (Shin, 2016).

Mozilla, a not-for-profit organization and the developer of Firefox, also support a distributed work environment, as well as remote workers around the world. They accommodate employees who want to work from home or in one of their remote offices in 30 countries around the world. The company explains "We have 13 global offices and people working in more than 30 countries. If you work best from home, that's not a problem. We can support you anywhere" (Reynolds, 2015).

Equation Research, is a strategic research company working with clients on brand equity and strategy, concept testing, advertising testing and tracking, and community panels (Reynolds, 2015). Its business model is quite impressive and the way they deliver services to their clients is quite unconventional. The CEO, Mike Travis commented and said "When we launched back in 2000, we set out to build and grow a company that NEVER HAD AN OFFICE. It was not a fear of the old food in the back of the refrigerator that drove us—it was the inspiration of building a different kind of experience for the people that shared in this adventure. It was part of the innovation we craved" (Reynolds, 2015).

Varsity Tutors, a private tutoring company that provides virtual and in home tutoring services, or where ever it is convenient for their clients. They provide one-on-one tutoring, they have over 20,000 instructors and a 24/7 online learning platform. The company prides itself in the "no commuting time" concepts as their instructors do most of their work using the online learning platform (Reynolds, 2015).

The list of these companies continues to grow and from the initial response to this movement, it is highly unlikely to see a decrease in this growth anytime soon.

In looking at the list of over 125 companies implementing the distributed work environment model, it begs the question: how do they do it? What strategies have they use to ensure that their employee and business needs are being met? In looking at companies that have been leading the way in distributed work environments, three main strategies have helped them be successful with this method and have grown their companies substantially over the years. These three main strategies are open communication, adequate resources and equipment, and promoting work/life balance.

Open Communication

In researching these companies, open communication, as a key to their success, was a recurring theme. Without having a strong communication system, these companies would most likely crumble as most or all of their employees are located across the country and the globe and not in central locations. Being a remote employee who feels that he/she is missing out on important information and discussions because the avenues of communication are not as robust as they need to be can be a very scary and demotivating position to be in. As a result, these companies employ several communication methods to keep their employees informed, engaged and productive. Let's take Automattic, for example. Automattic

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

is the company that created WordPress.com and several other services for WordPress.com customers. They have over 400 employees spread across 40 countries to help to power companies' websites and their website needs (CloudPeeps, 2015). In their business model, to promote open communication, they have chosen to not use email. Instead they have worked on streamlining their communication channels to ensure that it is open and engaging. To replace the use of email, Automattic employees use an instant messaging chat system and an internal blog system, called P2, which comes with its own Google alert system so that employees are notified whenever new content has been posted on the blog (CloudPeeps, 2015). Automattic is also using an unconventional way of communicating with potential employees. Instead conducting traditional or virtual initial interviews, their process includes the following (CloudPeeps, 2015, p. 2):

1. The CEO screens all resumes
2. The hiring lead sends quality candidates a note
3. The hiring lead then pings them on Skype – and has a Q&A via Skype chat
4. The candidate completes a paid trial project on their own time
5. The CEO has a final review chat on Skype with the candidate

Even more unconventional is that there have been times when new hires have been brought on board without ever having a single voice interview (CloudPeeps, 2015). This method seems to be working for Automattic because it has seen 100% employee retention in its design and growth department (CloudPeeps, 2015). The CEO supported this process by saying "This has been amazing for the company in that we can attract and retain the best talent without them having to be in New York or San Francisco or one of the traditional tech centers" (CloudPeeps, 2015).

Another example is with Zapier, the company that creates software that connects applications (apps) that are used for the automation of tasks and leveraging more out of exciting data. Zapier takes communication very seriously with its remote teams, and it uses a series of communication apps across the company that are specific to each department and its functions. For example, when a new hire comes on board in their marketing team, he/she is provided with a list of communication apps, such as the one shown below to get them acquainted and equipped to engage in the open communication platform (CloudPeeps, 2015, p. 5):

1. Slack for ongoing chatter in their designated channels
2. Trello Editorial Calendar board for discussion around individual blog posts
3. Google Docs for Weekly Marketing Meeting notes
4. Google Calendar for keeping up with each other's schedules, including out of office
5. Async (their internal blog modeled after Automattic's P2 mentioned above) for Friday Updates and Monthly Marketing Updates
6. The team@zapier.com email for Daily Recaps (automated), hiring decisions, hiring announcements, time-sensitive news or questions

The above tools and several others have kept the employees engaged and productive, which in turn has made the company successful.

Another method of open communication being using is called "daily standup meetings. A company named Groove, known for its exemplary story telling approach to present website content for their cus-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

tomers, values communication and understands its importance to keep a remote team productive and engaged. Groove also supports the idea of employees working during the times they are most productive; in other words, they do not have the expectations for employees to be at their desk at home or wherever at all times. This provides great flexibility for the employees and allow them to produce their best work every time. However, Groove also understands that, with this type of flexibility, having a good grip on what everyone is working on is crucial to keep projects moving and delivered; therefore, they instituted "daily stand up meetings" where everyone comes on and shares with the rest of the team what they are working on for the day, have weekly team calls, share their quarterly and annual goals, as well as ask or answer any questions, as well as have weekly meetings calls to discuss projects and any other issues that may have arisen throughout the week (CloudPeeps, 2015). Groove is able to provide such flexibility to its employees because of the strong culture of trust, principle and habits that they have engraved in their company. They are selective in their hiring practices; they look for candidates that will fit in their culture and move their mission forward. As they are screening potential employees, they look for specific qualities in the candidates such as (CloudPeeps, 2015, p. 6):

1. Have they worked remotely before or ran their own small business
2. Are they mature decision maker, meaning they can make the best decisions for customers and manage their energy on their own
3. Are they extraordinary communicators

A combination of these attributes is hard to find, but when it is found, Groove is confident that the employee will be a valuable asset to company and contribute to its success.

Companies like Automattic, Zapier and Groove, along with many others, have found that one key component of having a successful distributed work environment is open and streamlined communication. Keeping up with employees across the globe and not at a specific central location can be a difficult task; however, they seem to have figured a system that works for them, that just may work for other companies who are thinking about moving in the distributed work environment direction.

Adequate Resources and Equipment

Another strategy that companies in the distributed work environment have employed is ensuring that their remote employees have adequate resources and equipment to do their work. These companies realize that without the appropriate resources, employees will get frustrated and not perform to their highest potential. In addition, having remote employees means low overhead costs as these companies do not usually have headquarters or central locations. Therefore, they are able to invest in top of the line equipment and resources needed. On example of this strategy comes from Automattic. They ensure that they provide everything that the employees need to be comfortable and do their best work. Some examples of the resources that Automattic provides to its employees are (CloudPeeps, 2015, p. 2):

1. The best equipment for doing their jobs
2. A stipend for improving their home offices
3. Allowing any team to meet wherever they want for a "hack week"
4. Once a year, the entire company gets together for a "grand meetup" in a beautiful location
5. Employees make their own schedules

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Another example comes from a company called Buffer, which provides services to clients to help them drive traffic to their website, increase fan engagement and save time through social media. They too understand that they need to provide the best resources and equipment to their employees. Being present around the globe means that their employees have to be available to clients at different time zones. Therefore, employee satisfaction is key as these employees interact directly with the clients and need to provide impeccable customer service. As a result, Buffer ensures that its employees have Kindles, laptops, software such as Timezone.co, used to know when and where team members and clients are; Speak.io, used to provide fast video conferencing; and Hipchat, for regular chat communication among team members (CloudPeeps, 2015). Buffer, like Automattic, also puts on gatherings in a nice location for all of its employees to meet face-to-face, networking and engage in team building activities (CloudPeeps, 2015).

Providing these resources motivate employees to do their best because they see that the companies invested in them and understands the value they bring to the team. So many times, employees do not have the adequate resources to do their work; they have to get creative and make do with what they have. After a while, they get frustrated and demotivated and end up leaving the company. This is an issue for companies as these employees who leave, take with them vast amount of knowledge that was not transferred and companies basically have to scramble to get the work done. So it behooves all companies, remote or headquartered to be sure and invest in providing the necessary resources to their employees as the companies mentioned above have, to ensure productivity, job satisfaction and success.

Promoting Work/Life Balance

Another aspect of distributed work environment is the work/life balance concept. Chances are that being remote employees most likely means that they work from home where their families live. Therefore, it is important to ensure that a balanced work/life environment exists where there is a precise amount of time set aside for work and a precise amount of time set for family. This way employees can enjoy their work and their family lives and not feel that they have to choose one over the other. Companies who are part of the distributed work environment community understand the importance of this concept and take steps to support their employees in maintaining that crucial balance.

One example involves a company called Baremetrics that provides data mining services to companies. They strongly believe in the work/life balance concept and have created an environment where employees are able to achieve the balance while performing at their highest potential and spending quality time with their families. One thing that they recognize as a priority is self-care, and they encourage employees to practice self-care by providing them with these tips (CloudPeeps, 2015, p. 7):

1. Have set work hours and stick to them
2. Exercise every single day
3. Alternate between sitting and standing
4. Eat well
5. Take frequent breaks

They feel that by following these tips, employees are less likely to burn out and their job satisfaction level will continue to increase.

A second example comes from a company called Help Scout, that leads the help desk software support industry. At Help Scout, they understand the anxiety that new employees face especially of they are

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

remote employees. As a result, they have developed a buddy system that is solely there to support the new employees when they first get on board, and ease the stress and anxiety that comes with starting a new job. One of their marketing team members had this to say about the buddy system:

We figure being new at work isn't so far removed from being the new kid at school. Wouldn't it be nice to make a friend on the first day? For every new Help Scout teammate, someone who's been on board for a while steps up and becomes their go-to guy/gal who shows them the ropes. Work friends matter, and although they naturally form over time, feeling settled in shouldn't wait… A new buddy is especially important for remote work because you're not meeting a ton of people face-to-face your first few weeks. With so much to take in, now is not the time to let things get quiet (CloudPeeps, 2015, p. 10).

When new employees come onboard, team members have a list of activities that they can engage in with their buddy. Some of these activities include (CloudPeeps, 2015, p. 10):

1. Check-in every couple of days to see how things are going
2. Share a story from the team retreats, or what it's like to hang out in Boston
3. Share "unwritten rules," like the subtle difference between the #general and #offtopic channels in Slack
4. Have a video chat over Appear.in or Skype
5. Give them the run-down on who to ask for what

Such a system allows the new employees to get engrained in the Help Scout culture and be part of the family. Alleviating the stress of a new job in this way allows the new employees get on boarded at a much faster pace, which reduces the backlash that stress can have on their own families. Employees from this company and others mentioned above have written and expressed gratitude for the care they have been afforded through these companies which has allowed them to live happier and more fulfilled lives due to the unconventional way they work.

CONCLUSION

As presented in this chapter, the landscape of the work environment is changing due to the advancement of technology and more companies are considering or implementing distributed work environments. This type of work environment can be beneficial to organizations and employees if implemented correctly, using the right technology with the right employees and managers. In contrast, they can come at the detriment of organizations and employees if proper human and technological systems are not put in place. Over 125 companies in 2016 have fully or partially implemented the concept of a distributed work environment. They all have had their lessons learned, but they are pushing forward with the concept and are seeing positive results for their companies and employees.

As we examined the concept of a distributed work environment, we focused on the reasons why companies are entering this realm. The main reasons are for sustainability and having a competitive edge. In addition, companies have to respond to the needs of a new generation of employees who are looking for flexibility and autonomy in how, when and where they complete their work.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

In implementing a distributed work environment, organizations have to consider several things, such as aligning their goals, objectives and culture as a whole so that they can clearly see if a system as a distributed work environment would work for their business and employees. They have to ensure that they have a robust technology infrastructure to support such an environment. They also have to look at the types of work and services that they provide to ensure that the same level of service and productivity or higher can be accomplished through a distributed work environment. In addition, companies have to examine the types of employees they have to determine if they would be a good fit for such a work environment. They need to figure out, based on what they know and have observed about employees, if they would thrive in a remote work environment. Looking for behaviors like self-directedness, self-motivation, time management, to name a few, are key to a successful distribute work environment employee integration. Further, employers need to make sure that they have the necessary resources, equipment and systems to support the distributed work environment infrastructure to promote business and employee success.

As with any system, distributed work environment have a definite impact on the human condition. As a result, careful considerations must be made to ensure that a distributed work approach is the best course of action for their employees. To make this determination, companies and employees need to pay attention to social and individual factors that surround the distributed work environment concept. The social factors include socialization, communication between remote and office workers, and decision making and communication with virtual teams. Individual factors include the connection that exists between personality, competencies and distributed work environments; employee motivation and psychological contract; the connection that exists between job characteristics and employee well-being; and the home and work interface. Failure to examine all of these factors to determine the best course of action on deciding on distributed work environments, will put organizations at a disadvantage because they will not have a clear picture of how their employees measure up against these factors in order for them to make sound decisions.

We also looked at the management of distributed work employees and how it differs from managing traditional office employees. Managing remote workers is not an easy task; therefore, human resources professionals have to ensure that they match the right employees and managers together for such a work environment as the communication, socialization and resource needs for these employees are different from the needs, for the most part, of traditional office employees. In addition, human resources and managers have to ensure that adequate training opportunities are available for both managers and employees to become familiar with the components of distributed work environments.

Finally, we looked at some examples of companies that have implemented a distributed work environment and how they have managed to make it successful. In reviewing these companies, there were three main practices they had in common that seem to be integral parts of their success: open communication, adequate resources and equipment, and promoting work/life balance. These three components seem to resonate with employees at these companies, and have allowed them to become stronger teams.

In the end, although distributed work environments need to be further researched both on the organizational and human aspects, the concept seems promising to companies as long as it makes sense for them. Given the continued rise of the digital age, distributed work environments may become the norm in the near future; therefore, it behooves organizations to be proactive and take the necessary steps to prepare their employees and organizational infrastructure for a possible change in that direction.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

REFERENCES

Behling, O. (1998). Employee Selection: Will intelligence and conscientiousness do the job? *The Academy of Management Executive*, *12*, 77–86.

Cascio, W. F. (2000). Managing a virtual workplace. *The Academy of Management Executive*, *14*, 81–90.

CloudPeeps Team. (2015). Top 10 companies winning at remote work culture and their secrets. *CloudPeeps*. Retrieved from http://blog.cloudpeeps.com/top-10-companies-winning-at-remote- work- culture/

Cole, S. M., Achanhals, J. A., & Vallilww, G. W., IV. (2002). System and method for supporting a worker in a distributed work environment. *IFI Claims Patent Services*. Retrieved from https://www.google.com/patents/US6359711

Harrison, A., Wheeler, P., & Whitehead, C. (2004). *The distributed workplace: Sustainable work environment*. New York, NY: Spoon Press.

Holman, D. (2003). *The new workplace: A guide to the human impact of modern working practices*. Hoboken, NJ: Wiley.

Kramer, J. (2011). Why distributed teams are making your traditional office obsolete. *Fullstack*. Retrieved from http://gofullstack.com/why-distributed-teams-are-making-your-traditional-office- obsolete

Omari, M., & Standen, P. (2000). Selection for telework. In K. Daniels, D. Lamnf, & P. Standen (Eds.), Managing Telework: Perspectives from Human Resource Management and Work Psychology. London: Thomson Learning.

ONeill, T. A., Hambley, L. A., & Chatellier, G. S. (2014). Cyberslacking, engagement, and personality in distributed environments. *Computers in Human Behavior*, *40*, 152–160. doi:10.1016/j.chb.2014.08.005

ONeill, T. A., Hambley, L. A., Greidanus, N. S., MacDonnell, R., & Kline, T. J. B. (2009). Predicting teleworker success: An exploration of personality, motivational, situational, and job characteristics. *New Technology, Work and Employment*, *24*(2), 144–162. doi:10.1111/j.1468-005X.2009.00225.x

ONeill, T. A. A., Hambley, L. H., & Bercovich, A. (2014). Prediction of cyberslacking when employees are working away. *Computers in Human Behavior*, *34*, 291–298. doi:10.1016/j.chb.2014.02.015

Reynolds, B. W. (2015). 76 virtual companies and distributed teams. *FLexjobs.* Retrieved from https://www.flexjobs.com/blog/post/76-virtual- companies-and-distributed-teams/

Robins, J. (2014). *What is a Distributed Company*? Lullabot. Retrieved from https://www.lullabot.com/articles/what-is-a-distributed-company.

Roper, K. A., & Kim, J. H. (2007). Successful distributed work arrangements: A developmental approach. *Journal of Facilities Management*, *5*(2), 103–114. doi:10.1108/14725960710751852

Shin, L. (2016). At these 125 companies, all or most employees work remotely. *Forbes*. Retrieved from http://www.forbes.com/sites/laurashin/2016/03/31/at-these-125-companies- all-or-most- employees-work-remotely/#7ebf93554d94

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Sparrow, P., & Omereen, V. (2000). Teleworking and psychological contract: a new division of labour. In K. Daniels, D. Lamnf, & P. Standen (Eds.), Managing Telework: Perspectives from Human Resource Management and Work Psychology. London: Thomson Learning.

Tett, R. P., & Burnett, D. D. (2003). A personality trait-based interactionist model of job performance. *The Journal of Applied Psychology*, *88*(3), 500–517. doi:10.1037/0021-9010.88.3.500 PMID:12814298

Tregaskis, O., & Daniels, K. (2000). Organizational Learning. In K. Daniels, D. Lamnf, & P. Standen (Eds.), Managing Telework: Perspectives from Human Resource Management and Work Psychology. London: Thomson Learning.

KEY TERMS AND DEFINITIONS

Self-Motivation: Initiative to undertake or continue a task or activity without another's prodding or supervision.

Teleworker: Employees who work from home or satellite locations for an organization.

Socialization: A continuing process whereby an individual acquires a personal identity and learns the norms, values, behavior, and social skills appropriate to his or her social position.

Intra-Organizational: The level to which an employees has built strong relationships with their colleagues within an organization.

Self-Directed: The ability to guide, manage or regulate oneself without supervision.

Communication: The process of imparting or interchange of thoughts, opinions, or information by speech, writing, or signs.

Virtual Teams: A team of employees working together from different remote locations. The majority of their collaboration occurs online.

Personality: The sum total of the physical, mental, emotional, and social characteristics of an individual. The organized pattern of behavioral characteristics of the individual.

This research was previously published in the Handbook of Research on Human Development in the Digital Age; pages 427-448, copyright year 2018 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Chapter 101
What Does the Future Hold for Innovation Management Education?

Klemen Širok
https://orcid.org/0000-0001-9072-4755
University of Primorska, Slovenia

Pia Jääskeläinen
South-Eastern Finland University of Applied Sciences, Finland

ABSTRACT

Education often struggles to keep up with the pace of changes in the global economy- and technology-driven world. This issue can be seen especially in the education of innovation management. Even if the current pace with which education in general is adapting to these changes remains the same, the intensifying change dynamics imposed by accelerating technological development, labor market changes, population aging, and environmental challenges will simply outpace the education system's adaptability. This chapter aims to identify and describe emerging trends that will most likely put additional pressures on innovation management education in the short- and mid-term. Based on the presented change-driving trends, a concept of a future-oriented innovation management course will be presented. Additionally, the hypothetical implementation of the innovation management course concept will be presented. In the conclusion, the challenges that innovation management education should address will be outlined and discussed.

INTRODUCTION

Education often struggles to keep up with the pace of changes in the global economy- and technology-driven world. This issue manifests especially in the rapidly developing field of innovation management education. Even if the current pace at which education in general adapts to changes remains the same, the intensifying change dynamics imposed by accelerating technological development, labour market

DOI: 10.4018/978-1-7998-7297-9.ch101

Copyright © 2021, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

changes, population ageing, and environmental challenges will simply outpace the education systems' adaptive potential.

This chapter aims to identify and describe emerging trends and developments that will most likely place additional pressures on educational systems in the short- and mid-term. Based upon the presented change-driving trends, a concept of a future-oriented innovation management course is proposed.

Since the aim of this chapter is to inform readers of current and expected future developments in the field of education—more specifically, the education of innovation management—the analysis of context is based upon the context and integrative review (Neuman, 2011, p. 112) of semi-scholarly professional publications and online newsmagazines from the fields of interest (education, technology), observing the general principles of the trend analysis (Rescher, 1998). The proposed concept of a future innovation management course suitable for the outlined changing conditions is the result of a thought experiment built upon the authors' experience with emerging technology in an educational setting.

Following its aim, this chapter first outlines emerging generic societal trends that will most likely put additional pressure on educational systems as being currently recognised by the education (management, developers) community. The observed time horizon for trends is limited to the next five years, since the timeframe to develop and pilot the proposed innovation management course falls under a short- to medium-term scope. The detected trends will be described following the distinction from general to specific. Thus, we first focus on the trends that represent external pressure on education systems and later present more specific short-term developments within the education sector. Next, by taking into consideration the limitations of predicting trends (i.e. trend analysis), we deduce and describe cornerstones and main challenges that the proposed concept of a future-oriented innovation management course should address. In the next section, the introduced concept of an innovation management course will also be presented through a description of its hypothetical implementation. We conclude the chapter with a discussion of the most notable challenges that education systems should address in the mid-term future.

GENERAL SOCIETAL TRENDS MOST LIKELY TO SHAPE INNOVATION EDUCATION IN THE MID-TERM FUTURE

Although appealing, predicting trends (i.e. trend analysis) as practice of collecting information and attempting to spot a pattern is difficult, as historical data may not give a true picture of an underlying trend (Rescher, 1998). Predicting trends involves identifying turning points, but it is difficult to tell in the moment whether one observes mere aberrations or the beginning of a new trend. In addition, long-term projections need more data to support them, which may not always be available. The further out in time one forecasts, the greater the possibility of error, as the passage of time will inevitably introduce new variables. Because trend analysis is based on historical data, both the accuracy and reliability of such forecasts suffer when the environment changes or when one mistakes cyclical trends for long-term influences (Merkgraf, 2017). Despite those limitations, the inherent need to forecast future developments and anticipate problems is important and appealing in a dynamic and uncertain environment, and in higher education, change will be a constant state of affairs in the foreseeable future (Fagan, 2017).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Economic Pressure

Market pressures constantly push institutions to reduce the cost of education (Agrawal, 2017; Fagan, 2017), deliver more value (Fagan, 2017), increase access, and optimize the education system (Agrawal, 2017). In that sense, information technology (IT) innovations offer the possibility of making education more cost-effective and affordable, lowering the overhead costs of institutions, reducing completion times, improving the quality of (online) courses and increasing enrolment, and maximizing the number of students universities can admit (Agrawal, 2017). On the other hand, the societal role of educational institutions has shifted over the last years due to economic pressure and changes in the higher education environment towards a multi-acting innovator in an ecosystem rather than an inter-disciplinary science institution in a global society (Steinbuch, 2016).

Additional forces in the business environment, like market power shifting to the customer, globalization pressure, and new forms of partnership, also contribute to the emerging trend (Kamath, 2015)—observed for now only in the U.S.—of public colleges and universities offering online education programs or courses that rely on external companies. The services of these companies—so-called online program managers—range from simply supplying the online platform through which university affiliates interact with students to all-inclusive distance-learning programs rebranded under the institution's name (Mattes, 2017). While in the U.S. the online program managers are shaping the educational world in the long run, on a global basis, a similar change is increasingly taking place through education export programs. For example, Education Finland (2017), a national education export program run by the Finnish National Agency for Education, is aiming at offering Finnish educational knowhow and learning solutions on a global basis from early childhood and basic education to higher and vocational education, as well as corporate training.

A strong drive for universities to work in a more inter-disciplinary way, focus on entrepreneurs, and determine how to create value is evident. In an environment in which linear thinking and linear processes are desired to be replaced by exponential growth, using the power of platforms (i.e. networks) and circular processes, increased pressures arise for universities to network and open channels to industrial, entrepreneurial, and societally engaged individuals, customers, and partners (Steinbuch, 2016). According to the OECD (2017, 70) institutional collaboration and alliances have occurred recently, but the literature on institutional collaboration remains limited, and going forward, the most weight should be put on the impacts of collaboration and consolidation initiatives to determine the outcome of these activities. In addition, universities are experiencing a proliferation of alternatives to supplement and customize classic education programs and courses, such as Massive Open Online Courses (MOOCs), programming boot camps, and nanodegree programs. Or, as McNeal (2016) puts it: "As Napster 'unbundled' music albums, EdTech start-ups are unpacking the degree."

Technological Pressure

Since the beginning of the information age, we have witnessed general trends of an exponentially increasing amount of data and the development of IT and the number of devices able to handle it. There is a growing awareness that technology will play a positive role in the future of higher education, but some technologies will be more important than others (Kelly, 2017). Additionally, IT technology provides an answer to students' diverse learning needs in academic and work-related environments.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

The increasing number of technologies that can be easily adapted to solve problems in the education sector has recently caught the interest of IT innovators and entrepreneurs (for instance, the Bill and Melinda Gates Foundation and Mark Zuckerberg's Chan Zuckerberg Initiative). Currently emerging IT technologies that will continue to develop in the future include artificial intelligence (AI), big data, and the Internet of things (IoT), which aims to connect multiple electronic devices. Without AI, it would not be possible to manage the massive amount of data available and learn from it to make business decisions, solve perception problems, organize knowledge, or make machines to learn and move. In addition, with increasing computing power, visual time representation of complex data exposed to multiple people in collaborative interaction are also gaining in importance (Cardoza, 2017). However, with the increasing pervasiveness of AI, challenges of security emerged as well (Kleindienst, Land, & O'Meara, 2017). In addition, we should not forget that technology has never been the sole driver of social changes (Edgell, 2011; Watson, 2017). The conference "AI and the Future of Work," hosted by MIT's Computer Science and Artificial Intelligence Laboratory, showed that experts generally agree that AI will have a major impact on jobs and the very nature of work. But, for the most part, these experts viewed AI as mostly augmenting rather than replacing human capabilities, automating the more routine parts of a job and increasing the productivity and quality of workers (Wladawsky-Berger, 2017).

The growing reliance on and usage of mobile devices, along with improved connectivity, the growing need for work-life flexibility, and the growing pressures on higher education institutions to improve graduation rates, pave the way for online classes to retain or grow their popularity. The online education market is forecasted to grow at a compound annual growth rate of 20 percent until 2020 according to a market study released by Technavio (Online Higher Education Market in the US - Forecasts and Analysis by Technavio, 2017), though the European Union (EU) is still lagging behind in this respect (European Union, European Commission, & Directorate-General for Education and Culture, 2016), despite policy efforts to open education ('Opening up Education through New Technologies - Education and Training - European Commission', n.d.).

Labour Market Pressure

Despite mixed reports and opinions on the impact that technological development will have on the future of work (Edgell, 2011; Watson, 2017), one thing remains certain: For now, employers will continue to complain of the insufficient or outdated skills provided by the education system, which are made obsolete by fast technology development and changing business demands. As a consequence, educational institutions will remain under pressure to refine curricula to meet employers' needs, make higher education more accessible, and recruit top employees (Fagan, 2017). In addition to academic skills, non-academic skills should be taken into consideration when defining future curricula (Kamenetz, 2015). The future business world desires not only strong substance skills, but also flexible skills and knowhow—for example, regarding entrepreneurship, marketing, strategic management, collaboration, and innovation. To keep up with the pace of change, close cooperation between businesses and educational institutions is integral.

According to the Hays Global Skills Index 2017 (2017, p. 4), the three major drivers in future global labour markets will be innovative working patterns, diverse working places with well-educated migrants, and digitalization. More and more employers and workers will adopt innovative working patterns, such as freelancing and temporary or on-call jobs. This will have a major impact on the versatile skills future employees (and employers) must be equipped with to succeed in business life. Another important finding of the report is that migrants are increasingly well educated and will increasingly enter the business

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

world on a global basis. Owing to this, working places will become intercultural, requiring entirely new skills from future employees. Finally, digitalization, according to the report, includes AI, big data, online platforms, and computers communicating with each other with little or no human intervention. Digitalization will move up or down the skills spectrum, creating entirely new work roles due to greater efficiencies and lower costs. There are many non-academic skills that will play a major role in the future workplace, but in this context, skills such as critical thinking, collaboration, communication, creativity, and information, media, and technology skills should be highlighted. How to act in the online world with increased awareness of the various items going on around oneself will be in an important part of media skills in the future.

HOW WILL THE OUTLINED TRENDS CHANGE INNOVATION EDUCATION IN THE NEAR FUTURE?

How will the outlined (external) trends change the near future of innovation management education? Can we identify specific education trends shaped by the external pressures? After all, when venture capitalists and seasoned IT innovators and entrepreneurs invest in ideas aimed at disrupting the education sector, one should expect some changes in the near future. But first, according to some observers (Bhalla, 2017) one can also expect a slow but steady downfall of lecture-based or unidirectional learning engagements. However, since all developments and changes also generate some counter-reactions, the second part of this section is dedicated to presenting some pending issues that the described developments will most likely generate.

Data Analytics, Artificial Intelligence, and Personalized Learning

Although often criticized, personalized learning that flies on the wings of improved data analytics supported by AI, big data, and the IoT is certainly hot topic—in the U.S, if nowhere else (Bogardus Cortez & Salcito, 2017; Herold, 2017; Newman, n.d.). The data utilization trend at the university level has shifted from collection and display to real integration. Data systems powered by AI can help create trend insights and projections. Using AI, universities will be able to establish a foundation to use data to drive efficiencies in many aspects of campus life, from learning to infrastructure and management (Bogardus Cortez & Salcito 2017). Learning analytics also promise to support adaptive learning programs (Bogardus Cortez & Salcito, 2017). Data can increase student success and retention, while AI can support the personalization of learning (Bogardus Cortez, 2017e). In a survey of IT decision-makers in higher education, Unit4, a leading global enterprise applications provider for student educational services in higher education institutions, (2017) found that the importance placed on data analytics programs was a driving force of investments in these programs, with 60 percent of surveyed universities in the U.S. using data automation to inform them of at-risk students and provide real-time learning feedback.

Millennials bring an interesting point of view to the table when discussing AI, analytics, and personalized learning. As they were born with the technology at their fingertips, most of them are more comfortable learning from technology than from people (Kelly, 2017b). That said, the technology (AI and personalized learning) should be exploited in a new manner to combine the human touch with technological platforms. In Japan, there are many robots used in the business world (hotels, retirement homes, food deliveries) already taking care of lower level, transactional duties.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Augmented Reality/Virtual Reality/Mixed Reality

Virtual solutions are expected to receive more attention both from education technology (EdTech) developers and from users of this technology (Newman, n.d.), moving beyond existing systems of visual data exploration in biology, math, engineering, visual arts, and digital humanities and making large and complex data sets even more intuitive. We expect that augmented reality (AR) will get more attention than virtual reality (VR) because of its more appealing mix of immersive and personalized virtual learning (Bhalla, 2017). According to Bogardus Cortez (2017c), AR blends real-world interactivity with an immersive video game world, letting students interactively engage with topics of space, human anatomy, and architecture. Medical schools are already looking into how AR and VR can play a role in training future doctors and surgeons. There is also already AI and game-driven training available for criminal justice students examining a crime scene and answering questions (Bogardus Cortez, 2017b).

Reality-based solutions play a key role in getting students (future employees, employers, and entrepreneurs) ready for business life. Reality-based platforms are the only way for students to exercise and practice real-life situations—possibly failing and trying again—in a safe environment. In virtual surroundings, the emphasis of the real-life situation should be in focus, but the user interface and overall usability of the platform naturally plays a role too. Without a user-friendly interface—especially today, thanks to well-developed game and virtual reality environments—the student will find it difficult to focus on the main challenge thrown in his/her direction.

Gamification

Closely related to emerging trend of AR, VR, and mixed reality protruding into the realm of education is the emerging presence of gamification (Newman, n.d.; Reynard, 2017). Graphical, technological advancements have pushed gaming forward and integrated it into learning contexts (Reynard, 2017). Gamification enables (Bhalla, 2017) immersive physical experiences in project-based, social activity-based, and hands-on learning experiences coupled with the ability to record and measure learning improvements while students work on various kinds of projects or tasks. Therefore, in this respect, hardware, sensors, and associated AI merge into physical educational solutions that enable the possibility of evaluating the progress towards educational goals (Teyssier, 2016). Gamification also increases engagement through concepts like accrual, levelling, competition, and rewards. Games also provide students a safe environment in which to fail and try again (Lynch, 2017a).

Increased Collaboration and Networking

Another area of education in which we can expect intensified development in the near future is collaboration and networking (Bogardus Cortez & Salcito, 2017). With the increasing pressure on colleges to prepare students for today's workplace, collaboration tools offer an appealing opportunity to close skill gaps. A more institution-wide approach to collaboration that mimics work environments for students can be developed by opening universities to industry representatives, entrepreneurs, societally engaged individuals, and customers. Challenge-based learning will continue to grow in importance for students because they must be able to make clear connections between their coursework and the real world and realize how the new knowledge and skills will impact their future work (Cortez, 2017a). According to Reynard (2017), connections between communities of learners from various cultures and in various

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

subject areas are also expected to increasingly develop. Some gamification projects have already been coordinated to include participants from around the world, addressing global issues such as poverty and hunger. Indeed, The World Government Summit of 2016 gave attention to gamification and the future of education.

Lynch (2017b) identifies makerspace areas as essential to innovation. This space indicates a creative space in communities, schools, and public and academic libraries that enable collaboration. These makerspaces increase innovation because of the hands-on work done in cooperation with others. Traditionally, these have been labs or working areas in the physical environment, but with digitalization, makerspaces will be available more and more in online and virtual surroundings. Makerspaces provide students with crucial and diverse collaborative experiences, which in business life could be frequently experienced though project-based work, in which people come and go, knowledge is shared among the project team members, and everyone is working towards a common goal in a results-oriented manner. Especially in smaller educational institutions, collaboration and an experiment-focused culture play key roles in success (Garrison, 2017). All educational institutions must become more agile members of the community and society and more innovative partners in the ecosystem, providing added value to the network.

Blended Is Here to Stay, at Least for Now

As already mentioned (Cortez, 2017a), technology will be used to create environments of more flexible learning that blend class time with digital tools. This study has indicated that digital tools can help expand the reach of educators and introduce expert voices to students. Emerging technology like VR will also continue to help facilitate blended learning. Taking into consideration vocal critics of the expansion of AI into realms of education—especially personalized learning (Herold, 2017; Watters, 2016, 2017)—it becomes obvious that at least in the mid-term future (Agrawal, 2017) EdTech solutions should be built to enhance proven processes and help them transition into the digital age. When educational institutions use AI-powered online environments, they should use the AI predictive modelling to create a trajectory for learning that can be shared with the students to support the creation of a learning path (Cortez, 2017d). To ensure widespread success in this use of AI, the precise models and algorithms that educational institutions use cannot be locked up in proprietary systems. They must be challengeable, peer-reviewable, and transparent, so that pedagogical decision-making is done by the people who usually make those decisions.

If you're going to be successful in an online environment, it has to be about putting people first, not tools. The platform and courseware are important—but we will lose a huge portion of students if we don't keep the human connection. (Cortez, 2017b)

Pending Issues Accompanying the Outlined Trends

All developments and changes also generate some level of counter-reaction. Accordingly, all the AI/automation/IoT hype is also building rather strong opposition among humanist-focused people. Every action generates some reaction, and those reactions should be taken into consideration as well.

A lot of the literature focuses on discussing automation, AI, and their impact on future jobs. With all the hype around automation, it seems that on a global basis, automation will disrupt entire industries and put millions of people out of jobs. In fact, up to 45 percent of existing jobs can be automated using

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

current technology (Bidshahri, 2017). How can lecturers know what lies ahead in the future of work? Lecturers and educational institutions were not able to predict the birth and blossoming of the Internet. Yet, educational institutions and their teachers have still managed to enable their students to survive in the Internet-driven business environment (McNeal, 2016). With the growing number of AI-driven devices and robots and increasing automation, will the human touch be minimized in or entirely eliminated from the future business world? Learners must prepare for careers that employ uniquely human traits like self-regulation and communication. Creativity, complex problem-solving, and coordinating with others are among the skills that will become increasingly important for workers to develop by 2020, according to the World Economic Forum (2018). At the same time, future jobs will require multi-skilled employees who are fluent with technology and devices, have their heart and mind in the right place (human touch), and provide additional value to customers. The power remains with humans, not machines. Technological devices will remain platforms and enablers to augment human work performance.

Without a doubt, automation will also shape education and the future work of teachers. After a detailed analysis of more than 2,000 work activities in over 800 occupations, a report by McKinsey and Company stated that of all the sectors examined:

The technical feasibility of automation is lowest in education. Effective education involves more than just transfer of information from a teacher to a student. Good teaching requires complex social interactions and adaptation to the individual student's learning needs. An effective teacher is not just responsive to each student's strengths and weaknesses, but is also empathetic towards the student's state of mind. It's about maximizing human potential. Furthermore, students don't just rely on effective teachers to teach them the course material, but also as a source of life guidance and career mentorship. Deep and meaningful human interaction is crucial and is something that is very difficult, if not impossible, to automate. (Bidshahri, 2017)

All this, along with the strong professional record of accomplishment of teachers, is something AI cannot offer. After all, robots are "only" programmable talking heads. According to McNeal (2016), most adaptive software focuses on knowledge acquisition instead of helping students learn to think and function in modern society.

Siri and Alexa, AI-powered chatbots, proved to be commercially viable, but are they pedagogically viable? That remains an open question. According to Waters (2017), nobody actually wants to talk to a bot. That seems to be a rather crucial observation often overlooked when hyping the capabilities of AI. To be fair, no one actually wants to talk to a human either in many of the scenarios in which bots are utilized—in customer service, for example, in which, whether conducted by human or machine, interactions are highly scripted, and there is always a human behind the scene writing the scripts. Despite the recent hype around advances in AI, we do not have thinking machines. We certainly do not have caring machines. Yet we continue to build teaching machines that reduce pedagogy to its most instrumental form. We continue to build pedagogical agents that reduce helping to the most mechanical and scripted gestures. In addition, according to McNeal (2016), Rory McGreal, a professor in the Centre for Digital Learning at Athabasca University says that you "can't be an adaptive learner if you don't know anything." He says learners need to master content and skills before they can move on to "higher-order" functions like creative thinking.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

According to Herold (2017) leading researchers also claim that their work does not support the most enthusiastic claims being made by supporters of personalized learning, raising numerous questions about the implications of personalized learning for teaching and learning. First, many critics think that personalized learning is all about kids working on their own in front of the computer, a way of working, which ignores the essential social characteristics of learning and puts teachers to the role of "facilitators". Due to the fact, that so many different approaches can be called with the term "personalized learning," it is challenging to say how often this criticism is right on point. Second, some aspects of personalized learning highlight a "reductionist type of education" which divides learning into smaller bits and pieces of various skills, disconnected from an inspiring, overall learning experience and swiping away from students the control over their learning experience (Herold, 2017). Third, tailored learning's experience on enabling different content and study paths to students individually could open the door for watered-down and fewer expectations, greater unfairness, and more challenges holding schools accountable. Forth, rather than advancing human potential, many EdTech companies and universities are perpetuating the status quo (McNeal, 2016). In the meantime, when machine-based, automated learning is obviating the need for students to remember content and improve routine skills, existing EdTech solutions still aims at helping students develop these capabilities. Instead, they should drive learners to sharpen their unique human traits—the ones that will enable them survive and succeed in an ever-increasing automated world. Fifth, many critics are concerned that the term "personalized learning" is just a set up for a disruptive push by the EdTech industry to change education into a massive data-mining program utilizing the IoT and AI-controlled teaching. We are sacrificing our children's privacy and allowing corporations to make potentially life-changing decisions about our kids (Herold, 2017).

Educational institutions, like any other businesses, face enormous market pressures. One must keep an eye on cost, bring more value to the customers (students and government), and reduce completion times. Optimization is key in the game of survival. The roles of educational institutions have changed and will continue to do so in the future. However, there is much literature (scientific and commercial) available to companies of all sizes on re-shaping businesses for the future. The boldest studies propose that companies create their own blue ocean strategies and continuously re-evaluate the business environment and the value they bring to customers (Kim & Mauborgne, 2017). Similar guidance is not available for educational institutions, at least considering the extent of the literature. One could even say that educational institutions should grow gradually with students and not make any major, revolutionary changes in their operations even when the changes around the institutions are clearly more radical. In these cases, is this dramatic change a revolution, or is it only an evolution of the Internet revolution? Educational institutions had to change revolutionarily when the Internet became dominant and changed the way teachers do their jobs. Herold (2017) refers in the publication to Larry Cuban, who is the Stanford University Professor and author of many online learning publications, said he was surprised to find "meaningful, incremental improvements in how teachers organize and teach a lesson"—but not a revolutionary new model of education (Herold, 2017). With all these trends of change in mind and an eye on the future, does the education world really face a major change, or is this just another storm in a teacup?

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

THE CONCEPT OF A FUTURE-ORIENTED INNOVATION MANAGEMENT COURSE

Course Foundations

If we try to summarize the discussion of the emerging (education) trends presented above, there are some elements that stand out, pointing to what should be (in general) integrated when developing future business management courses and (more specifically) the proposed concept of a future-oriented innovation management course. Those courses should incorporate the following fundamental cornerstones.

First, the essence of the courses should revolve around scenarios integrating real-life situations with elements of simulation (in hypothetical cases). The real-life situations or real-life cases should be taken as the starting point for scenario development. For instance, the scenario could include either realistic innovation challenges (already existent and addressed, such as the development of an existing market product or service) or human resource management situations (such as the case of recruiting the computer numerical control (CNC) technician within a small or medium-size enterprise (SME) in the automotive sector under tight labour market conditions). These real-life cases and scenarios would allow a lecturer to inject his/her pedagogic methods (such as prior readings, group discussions, etc.) with corresponding teaching content (theory) into the script and simulated situation.

Second, the course should take place in a virtual environment with an integrated gamification component—i.e. a scripted story forming the backbone of course activities as described above (for instance, a virtual company set up in Second Life and expanded with gamification, AI, and blended learning elements). In this virtual context, the stakeholders would take on different roles mimicking real-life situations, like developing the new product, conducting employee performance evaluations, firing employees, etc. In general, students or learners in business management courses would take on the managerial roles, while the teachers or company representatives would take on the roles of either senior management, customers, or teachers (monitoring the simulation progress), depending upon the simulated situation. It is important to stress that the greatest value of the proposed concept lies not in its virtual component, but in its gamification element. For the course to be effective, the scripting of many possible courses of action that the simulation can take is of utmost importance for providing an experience that is as realistic as possible.

Third, as just outlined, the element of blended learning simultaneously integrating different stakeholders (as many as possible) into the scripted simulation is essential for providing as realistic a teaching experience as possible. It must be stressed that group initiatives with diverse teams (such as a project team including experts from various fields of expertise to solve common challenges) can also be integrated into simulated scenarios. After all, future experts need to understand the big picture, not just their own narrow area of expertise. HR managers, for instance, must understand what is going on in the company in general and how different actions impact different items. With respect to providing a holistic and realistic experience, this concept also enables the integration of co-teaching, allowing knowledge transfer from different yet complementary fields of science. For instance, mastering the first phases of the innovation process requires an understanding of its technology or research, development and innovation (RDI) aspects, financials, marketing, and leadership. The authors of this manuscript propose naming this concept BLURNING, denoting the notion that the borders between learners and other stakeholders in the education/training process are blurring, even more so when the scripted VR scenarios allow for different roles to be taken (played) interchangeably. Multichannel communication with the parties

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

involved could take advantage of social media (crowdsourcing), games, etc. being integrated into a learning platform (i.e. Second Life or other VR/gamification platforms). However, it is essential that face-to-face elements (F2F) remain an integral part of the process to avoid the known limitations and problems of "pure" online learning. The key role remains embodied in the teacher. The teacher with his/her substantive and pedagogical knowledge provides a strong mentoring role (almost that of a big brother), overseeing the whole process and providing information on the expected simulation progress and outcomes, as well as the learning outcomes. The ultimate goal of the virtualized simulation would then be to complete the simulated scenario, with the student applying the knowledge passed to him/her along the way (knowledge application) by solving the challenges experienced in a realistically framed situation (close to realistic experience) focused on achieving specific goals (goal achievement).

The fourth and final cornerstone of the proposed concept is using AI to integrate external contextual elements into the scripted simulation. AI is essential for providing a realistic learner experience and personalizing learning with real-time learner-specific feedback. More specifically, AI integrating realistic external business environment factors like labour market conditions, stock exchange values of certain raw materials, changing market shares, etc. improves the realness of the experience and introduces the uncertainty factor characteristic of the business world. In addition, AI will be employed alongside the gamification evaluation tools to provide individualized (360°) feedback to learners. As students make choices during the simulation responding to the simulated scenes, the evaluation will be generated from those choices. Each of their choices will have consequences for the next scene in a real, branching-scenario approach. In addition, by adapting known education methods like report writing, self-assessment, and peer evaluation at the end of or during the simulation, every learner will be promptly provided with his/her results on each analysis criterion with customized feedback provided by AI and complemented by the teacher/mentor. The strongest personalized-learning models offer the best of what both conservatives and progressives want: high-quality standards and content for students with opportunities to apply that knowledge via self-directed projects, all supplemented by human mentors and technology tools that help students keep track of their own learning (Herold, 2017).

The Hypothetical Implementation of a Bachelor or Masterclass Innovation Management Course

The initial idea is to structure a bachelor or masterclass innovation management course around the eMIPS method (e-supported mass identification of problems and solutions); eMIPS is a meta-method for supporting the first phases of the innovation process, in which a series of specific innovation methods and tools could potentially be used (e.g. Ishikawa diagram, problem mining, innovation cube, etc.). This method is a somewhat extreme open innovation (OI) method, in which the first phases of the innovation process are directly supported and managed by external experts. The concept also puts an important focus (alongside the ideation phase) on the pre-invention phase—i.e. problem identification. The eMIPS method is a sort of "umbrella methodology" that can be dynamically adapted to various SME challenges integrating an organization's employees, external collaborators, and a group of skilled eMentors. The eMIPS method thus offers knowledge on the first phases of the innovation process (i.e. FEI management) and provides tangible results with regard to innovation problems, opportunities, and ideas. The proposed innovation management course concept would take the initial eMIPS idea and transfer it to VR and expand it with gamification scripts and AI tools.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

First, a virtual company will be set up in a VR world. There is also the alternative option of setting up a virtual (university, techno-parks) incubator. Within this virtual company, students would take on the role of a product manager leading a product development team and could interchangeably take on the role of team leader or team member. The innovation management teacher, or in this case mentor, would take on the role of the teacher/mentor (being a sort of big brother to the whole simulation) or the company owner (CEO). Since we assume the possibility of introducing the co-teaching method, one of these roles could be given to the other participating teacher—for instance, a marketing or economics teacher. External companies (i.e. specific SMEs selling certain products or services) would provide innovation challenge and take on the role of an angel investor. There is also the potential to include the suppliers of this external company in the simulation.

For the purposes of the simulation, different viable scenarios would be developed, taking into consideration possible changes in the external environment (different amounts of funding available, availability of specific expertise, different readiness levels of competitors, different company characteristics, etc.). AI would be integrated into scripting, providing some viable scenarios (with viable context limitations).

Within this broad context, the students would take on the tasks and activities dictated by the innovation process by following the eMIPS method, stepwise applying different innovation tools. Before taking on these specific tasks, they would need to attain the required knowledge, which would be provided by the teacher either through video conferencing or assigned readings. As in the real world, students would also need to engage in active communication with the company (i.e. representatives of the company supplying the innovation challenge, taking on the role of the angel investor), suppliers (i.e. representatives of the supplier company), and the market (the role assigned to groups of students or representatives of consumer organizations).

The course can be divided into three phases: preparatory activities, the innovation process, and the course conclusion with the evaluation activities.

The preparatory activities (1) take place in the introductory workshop and include the following sub-activities: a) introductory workshop; b) identification of the main innovation challenge, and; c) definition of teams and roles. The introductory short format workshop: (a) primarily serves to introduce the course (i.e. the simulation) to the participants, provide the initial motivational impetus, and familiarize the participants with navigation and functioning in the VR world. Next, (b) the main innovation challenge will be presented. However, it is important that a basic problem be clearly defined. Even though it is not an obvious pre-condition, it is also useful to check whether the problem is too narrow (potentially dealing with very specific technical details) and if it offers possibilities for teamwork. Next, a great deal of importance is also placed on selecting participants (c), assigning the roles to be taken in the simulation, and explaining the roles and clarifying their borders. The presentation is intended to give involved participants a realistic picture of the envisaged activities and expected results and benefits.

The problematization and ideation phase (2) presents the core of course activities to be carried out in VR. Here, students take their assigned roles and assume the task of navigating through the innovation process, focusing on the given innovation challenge and being exposed to different possible scenarios, guided by the AI and gamification scripting elements running in the background. Following their own assigned roles, teachers provide students both support and an overview of the simulation process. Other stakeholders play their assigned roles as well. The problematization and ideation phase consists of additional sub-phases wherein students apply the knowledge attained through compulsory reading in interactions with other stakeholders,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Identification of Innovation Problems/Opportunities (a). If the company has one serious problem, it might be useful to redefine or decompose the problem into smaller and clearer sub-problems. The result of this phase is a collection of the most important problems or roots of the basic problem. The other option is to focus on the 'mass' detection of problems/innovation opportunities within certain departments or in the whole company. The result of this phase is a clearly defined basic problem or set of problems. Evaluation of Problems/Opportunities (b). If many (sub)problems are identified, those with high potential should be selected. Regarding the basic problem and the company's needs, an appropriate method and selection criteria should first be defined, according to which the selection process is performed. Simply put, these are the problems for which resolution could have significant benefits. The result of this phase is a collection of the most relevant and serious (sub)problems. Next, for each of the selected problems, ideas for solutions (c) should be found. The result is most often a huge repository of ideas, which, of course, should be evaluated. The idea selection process (d) consists of the appropriate method and criteria selection. It is important to stress that the criteria should be chosen according to the initial innovation challenge, the company's specificities and some other relevant factors. The result is a set of the best ideas for solutions to the initial problem(s). The final phase of the course consists of (e) making an implementation plan, taking into account the most important issues of project management at the same time tightly integrating the angel investors and subcontractors into the process. The result is a clear and realistic plan ready for implementation.

After concluding the first cycle of problem identification, problem selection, idea generation, and idea selection, the cycle can be repeated with a different set of methods or with students assigned to different roles. If required (due to observed social dynamic specifics), some problematization and ideation phase activities may take place in face-to-face meetings.

It is important to note that the simulation, more specifically the scenario scripting, can enable different modularities on top of the previously mentioned limitations stemming from the external environment (different amounts of funding available, availability of specific knowhow, different readiness levels of competitors, different company characteristics, etc.). Innovation challenges can either be selected by the teacher, by the students, or by participating companies. Students can either be involved in competing innovation teams within one virtual company or in competing companies within one (university, technoparks) incubator. It is also possible to integrate into the simulation students attending other courses or students from different study fields (faculties)—e.g. chemistry, marketing, management, etc. For instance, entrepreneurship students can, by taking up the role of a different company department, work on feasible business plans, and marketing students can provide realistic market research analysis. In such cases, the simulation involves more teachers (further exploring the opportunities for co-teaching), each of them supervising one aspect of the innovation project. This approach is based on very intense inter-departmental, inter-faculty, and inter-student collaboration. A teacher can also organize the scripting to provide some typical cases of real innovation challenges and then divide students into different groups that each has its own separate role—e.g. companies A, B, C, D, E, a municipality, a natural park administration, a tourist agency, etc. Students within each group then jointly work on finding appropriate solutions to the typical innovation problems by using different methods of innovation/creativity while taking into consideration (at least to some extent) the specifics of their assigned roles (interests, behaviors, norms). The goal of this joint group collaboration is to develop and upgrade the proposed initial solution(s) to the level of a potentially applicable service/product for the market.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

As already mentioned, the final part of the course deals with the assessment of learning outcomes, which will be provided with an eye to many different aspects, giving individualized (360°) feedback to learners. Of course, there is the potential give a classic quiz to evaluate learners, but the main evaluation can be conducted throughout the game by automatically evaluating the decisions taken by the learners. That said, by accommodating the existing educational methods such as report writing, self-assessment, and peer evaluation at the end of or in the middle of the simulation, every student will be provided with his/her results on each analysis criterion with personalized feedback provided by AI and complemented by the teacher/mentor.

CONCLUSION

The title of this chapter is "What Does the Future Hold for Innovation Management Education?" First, the various external trends affecting education in general, such as economic, technological and societal trends, were introduced and discussed. The trends discussed may put additional pressure on education or, alternatively, open new avenues to implement education in the future and build new networking and collaboration bridges between educational institutions and businesses using recent technological advances. In this chapter, the authors propose a new concept of an innovation management course that is in line with emerging changes and is built around the needs and requirements of students (future employees, employers, and entrepreneurs) and business life. The proposed concept of an innovation management course is based on a virtual environment with integrated gamification components, orchestrated by a scripted story forming the backbone of course activities, and the use of AI to integrate external contextual elements. Moving away from the traditional classroom environment and utilizing a scripted, virtual, and AI-powered environment with changing external factors, the students are able to experience real-life business challenges and innovation situations working closely with different target groups. To enable them to gain real business experience, the students are mentored and guided by external business experts and teachers with different areas of expertise to exploit blended learning. The team of experts from various areas provides valuable insights for the students to see and experience the ways in which many details and aspects impact the final decision-making process. Finally, in this proposed concept, the students work in diverse teams (such as project teams) utilizing multichannel communication opportunities. All in all, the new innovation management concept is to be tested in real-life situations combining broader innovation aspects.

The new innovation management course concept also sets certain challenges to the parties involved. Teachers have a key role, orchestrating the concept in its multichannel format and in close collaboration with external business representatives and other teachers. This concept clashes strongly with the notion of "teacher autonomy" and poses tremendous challenges with respect to technology mastery. One can assume that the required IT knowledge is rather high, as is the reliance upon other stakeholders (company participants, suppliers, other teachers). The need to cooperate in co-teaching is still unusual. Additionally, the ability to innovate and adapt to changes is required from all teachers involved in the proposed concept (for instance, design thinking, big-picture thinking going beyond the narrowness of a specific theme [marketing], and responding to changing external factors).

The dependence on IT specialists required to master VR, AI, and the gamification components opens the question of the economic viability of the development of such education programs by regular teaching staff within the university environment. Most likely, one can expect that such courses would

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

be developed by specialized companies backed by companies within a certain industry sector (i.e. the automotive cluster) and then (in later stages) offered in a modified form to the higher education sector. In addition, the initial input required to develop such courses and the complexity of their development would require financial backing. This would come either from the private sector using known entrepreneurial mechanisms or through support from program funding if the development initiative is to stem from the educational realm.

The involvement of industry representatives (external stakeholders with real-life innovation challenges and a positive attitude towards open innovation) is certainly essential to this concept. The question of to what degree the external stakeholders will be willing to participate in the development of such programs remains open. The notion of open innovation is already wide-spread and accepted, but if courses are not specific enough for companies to recognize their benefits, the industry will be reluctant to participate. Even if backed by program funding, the wider adoption beyond the development phase depends to a large extent on the attractiveness of this concept to the industry. Only after this condition is fulfilled will transferring it to general higher education business management programs become viable.

This new concept works strongly to students' advantage. The only challenge from their perspective would be their reluctance to play the learning game (real-life simulation) and deliver in that surrounding. Competitions between the teams, which would require proactive attendance from all students involved, could be a challenge for some individuals.

REFERENCES

Agrawal, A. J. (2017, December 14). *How edtech innovation can revolutionize the education industry*. Retrieved 26 December 2017, from https://thenextweb.com/contributors/2017/12/14/edtech-innovation-can-revolutionize-education-industry/

Bhalla, T. (2017, December 26). *What to expect in 2018 in Edutech sector*. Retrieved 28 December 2017, from http://bwdisrupt.businessworld.in/article/What-to-Expect-in-2018-in-Edutech-Sector-/26-12-2017-135693

Bogardus Cortez, M. (2017e, December 15). *The Top 3 higher ed trends of 2017*. Retrieved 29 December 2017, from https://edtechmagazine.com/higher/article/2017/12/top-3-higher-ed-trends-2017

Bogardus Cortez, M. (2017a, March 30). *NMC report identifies analytics, collaboration as key higher ed tech trends*. Retrieved 29 December 2017, from https://edtechmagazine.com/higher/article/2017/03/nmc-report-identifies-analytics-collaboration-key-higher-ed-tech-trends

Bogardus Cortez, M. (2017b, October 13). *Emerging tech boosts online education growth over next 4 years*. Retrieved from https://edtechmagazine.com/higher/article/2017/10/emerging-tech-boosts-online-education-growth-over-next-4-years

Bogardus Cortez, M. (2017c, October 16). *How will AR transform education?* Retrieved 26 December 2017, from https://edtechmagazine.com/higher/article/2017/10/how-will-ar-transform-education-infographic-0

Bogardus Cortez, M. (2017d, December 13). *What higher education experts want you to know about AI*. Retrieved 29 December 2017, from https://edtechmagazine.com/higher/article/2017/12/what-higher-education-thought-leaders-want-you-understand-about-ai

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Bogardus Cortez, M., & Salcito, A. (2017, November 29). *Data, AI and collaboration top higher ed tech trends*. Retrieved from https://edtechmagazine.com/higher/article/2017/11/data-ai-and-collaboration-top-higher-ed-tech-trends

Cardoza, C. (2017, December 27). *2017: Going all in with AI.* Retrieved 28 December 2017, from https://sdtimes.com/ai/2017-going-ai/

Edgell, S. (2011). The sociology of work: Continuity and change in paid and unpaid work. *Sage (Atlanta, Ga.)*.

European Union, European Commission, & Directorate-General for Education and Culture. (2016). *Education and training monitor 2016*. Luxemburg: Publication Office of the European Union.

Fagan, N. (2017, July 25). *In higher education, IT change is what you make of it*. Retrieved 29 December 2017, from https://edtechmagazine.com/higher/article/2017/07/higher-education-it-change-what-you-make-it

Herold, B. (2017, November 8). The case(s) against personalized learning - education week. *Education Week*. Retrieved from https://www.edweek.org/ew/articles/2017/11/08/the-cases-against-personalized-learning.html

Kamath, V. (2015, January 26). *Observations on online program management*. Retrieved 30 December 2017, from http://tytonpartners.com/library/observations-on-online-program-management/

Kelly, R. (2017, November 10). *Faculty predict virtual/augmented/mixed reality will be key to ed tech in 10 years.* Retrieved 26 December 2017, from https://campustechnology.com/articles/2017/10/11/faculty-predict-virtual-augmented-mixed-reality-will-be-key-to-ed-tech-in-10-years.aspx

Kim, W. C., & Mauborgne, R. (2017). *Blue ocean shift: Beyond competing: Proven steps to inspire confidence and seize new growth*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1610952

Kleindienst, D., Land, J., & O'Meara, D. (2017). *2017 emerging technology domains risk survey* (Technical report No. CMU/SEI-2017-TR-008). Software Engineering Institute, Carnegie Mellon University. Retrieved from https://resources.sei.cmu.edu/asset_files/TechnicalReport/2017_005_001_505319.pdf

Mattes, M. (2017, August 7). *The private side of public higher education*. Retrieved 26 December 2017, from https://tcf.org/content/report/private-side-public-higher-education/

McNeal, M. (2016, August 11). 'Our technology is our ideology': George Siemens on the future of digital learning. *EdSurge News*. Retrieved 27 December 2017, from https://www.edsurge.com/news/2016-08-11-our-technology-is-our-ideology-george-siemens-on-the-future-of-digital-learning

Merkgraf, B. (2017, September 26). *The pros & cons of trend analysis in forecasting*. Retrieved 29 December 2017, from https://bizfluent.com/info-10049339-pros-cons-trend-analysis-forecasting.html

Neuman, W. L. (2011). *Social research methods: Qualitative and quantitative approaches*. Boston: Allyn & Bacon.

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Newman, D. (n.d.). *Top 6 digital transformation trends in education*. Retrieved 28 December 2017, from https://www.forbes.com/sites/danielnewman/2017/07/18/top-6-digital-transformation-trends-in-education/

Online Higher Education Market in the US - Forecasts and Analysis by Technavio. (2017, August 31). Retrieved 31 December 2017, from https://www.businesswire.com/news/home/20170831005049/en/Online-Higher-Education-Market---Forecasts-Analysis

Opening up education through new technologies - Education and training - European Commission. (n.d.). Retrieved 31 December 2017, from https://ec.europa.eu/education/policy/strategic-framework/education-technology_en

Rescher, N. (1998). *Predicting the future: An introduction to the theory of forecasting*. SUNY Press.

Reynard, R. (2017, January 3). *Technology and the future of online learning*. Retrieved 26 December 2017, from https://campustechnology.com/articles/2017/03/01/technology-and-the-future-of-online-learning.aspx

Steinbuch, M. (2016, July 23). *Towards the 4th generation university*. Retrieved 26 December 2017, from https://steinbuch.wordpress.com/2016/07/23/towards-the-4th-generation-university/

Teyssier, Y. (2016, November 20). *5 advantages of using games for learning*. Retrieved 30 December 2017, from https://elearningindustry.com/5-advantages-games-for-learning

Unit4. (2017, November 1). *Unit4 reports 73% of higher ed institutions have adapted structures to support student success*. Retrieved 27 April 2018, from https://www.unit4.com/us/about/news/2017/11/student-success-technology-survey

Watson, T. (2017). *Sociology, work and organisation* (7th ed.). Taylor & Francis.

Watters, A. (2016, September 14). *Clippy and the history of the future of educational chatbots*. Retrieved 30 December 2017, from http://hackeducation.com/2016/09/14/chatbot

Watters, A. (2017, December 20). *Robots are coming for your children*. Retrieved 30 December 2017, from http://hackeducation.com/2017/12/20/top-ed-tech-trends-robots-kids

Wladawsky-Berger, I. (2017, December 22). Artificial intelligence and the future of work. *The Wall Street Journal*. Retrieved from https://blogs.wsj.com/cio/2017/12/22/artificial-intelligence-and-the-future-of-work/

This research was previously published in Educational and Social Dimensions of Digital Transformation in Organizations; pages 294-315, copyright year 2019 by Information Science Reference (an imprint of IGI Global).

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Index

21st Cen 263
70-20-10 model 1770, 1785-1786

A

Academia 189, 229, 238, 274, 276, 525, 619, 660, 717, 987, 998, 1282-1283, 1286-1293, 1295, 1298-1299, 1367-1369, 1451, 1457, 1467, 1782, 1938, 1944
Academic Behaviors 1282
academic culture 1282, 1291, 1295
academic members 1288, 1290, 1292-1293, 1299
Accessibility 70-92, 191-192, 194-201, 247, 312-313, 315-318, 321, 329, 354-365, 367-381, 383, 385, 390, 393-414, 449-453, 455-462, 501-505, 509, 512-513, 516-521, 525, 687-691, 694-697, 716, 780-785, 787-789, 793-802, 924, 954, 1025, 1123, 1125, 1129, 1134, 1300, 1306, 1308, 1312, 1372-1373, 1377, 1385-1404, 1472-1479, 1483-1500, 1502-1503, 1507-1512, 1514, 1518, 1533-1537, 1542, 1545, 1550-1551, 1553, 1556, 1572, 1909, 1991-1992
Accessibility Evaluation 87, 91, 362-363, 365, 368-369, 375, 378-379, 383, 385, 394-406, 408, 411-412, 517, 697, 783, 785, 796-797, 799-800, 1387, 1393, 1398-1401
accessible design 191-198
accessible participatory design 191-193, 195-196, 198
Action Research 8, 10-11, 21, 610, 750, 824-825, 834, 836, 1455-1457, 1469, 1571-1573, 1774, 1802-1804, 1806, 1811, 1814
Activity Theory 194, 590-591, 595-598, 600-602, 604-605, 607, 610-612
Ad-Hoc Training 2000, 2010
ADKAR 990, 996, 999, 1383
Adoption 12, 16, 19, 23-31, 34, 37, 52, 59, 68, 74, 78, 84, 108, 120, 125, 127, 132, 168, 187, 242, 299, 333, 338-339, 342, 345-346, 348, 350-351, 370, 416, 430, 465, 471, 480, 504, 542-544, 559, 583-584, 628, 641, 653, 663, 763, 766, 790, 796-797, 802, 804-805, 815-816, 820, 839-840, 848, 885, 909-912, 914-930, 955, 1021, 1065, 1197, 1225, 1237, 1239, 1247-1248, 1261, 1266, 1268-1270, 1276-1277, 1280, 1291, 1301-1302, 1305, 1307-1315, 1357, 1366-1368, 1379, 1386, 1394, 1397, 1400-1401, 1406-1408, 1417-1418, 1420, 1423-1424, 1473, 1492, 1500, 1514, 1536, 1575, 1581, 1587, 1593-1597, 1601, 1605, 1608, 1610-1611, 1614-1615, 1637-1639, 1641, 1645, 1651-1654, 1656-1659, 1705, 1712, 1721, 1724, 1735, 1738, 1743, 1883, 1898, 1946, 1987, 1992, 2024, 2047
adoption rate 915, 918, 920, 923-925, 929
Adult Learning 24, 31, 33, 37, 54, 748
Affective Commitment To Change 804, 806-808, 810-816, 818, 1405-1406, 1409-1411, 1413-1419
Affective Commitment To Organization 803-804, 806-808, 810-816, 1405-1406, 1408-1411, 1413-1418
Agency 43, 188, 195, 230, 339, 342, 742-743, 750-751, 879, 934, 938, 946, 948, 950, 1001, 1076, 1104, 1115, 1129, 1131, 1343, 1367, 1400, 1429, 1447-1448, 1516, 1534, 1540, 1574, 1576, 1597, 1605, 1611, 1617, 1653, 1671, 1792-1793, 1795-1797, 1800, 1802-1806, 1811-1812, 1891, 1949, 2035, 2045
agent performance systems 1824
agentic traits 616
Agile 239, 279, 471, 478, 480, 482, 641, 661, 840, 1105, 1199-1201, 1205, 1210, 1217-1218, 1221, 1317, 1361, 1366, 1377, 1379, 1384, 1420, 1550, 1573, 1625-1626, 1637, 1742, 1928, 1939, 1941, 1944, 2001, 2005, 2039
Alternative Contents 391, 407, 410, 413
animal and crop diseases 243-244, 253
anywhere leadership 279-280, 283-286, 295, 297-302, 309-310
Application 8, 36, 38, 80-81, 85, 126, 166, 171, 179, 190, 230, 233, 244, 247-249, 251-253, 260, 273, 332-333, 341, 343, 355, 360, 367, 430, 449,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

451-453, 457-460, 462, 464, 466-467, 486, 493, 499, 505-506, 518-519, 529, 534-535, 543, 555, 560-561, 567, 577, 585, 609-610, 640, 698, 703, 707, 735, 745, 747-748, 777-778, 820, 839, 843, 847, 856, 862, 894-895, 898, 902-903, 909, 979, 982, 987, 989, 1004, 1006, 1009, 1029-1030, 1032, 1034, 1044, 1050-1051, 1122, 1138, 1153, 1158, 1183, 1195, 1230-1231, 1235, 1240, 1242, 1246, 1263, 1268-1269, 1282-1283, 1287, 1289, 1293, 1300-1304, 1310, 1320, 1325, 1350, 1354, 1361, 1428, 1440-1441, 1443-1444, 1472, 1477, 1480-1481, 1490-1491, 1493, 1507, 1509, 1513, 1522-1524, 1554-1555, 1557-1559, 1566-1567, 1569, 1574, 1608-1609, 1614, 1617, 1628, 1637, 1643, 1696, 1704-1706, 1708, 1710-1711, 1715, 1750-1752, 1758, 1760, 1762, 1764-1766, 1779, 1797, 1807, 1835, 1872-1873, 1880, 1905, 1910, 1939-1940, 1980, 1982, 1986, 2001, 2016, 2021, 2024, 2043

Archaeological Spaces 1472

Artificial Intelligence (AI) 33, 119, 1219, 1259, 1261, 1624, 1706, 1739, 1944, 1953, 2036

asset specificity 915, 919, 929

Assistive Technology 80, 197, 200-201, 363, 370, 501, 503, 798, 1134, 1403

Asynchronous 618, 668, 674-675, 682, 1063-1064, 1068-1069, 1073, 1075, 1080-1081, 1084, 1088-1090, 1095, 1498, 1555, 1567, 1663-1664

asynchronous communications 1068, 1081, 1088-1089, 1095

ATAG 374-377, 409-411, 413

ATAG 2.0 374, 376-377, 409, 411

Attitude Toward Enterprise Resource Planning System 803, 1405

Attitude Toward ERP 803, 807-808, 810, 814, 816, 1406-1411, 1413-1416, 1418-1419

Attitude Towards Organizational Change 130, 132-133, 135-138, 140-145, 1763

Attitudes 4, 9, 12-13, 74, 94, 96, 98-99, 109-110, 112, 114, 130-135, 137, 145-147, 149, 177-178, 188, 206-207, 229, 288, 309, 330, 350, 416, 508, 557, 564, 634, 649, 653, 658, 735, 739, 743-746, 749, 754, 803, 805-807, 814-816, 818, 821-822, 826, 884, 911, 925, 1119, 1121, 1125, 1136, 1148, 1157, 1177-1178, 1181, 1191-1192, 1296, 1358, 1410-1411, 1417, 1425-1426, 1446, 1455, 1469, 1620, 1625, 1628, 1630, 1641, 1645, 1660-1667, 1669-1673, 1675, 1677, 1697, 1750, 1752, 1755-1768, 1799, 1918, 1937-1938, 1940, 1943, 1949, 1974-1975

authentic followership 1616, 1622, 1630, 1632

Authentic Leadership 150, 1195, 1432, 1618, 1630-1636

Authentic Learning 524, 527, 534, 536, 539, 1060, 1063, 1080

Authentic Learning Situations 1060, 1063, 1080

Authenticity 913, 1057, 1583, 1618, 1621-1623, 1627-1628, 1636, 1780, 1923

authoring tools 194, 355, 372, 374-376, 409-410, 413

autocatalytic process 939, 944-945, 950

auto-ethnographic narratives 1465

Automation 49, 51, 53-55, 57, 63-64, 66-67, 122, 248, 328, 352, 458, 587, 706, 711, 839-840, 844-845, 852, 854, 859-860, 864, 872, 913, 923, 1008, 1051, 1219, 1230-1232, 1241, 1577, 1579, 1608, 1619-1620, 1634, 1786, 1977, 1981-1982, 1994, 1996, 1999, 2026, 2037, 2039-2040

Autopoietic Processes 950

B

B2B (Business-to-Business) 1243

B2C (Business-to-Consumer) 1244

B2G (Business-to-Government) 1244

Bank Sector 46, 756

basic learning activities 918-919, 922-923, 925, 929

Behavior 8-9, 11, 13, 19-21, 31, 39, 82, 86, 89, 91, 114-115, 132, 134, 138-140, 143, 146, 148, 156, 169, 188, 202-209, 219, 223-224, 230, 233-234, 236, 239, 282, 284-285, 288, 295, 297, 305, 307-310, 313-314, 317, 346, 348, 352, 371, 416, 419-420, 422, 431, 453, 457, 466, 477, 479, 485, 487, 504, 513, 525, 538, 557-558, 568, 590-593, 595, 598-599, 601-604, 606, 609-610, 612, 617, 621-622, 628-629, 632-634, 636-638, 645, 650, 655, 659, 685, 688, 690-695, 697, 712, 721, 728, 730, 732, 737-738, 753, 757-758, 775, 781, 805-807, 814, 817-822, 825-827, 833, 861, 898, 900, 903, 915, 919, 934-936, 938, 940-941, 943, 956, 958, 961, 963-964, 977, 979, 982, 989, 993, 996, 1000, 1002-1003, 1041, 1043-1044, 1056, 1071, 1104, 1113, 1134-1135, 1148-1149, 1152, 1177, 1191, 1194, 1196, 1202, 1227, 1234, 1285, 1288, 1299, 1318, 1324-1325, 1355, 1358, 1410, 1416, 1419-1423, 1425-1426, 1449, 1451, 1453, 1459, 1462-1463, 1468, 1524-1525, 1574, 1588, 1591, 1613, 1618, 1620, 1629, 1633-1635, 1646, 1653-1654, 1656, 1658-1659, 1661, 1672, 1674, 1685, 1689-1690, 1706, 1748, 1752, 1754, 1766-1767, 1770, 1775-1779, 1781-1782, 1785-1786, 1805, 1818, 1831, 1836-1837, 1841, 1843, 1845-1850, 1891-1895, 1897, 1932-1934, 1946, 1974-1976,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

2002, 2031-2032
behavioral cluster 288, 291, 296, 298, 309-310
Behavioral Taxonomy 279, 286, 310
Behaviorally-Based Leadership 309
Best Evidence 46-47, 227, 231, 743-745, 747, 824, 1568, 1792, 1801, 1803-1807, 1811-1812
Big Bang Theory 1045, 1058
Big Data 115, 121, 128, 265, 331, 463, 468-470, 481-482, 484, 543, 587, 699, 703, 718, 762, 778, 838, 840-843, 846, 859, 863-864, 1151, 1215-1216, 1220, 1225, 1235, 1258, 1263, 1579-1580, 1583-1587, 1590, 1592, 1640, 1703, 1706, 1709-1712, 1715-1717, 1719, 1738, 1743, 1745, 1749, 1914, 1979, 1987, 2036-2037
Blended Learning 64, 908-912, 914-921, 925-929, 1155, 1950, 1954, 2033, 2039, 2042, 2046
Blogs 533-534, 620, 917, 1009, 1382, 1509, 1777, 1869, 1917-1918, 1921-1922, 2049
BLURNING 2042
boundary flexibility 1955-1957, 1959-1962, 1964-1965, 1969, 1971, 1975
boundary permeability 1955-1957, 1961-1962, 1966, 1969-1971
Boundary Theory 1955, 1976
Braille keyboard 501, 503, 505, 509, 512-513, 515, 517, 519
Business 2-4, 6, 12, 14, 16, 18-19, 21-25, 27, 30-31, 37-40, 44-45, 47-48, 54, 59-60, 64, 67-68, 72, 74, 78-80, 88-89, 101-102, 104, 113, 115-126, 129, 148-149, 152, 163-169, 173, 177-190, 203-204, 208, 212, 215-216, 219-224, 229, 237, 239-242, 249, 263-278, 282, 284, 295, 301, 303-307, 309-310, 313, 332-334, 340, 342-351, 415-417, 429-430, 433-435, 437, 443-448, 451, 460, 463-469, 475-477, 479-484, 486, 493, 499, 540-541, 543, 554, 556-558, 567-568, 571, 580-581, 586-587, 607, 621, 632, 634, 636, 640-641, 643-649, 652-658, 661-662, 665, 685, 697, 703-704, 706, 711, 718-719, 721, 724, 729, 737-741, 744, 751, 754-756, 758, 760, 765, 772, 774-779, 798-799, 803-804, 819-821, 823-825, 829, 833, 835, 837, 839-840, 865, 873, 877, 883, 886-895, 897-899, 901-907, 928, 951-954, 961-967, 969-977, 979, 981-983, 985, 988-989, 991, 997-1004, 1007, 1010-1011, 1017, 1019-1021, 1078, 1081-1087, 1089, 1091, 1095, 1097-1099, 1102, 1104-1106, 1113, 1117-1118, 1135-1138, 1140-1141, 1146-1148, 1150-1151, 1153, 1157-1160, 1162, 1164, 1166-1167, 1170, 1172, 1175-1177, 1179-1180, 1182-1183, 1186, 1190-1200, 1203-1204, 1208, 1210-1211, 1214-1215, 1217-1220, 1222, 1224-1227, 1230-1231, 1233-1234, 1236, 1240-1247, 1250-1255, 1258-1259, 1261-1262, 1264-1265, 1268, 1270, 1277-1280, 1283, 1287, 1294, 1296, 1298, 1300-1304, 1306-1311, 1313-1316, 1320-1323, 1325, 1329, 1336-1338, 1340-1368, 1371, 1374, 1379, 1381-1382, 1384, 1405-1406, 1420-1425, 1428, 1433, 1436, 1447-1452, 1457-1464, 1468, 1471, 1495, 1501, 1504, 1506, 1515, 1520-1521, 1523, 1525-1526, 1532, 1536, 1582, 1586, 1588-1591, 1601, 1605-1606, 1608, 1611, 1613-1614, 1618-1620, 1631, 1633-1634, 1637, 1640, 1644, 1658-1659, 1673, 1675, 1681-1682, 1689, 1691-1692, 1695, 1697-1700, 1702, 1704-1706, 1708-1712, 1715-1718, 1727, 1737-1750, 1753-1754, 1756-1757, 1762, 1767-1768, 1770-1773, 1776-1778, 1780-1783, 1785, 1787-1791, 1793-1795, 1797, 1799-1801, 1812-1814, 1816-1822, 1830-1832, 1834-1839, 1841, 1843-1846, 1848, 1850, 1854, 1859-1861, 1863-1866, 1869, 1882, 1889, 1891-1899, 1901-1902, 1905, 1907, 1909-1910, 1912-1914, 1916-1917, 1920, 1923, 1927-1934, 1939, 1944, 1948, 1950, 1953, 1962, 1974, 1976, 1979-1983, 1985, 1987, 1992-1993, 1995-2001, 2004, 2008-2011, 2013-2016, 2021, 2024-2027, 2030, 2035-2043, 2045-2047
business and competitive intelligence 966-967, 981, 983
Business Intelligence 126, 190, 265, 429, 982-983, 989, 1225, 1243, 1591, 1605, 1743
Business Process Analysis 1366, 1374, 1384
Business Transformation 40, 121, 557, 581, 640-641, 649, 778, 865, 907, 1748, 1773, 2001
business trip 1087
business-IT alignment maturity level 887, 893-894, 901, 903
Byzantine monuments 1472-1473, 1476-1477, 1479, 1486, 1495

C

C2C 1233, 1244
Central Archaeological Council 1475, 1485, 1487, 1489, 1495
Change Agent 1, 10-11, 22, 46-47, 145, 168, 234, 648, 652, 723-725, 735-736, 742, 744, 746-748, 750-752, 823, 828-830, 909, 1203, 1342, 1353-1355, 1358-1360, 1364, 1419, 1445, 1452-1456, 1459-1465, 1470, 1766, 1771, 1797
change diagnostics 1199, 1203, 1219
Change Management 1-3, 8, 18-23, 26, 43, 46-47, 94, 99, 106, 108-109, 114, 121, 145, 147-148, 150, 152-153, 156-157, 160, 163, 168-169, 178, 183,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

187-188, 202, 204, 206-210, 212-214, 218-219, 221-223, 239, 241, 270, 432-434, 438, 445-447, 537, 640-652, 655, 658-661, 737, 739-740, 743-744, 746-747, 749-755, 757, 759, 804, 815-819, 822, 824, 831-835, 837, 931, 942, 953, 955, 962-964, 990, 992-998, 1000-1004, 1191-1192, 1194-1195, 1203-1204, 1221-1222, 1271, 1279, 1340, 1343, 1350, 1352-1356, 1358, 1360-1364, 1366, 1369, 1372-1373, 1375, 1378, 1380, 1382-1384, 1405-1406, 1418-1419, 1421-1422, 1424-1430, 1432, 1438, 1440-1441, 1446-1448, 1450, 1467-1468, 1532, 1595, 1597, 1611, 1614, 1702, 1750, 1753, 1762, 1765-1768, 1772, 1775, 1782, 1794, 1796-1798, 1800, 1802-1804, 1811-1814, 1817, 1819

Change Process 1, 4, 6, 9, 15, 17, 22, 105, 132-135, 144, 152-154, 156, 160-161, 168-169, 206, 234-237, 433-434, 444, 447, 656-657, 659, 724-736, 743-746, 749-750, 752-753, 759, 817, 825, 828-829, 831, 996, 1181-1182, 1185-1186, 1190, 1340-1345, 1347-1358, 1361, 1364, 1419, 1429, 1431-1432, 1434, 1438-1439, 1441-1442, 1451-1457, 1459, 1463-1466, 1625, 1753-1754, 1756, 1762, 1776, 1779-1780, 1797-1799, 1802

Change Readiness 733, 742-743, 747, 749, 752, 759, 834, 1373

Change Resistance 41, 43, 742, 746

Change Stimulus 1365

Channel 106, 119, 121, 244, 247, 254, 256, 259-260, 262, 647, 662, 668, 794, 913, 1009-1010, 1505, 1519-1520, 1524-1525, 1751, 1919-1920, 1923, 1925, 1928, 1930

Characterization 70, 92, 856, 860, 898, 955, 1107, 1112, 1321-1323, 1377, 1841, 1844

chatbot 1934, 2049

CIMM 1901-1911

circuits of power 1593-1594, 1597-1599, 1607, 1611, 1614

Cloud 57, 116-120, 122, 124, 129, 248, 265, 270-271, 412, 463-466, 475, 484, 529-530, 662, 666-667, 669, 681, 685, 762, 770, 799, 838, 840, 842-843, 846-847, 854, 859-860, 863-864, 929, 1008, 1068, 1081-1082, 1084, 1087, 1093, 1095, 1097, 1099, 1131, 1150, 1225-1226, 1230, 1232, 1235, 1237, 1263, 1300-1306, 1309-1310, 1312-1316, 1347, 1371, 1450, 1482, 1520, 1522, 1563, 1617, 1640, 1712-1713, 1716, 1718, 1738-1739, 1749, 1928, 1938, 1940, 1979, 1984

Cloud Computing 116-119, 124, 248, 270-271, 412, 463, 466, 484, 666, 685, 762, 799, 838, 840, 842, 846-847, 864, 929, 1081-1082, 1084, 1087, 1093, 1095, 1097, 1099, 1131, 1225, 1235, 1263, 1300-1301, 1303-1305, 1312-1316, 1617, 1640, 1712-1713, 1718, 1739, 1749, 1938, 1940, 1979

Cluster 136, 171, 183, 287-288, 291, 293, 296, 298, 309-310, 499, 529, 687, 690-691, 693-698, 767, 936, 1054, 1101-1102, 1112, 1115, 1118, 2047

co-classification 761-763, 766-767, 771, 777-778

Codification 1282, 1299

Codification Approach 1299

Collaboration 26, 42, 56, 59, 61-62, 82, 97, 132, 250, 252, 266, 270, 282, 287-288, 295, 297, 304, 308, 324, 338, 465, 467, 471, 478-479, 482, 500, 523-525, 528-531, 534, 536, 566, 571, 609, 616-617, 629, 645, 655, 663-666, 668-671, 682, 684-686, 729, 734-736, 776, 824, 871, 913, 1017, 1028, 1030, 1060-1062, 1065, 1067-1069, 1071-1078, 1080, 1084, 1092, 1098-1107, 1112, 1115, 1117, 1121, 1150-1151, 1198, 1214-1215, 1248, 1258, 1292, 1296, 1298, 1369-1370, 1373-1374, 1379-1380, 1384, 1423, 1460, 1464-1465, 1513-1514, 1520, 1565, 1614, 1617, 1638, 1643, 1650, 1654, 1657, 1664, 1671-1672, 1675, 1680, 1688-1690, 1697, 1708, 1916, 1924, 1929, 1937, 1942, 1946, 1984-1985, 1988, 2000-2001, 2004, 2021, 2032, 2035-2039, 2045-2048

Collaborative Culture 121, 478, 484, 1095, 1624, 1631

Collaborative Technologies 281, 523, 1150, 1661

Collaborative Work 198, 669, 890, 899, 1060-1061, 1063, 1065-1077, 1080, 1551, 1553, 1572

communal traits 614, 625

Communication 5, 14, 37, 40, 54-56, 58, 61, 70, 99, 103-105, 117-119, 123, 126, 128, 132, 135, 155, 172, 181, 189, 191, 196, 222, 244-248, 251, 254, 258, 260, 262, 264-267, 269-270, 274, 278, 280-283, 285, 287-288, 290-291, 293, 295, 297-298, 305-306, 309, 328, 334-335, 338, 351-352, 368-369, 410-412, 430, 432-447, 465-466, 484-486, 494, 499, 519, 523-524, 526-528, 531, 533-534, 536, 539, 543-544, 558, 561, 565, 568, 595, 597, 599, 611, 614-615, 618, 620-622, 624, 629-635, 637-638, 647, 649-650, 652-655, 661-664, 666, 668-669, 671, 674-676, 681-682, 685-686, 688, 698, 706, 712-713, 720, 725-726, 728-730, 732, 734-736, 738, 758, 762, 764, 767, 771, 774, 796, 798-799, 801, 817, 821, 828, 831, 846, 848, 851, 854, 860, 866-868, 871-872, 874-879, 881-882, 911, 931-943, 945-951, 955, 961, 969, 983-984, 997, 1003, 1006, 1008, 1011, 1017, 1022, 1024, 1030, 1036-1037, 1041-1042, 1050-1056, 1062, 1064, 1069, 1072, 1075, 1077, 1080-1082, 1084, 1087-1090, 1092, 1094, 1119, 1121-1122, 1129,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1132, 1137, 1140, 1148-1149, 1152-1158, 1173, 1180-1181, 1185, 1192, 1194, 1201-1203, 1208, 1210, 1212, 1214, 1224-1225, 1228-1229, 1231, 1238-1239, 1244-1246, 1251, 1253-1265, 1267, 1270, 1278, 1280, 1288, 1292, 1319-1320, 1336, 1343-1345, 1347, 1355, 1358, 1360-1361, 1368-1371, 1373, 1377, 1379-1380, 1385, 1391, 1393, 1400, 1406-1407, 1418-1419, 1424, 1440-1442, 1444, 1446, 1454-1455, 1460, 1463-1465, 1477, 1480, 1486, 1495, 1498, 1503, 1505, 1508-1510, 1512, 1515, 1534-1535, 1537, 1545-1546, 1549, 1551-1552, 1554-1555, 1557, 1559, 1564-1565, 1569-1571, 1575-1576, 1578, 1582-1583, 1585, 1589, 1591, 1615, 1623-1624, 1633, 1640, 1643, 1658, 1661, 1663-1665, 1672-1673, 1675, 1677, 1679-1683, 1685, 1687-1690, 1694, 1696, 1698-1699, 1718, 1720, 1725, 1732, 1735, 1741, 1744, 1753-1755, 1761, 1764, 1768-1769, 1782, 1797, 1823, 1829-1830, 1834, 1840, 1855, 1865-1866, 1881, 1889-1890, 1893-1895, 1897-1899, 1917-1919, 1923-1926, 1928, 1934-1938, 1940-1941, 1945, 1950, 1955-1956, 1966, 1974, 1976, 1978-1980, 1982-1983, 1987-1988, 1995-1997, 2003-2004, 2011-2012, 2016, 2018-2028, 2030, 2032, 2037, 2040, 2042, 2044, 2046

Communication Technologies 70, 117, 123, 128, 191, 247, 265, 280, 335, 352, 412, 466, 543, 561, 611, 664, 712, 774, 866-868, 871-872, 874-879, 881-882, 1022, 1024, 1030, 1036, 1042, 1050-1052, 1055, 1081-1082, 1084, 1121, 1137, 1224, 1228-1229, 1231, 1239, 1244-1245, 1257, 1355, 1385, 1393, 1495, 1512, 1537, 1549, 1578, 1582, 1677, 1718, 1720, 1735, 1823, 1830, 1840, 1889-1890, 1893-1895, 1897-1898, 1974

Commuting 280, 337, 339, 348, 1120, 1122, 1132, 1159, 1164, 1168-1169, 1171-1173, 1176, 1961, 2004, 2012, 2017, 2025

co-modal 1060, 1062, 1073, 1080

Company Culture 833, 969, 1199, 1202-1203, 1927, 1930

Company Maturity 1901

Comparison 47, 76, 217, 298, 322, 330, 348, 350, 360, 362, 486-492, 494-495, 497-498, 517, 555, 578, 580, 606, 616, 618, 626-627, 630, 632-633, 661, 675, 696, 766, 778, 792, 799, 812, 820, 836, 858, 899, 921, 927, 979, 1056, 1065-1066, 1138, 1158, 1226, 1230, 1233-1234, 1301, 1306, 1311, 1347, 1388, 1393, 1403, 1415, 1421, 1423, 1444-1445, 1527, 1543-1544, 1563, 1655, 1671, 1683, 1685-1686, 1690, 1712, 1848, 1866, 1897, 1902, 1966, 1993

competence development 908, 915, 930

Competency 31, 94, 105, 121, 657, 826, 1017, 1061, 1072, 1196, 1309, 1317, 1324-1327, 1329-1330, 1332-1333, 1336, 1338, 1374, 1377, 1386, 1656, 1664, 1979, 1985, 2007

competency management 1317, 1325, 1329-1330, 1336

Competitive Advantage 2-4, 18, 21, 31, 131, 163, 202, 274, 346, 465, 469, 484, 560-561, 585, 617, 625, 640-641, 652, 743-744, 747, 754-756, 761, 771, 774, 819, 829, 832-833, 835, 906, 961, 979, 986, 1011, 1016, 1019, 1021, 1098, 1153, 1155-1156, 1179, 1181-1182, 1195-1196, 1285, 1324-1325, 1344-1345, 1352-1354, 1356, 1491, 1499, 1696, 1705-1706, 1737, 1739, 1741, 1744, 1746, 1785, 1836, 1849, 1859, 1864-1865, 1893, 1901-1902, 1904, 1907-1909, 1919, 1943, 1991, 2006, 2016

Competitive Intelligence 656, 966-967, 981-983, 988-989, 1017, 1197, 1859

Competitiveness 18, 117, 123, 166, 185, 269, 567-568, 574, 578, 665, 732-733, 741, 868, 953-954, 966-967, 970, 973, 975, 978-979, 982, 985, 989, 1025, 1102, 1154, 1162, 1194, 1224-1225, 1231, 1317-1319, 1594, 1664, 1706, 1740, 1795, 1848, 1852, 1892-1893, 1899, 1978

Complex adaptive systems 948

Compliance 26, 75-77, 79, 83, 88, 90, 92, 135, 143, 162, 270, 354-357, 359-362, 364, 369-371, 412-413, 451, 456, 782, 784, 787, 794-795, 799-801, 876, 941, 954, 1031, 1097, 1231, 1270, 1375, 1386, 1388, 1393-1394, 1398-1399, 1401-1402, 1655, 1696, 1798, 1811, 1923, 1980

Computing 35, 56, 80-81, 89-90, 116-120, 124, 197, 199, 201, 248, 261, 265, 270-271, 332-334, 339, 341, 344-346, 372, 375, 411-413, 463, 466, 469, 480-482, 484, 506, 610-612, 666, 685, 697, 762-763, 768, 799-800, 838, 840, 842, 845-847, 854, 859, 864-865, 929, 1033, 1070, 1081-1082, 1084, 1087, 1091, 1093, 1095, 1097, 1099, 1131, 1225, 1235, 1245-1246, 1258, 1260, 1263-1264, 1300-1301, 1303-1305, 1312-1316, 1374, 1476, 1550, 1566-1567, 1577, 1588, 1617, 1640, 1711-1713, 1718, 1733-1734, 1739, 1749, 1831, 1882, 1933, 1938, 1940-1941, 1955, 1959, 1979, 2012, 2036

Concept 1-2, 15, 18, 31, 62, 72, 75, 95, 100, 102, 111, 113, 117-118, 123, 133-134, 149, 153, 156-157, 164, 194, 201, 212-213, 218, 221, 223-224, 233, 236, 239, 245, 263, 268, 272-273, 282, 284, 297, 305, 313, 322, 328, 336, 341, 346, 349, 418, 430, 434, 437, 466-467, 475, 496, 560-561, 563, 566-567, 571, 577, 585, 590, 592, 597, 601, 607, 700-701, 703-704, 706, 708-711, 714, 716, 721, 725,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

732, 746, 763-764, 777, 805, 823, 834, 838, 841-845, 848, 852, 859-860, 864, 867-870, 872-873, 886-889, 892-893, 904-905, 910, 915, 925, 929, 954, 963-964, 970, 979, 987, 1002, 1004, 1007, 1010, 1024, 1029, 1038-1039, 1042, 1044-1048, 1050, 1052, 1082-1083, 1088, 1090-1092, 1098, 1100, 1129, 1157, 1160, 1181, 1183-1184, 1207, 1236, 1239, 1267, 1271, 1284-1285, 1296, 1317, 1319-1321, 1328-1330, 1334, 1337-1338, 1343, 1346, 1375, 1408, 1431-1432, 1449, 1475-1476, 1480, 1483, 1502, 1507, 1513, 1515, 1527, 1541, 1549-1550, 1554, 1563, 1571, 1579, 1594-1595, 1598, 1640, 1642-1645, 1651, 1693, 1698, 1722, 1724, 1737, 1740-1742, 1744, 1752, 1784-1785, 1801, 1813, 1836-1837, 1839-1841, 1846, 1848-1850, 1855, 1859, 1863, 1877, 1880, 1890-1891, 1894, 1906, 1918-1919, 1921, 1937, 1945, 1956, 1959, 1961, 1978, 1994-1995, 1998, 2001, 2005, 2011-2017, 2025, 2028-2030, 2033-2034, 2042-2043, 2046-2047

Conceptual Framework 1, 18, 167, 173, 175, 204, 209, 263, 265, 274-277, 284, 347, 704, 1037, 1085, 1097, 1113, 1185, 1421, 1612, 1632, 1641, 1655, 1702, 1747

Connectivism 1055, 1058

Constraint 147, 714, 726, 815, 824, 934-936, 938, 942-943, 946, 950, 1063, 1068, 1270, 1418, 1505, 1695-1698

consumption process 1869-1871, 1875, 1879-1881

Contemporary 3-4, 22, 53, 78, 92, 166, 193, 222, 333-334, 338, 349, 416, 445, 538, 661, 665, 724, 743, 750, 756, 758, 910, 952-953, 966, 986, 988, 1050, 1086-1087, 1116, 1172, 1241, 1246, 1258, 1269, 1277-1278, 1280, 1313, 1340, 1347, 1359, 1362, 1365, 1371, 1376, 1431, 1466, 1469, 1478, 1493, 1508, 1579, 1612, 1616, 1621-1622, 1626, 1628, 1673, 1733, 1793, 1795, 1799, 1846, 1866, 1893, 1930-1931, 1998

Content Analysis 88, 163, 173-174, 637, 704, 706, 784, 1123, 1271, 1450, 1600, 1906-1908, 1911

continuance intentions 1638, 1642, 1645, 1649-1652

Continuous Improvement 76, 127, 655, 887, 904, 970, 977, 981, 985, 988, 1380, 1786, 1901-1903, 1905, 1907-1910, 1912, 1914

Cooperation 96-97, 104-106, 108, 110, 288, 437, 468, 568, 571, 576, 581, 588, 645, 655, 666, 671, 701, 736, 835, 871, 873-874, 876, 878, 881, 985, 1060-1061, 1065, 1078, 1080, 1154, 1175, 1180, 1182-1183, 1190, 1201, 1212, 1226, 1247, 1282-1284, 1288-1289, 1292-1293, 1295, 1343, 1345, 1355-1356, 1424, 1441, 1459, 1462, 1473, 1477, 1479-1482, 1484, 1489-1492, 1509, 1586, 1617, 1664, 1694, 1696, 1925, 1929, 1982, 1985, 2036, 2039

Corporate 21, 24, 43, 72-73, 78, 121, 146, 222, 250, 270, 274, 348, 430, 436, 445-446, 464, 480-481, 525, 532, 537, 564-565, 638, 643, 652, 657, 661, 703, 710, 714, 716-717, 721, 744, 753, 756, 773, 825, 834-836, 839, 858, 868-869, 876-877, 888, 905, 907, 949, 995, 1082, 1091, 1095, 1099, 1196, 1200, 1207-1210, 1212-1214, 1219, 1264-1265, 1268, 1270, 1279, 1282-1283, 1287-1288, 1292, 1296, 1358, 1360, 1363, 1519-1520, 1522, 1527-1531, 1605-1606, 1609, 1621, 1631, 1654, 1702, 1740-1741, 1747-1748, 1771-1772, 1774, 1786-1787, 1813, 1859-1860, 1864, 1929, 1998, 2001, 2009, 2024, 2035

cost distance 311, 316-318, 321-323

cost raster 311, 316-318, 320, 322-323, 328

Cost Surface Cumulative Cost 311

Course 9, 25, 33-34, 45-46, 59-60, 67, 76, 91, 229, 231, 234, 237, 268, 419, 423, 471, 525, 538, 581-583, 619, 714, 806, 808, 910-911, 913, 915-924, 929, 941, 994, 1039, 1042, 1055, 1061, 1064-1066, 1069-1070, 1074-1076, 1092, 1094, 1139, 1155, 1170, 1226, 1234, 1240-1241, 1252-1253, 1329, 1345, 1410, 1477, 1525-1526, 1661, 1667, 1730-1731, 1896, 1943, 1989, 1992-1993, 2005, 2007, 2013, 2018, 2021, 2030, 2033-2034, 2040, 2042-2046

course organization 917-919, 922, 929

coworking space 1100, 1102, 1104, 1109-1111, 1114, 1118

CPI 1385, 1390, 1393, 1396-1397, 1399, 1402, 1593, 1599, 1607, 1609-1611

Critical Incident Technique 279, 285, 303-304

Critical Reflection 830, 832, 1073, 1454, 1792, 1802-1803

critical success factors (CSFs) 1737

critical theory 1040-1041, 1058

CRM 188, 982, 1005-1011, 1013, 1016-1021, 1702, 1912, 1918-1919, 1928-1929, 1934, 2005

cronysm 41-42

Cross-Cultural Analysis 1138, 1158

Cross-Cultural Communication Barriers 1158, 1769

cross-cultural leadership 279, 285, 293, 295

crowd funding 1998, 2000, 2008-2010

cultural artifacts 823, 827-828, 834

Cultural Barriers 24, 34, 1149, 1152, 1282, 1295

Culture 1-3, 15-16, 18, 21-25, 31, 37, 72, 77-79, 89, 94, 96-97, 121, 132, 134, 145-150, 155-156, 158, 160, 162, 166, 179, 193, 195-196, 203, 207, 230,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

239, 259, 265, 274, 279, 284, 286, 288, 293, 295-297, 301, 303, 324, 348, 435, 437, 439, 470, 478, 482, 484, 525, 576, 623, 638-639, 641, 643, 645, 647, 650, 653-656, 658, 660, 664, 666, 718, 724, 726, 730-732, 741, 745, 750, 757, 817, 821, 823-837, 868, 890, 893, 899, 901, 908, 916, 931-932, 936, 940, 943, 947, 951, 954, 961-962, 969, 991, 994-996, 998, 1000-1003, 1023, 1026, 1031, 1037-1038, 1041, 1047-1048, 1050, 1052, 1054, 1056-1058, 1095, 1103, 1119, 1127, 1132, 1139-1140, 1143, 1148-1150, 1152-1153, 1155, 1157, 1180-1181, 1195, 1199, 1202-1203, 1206, 1215, 1217, 1220-1221, 1238, 1262, 1266, 1269, 1271-1272, 1274-1276, 1280, 1282-1295, 1297-1299, 1325, 1330, 1346-1348, 1353, 1355-1360, 1362-1363, 1366, 1369-1370, 1372-1373, 1375-1384, 1387, 1424, 1429, 1442, 1454, 1462-1466, 1468, 1474-1475, 1487, 1489, 1491, 1493-1494, 1497, 1519, 1594, 1600, 1608-1609, 1612, 1614, 1617, 1622, 1624-1627, 1631-1633, 1635, 1640, 1642, 1653-1654, 1692-1693, 1701, 1712, 1725, 1732, 1740, 1742, 1748, 1752-1754, 1756, 1762, 1766, 1768-1780, 1783-1786, 1794, 1797-1798, 1800, 1805, 1811, 1813, 1823, 1836, 1841, 1853-1854, 1891-1892, 1896, 1905, 1927, 1929-1931, 1943, 1949, 1973, 1979, 1984, 1987-1988, 1993, 2012, 2015, 2018, 2023-2024, 2027, 2029-2031, 2036, 2039, 2048

Culture Change 823-825, 828-832, 836, 1291, 1375, 1378, 1770, 1774-1776, 1783

Customer Experience 116, 126, 129, 641, 644, 1005-1006, 1011, 1214, 1234, 1378, 1519-1522, 1524, 1532, 1651, 1742, 1749, 1916-1920, 1922-1923, 1927, 1929-1934

customer focus 1934

customer journey 1916-1917, 1920, 1922, 1924-1925, 1932

Customer Value 116, 127, 469, 640, 1007, 1018, 1215, 1916

cyber incivility 614, 622, 628, 633-634

Cyber Physical Systems 561, 838, 1151, 1978

Cynicism 104-105, 134, 136, 146, 151, 742-744, 749-753, 755-756, 760, 1375, 1466, 1470

Czech Republic 329, 799, 966-967, 973, 975-976, 1230, 1717

D

Data Analytics 61, 116, 270-271, 468-469, 479, 482, 484, 543, 698, 778, 840, 859, 1225, 1258, 1312, 1367, 1572, 1712, 1715, 1718-1719, 1739, 1743, 1745, 1749, 2037

Database Development 1301, 1678

data-driven orchestration 918-919, 929

Decision Making 28, 34, 166, 269-270, 284, 302, 313, 416-417, 423, 428, 430, 468-470, 480, 482, 562, 634, 706, 731, 797, 826, 828, 842-843, 858, 860-862, 867, 871-872, 987, 1099, 1158, 1183, 1190, 1298, 1344, 1366, 1370-1371, 1440, 1449, 1466, 1470, 1514, 1581, 1583, 1586, 1594, 1596, 1609-1610, 1624-1625, 1705, 1711-1712, 1834-1835, 1838, 1843, 1845, 1850, 1852-1859, 1980, 2000, 2015, 2018-2020, 2030

Deep Learning 36, 524, 527, 533, 536, 539, 1706, 1712

Delicious 592, 602-604, 612

Delphi method 1821, 1823-1824, 1829, 1831

Design Science Research 187, 225-226, 228, 231-234, 238, 241, 1468, 1706, 1718, 1806-1807, 1811

Development 7, 12, 19-21, 24, 26, 31, 33, 35-36, 39, 42-44, 47-48, 57-58, 61, 65, 68, 71, 73, 75-76, 79-80, 83, 85, 87-89, 91, 97, 99, 101, 104-105, 107, 110, 112, 114, 119-120, 124, 131-132, 135, 137, 142, 144-149, 151-153, 157-158, 160-163, 166-167, 181, 183-185, 189, 194, 200-207, 209-214, 218-219, 222-225, 227-230, 232-233, 235, 239-240, 242, 250, 254, 263-266, 270-281, 293, 295, 297-299, 301-302, 305, 312-313, 324, 327-328, 330, 338, 342, 344-346, 352, 355-358, 360, 362, 369, 373, 388, 409, 415-417, 433, 443, 445-446, 449-453, 457-458, 460, 462, 465, 467-471, 474-483, 493, 502-503, 508, 520-521, 526, 531-533, 535-536, 543-544, 557, 561-578, 580-581, 583-584, 586-589, 598-599, 615, 617, 623, 625, 627-628, 633, 635, 637, 639, 644, 653, 658, 660, 664-666, 684-685, 687, 695, 700, 702-703, 709-710, 712, 716, 719, 724, 737-744, 753-755, 757-760, 764, 768-769, 771-772, 780, 793, 797, 800, 814, 818, 820, 824-827, 829-832, 834, 837, 839, 841-842, 844, 854-855, 857-858, 860, 864, 866-871, 874-879, 881, 884-885, 887, 890, 897, 899, 901-904, 908-917, 919, 921, 924-926, 928, 930, 932-933, 935, 938-941, 943, 947-948, 952-955, 961-962, 964, 977, 979, 983, 985, 989-995, 998, 1000-1002, 1004, 1006-1007, 1010-1011, 1013, 1017, 1019, 1022, 1024-1025, 1027-1028, 1030, 1032, 1038, 1041, 1046, 1051, 1054-1055, 1061, 1070, 1078, 1082, 1089, 1096, 1101-1105, 1107, 1110, 1112, 1114, 1116-1118, 1123, 1135, 1138, 1140-1142, 1146-1147, 1153-1156, 1160-1162, 1166, 1172-1173, 1177, 1180, 1191-1193, 1195-1197, 1205, 1209-1211, 1213-1214, 1217, 1220-1221, 1223-1225, 1227-1228, 1230-1243,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1246-1247, 1256, 1260, 1263, 1266-1267, 1276, 1278, 1281-1285, 1287-1289, 1291-1294, 1297, 1301, 1303-1304, 1314, 1319-1320, 1324-1330, 1335, 1341, 1343, 1352-1354, 1360, 1362-1363, 1368, 1377, 1381, 1385-1386, 1388-1391, 1393, 1397, 1399-1403, 1417, 1423, 1427-1428, 1431, 1433-1434, 1447-1448, 1450-1452, 1458-1459, 1464, 1466-1468, 1470-1471, 1473, 1475, 1477, 1479-1480, 1491, 1494, 1497-1498, 1500, 1502, 1505, 1507, 1515-1516, 1518, 1534, 1537, 1541, 1550, 1574-1576, 1579, 1588-1589, 1594-1596, 1603, 1606, 1608-1609, 1613-1614, 1616-1618, 1620, 1629-1630, 1632-1634, 1641, 1644, 1653-1654, 1657-1659, 1664, 1671-1675, 1678-1682, 1685-1687, 1689, 1691, 1693, 1695-1697, 1702, 1714-1716, 1721-1722, 1732-1735, 1739-1740, 1742, 1744, 1751, 1753-1754, 1761, 1764, 1768, 1770, 1772-1778, 1780-1794, 1797-1801, 1803, 1805-1806, 1811-1820, 1831, 1837, 1840, 1846, 1849, 1851-1852, 1857-1858, 1869, 1880-1881, 1891, 1893, 1895-1898, 1902, 1904-1906, 1909-1912, 1914, 1917, 1930, 1937-1938, 1940-1941, 1943-1945, 1947-1949, 1952, 1974-1976, 1985, 1988-1991, 1994, 2000, 2005-2006, 2008, 2011-2013, 2017, 2021, 2024, 2032-2033, 2035-2036, 2038, 2042, 2044, 2046-2047

Diamond of Innovation 470, 474, 484

Diffusion Of Innovation 40, 908, 915

Digital Business Strategy 482, 904, 1716, 1740, 1742, 1744, 1746, 1748

Digital Channels 124, 1916-1917, 1919, 1929

Digital Culture 23-25, 37, 1026, 1050, 1052, 1056, 1058, 1217, 1929

Digital Dexterity 777, 1640, 1651-1652, 1658, 1977, 1980, 1992, 1996

Digital Disruption 23, 25-26, 28-29, 31, 34, 37-38, 49-50, 63, 129, 581, 1220-1221, 1618

Digital Divide 65, 1022, 1036, 1123, 1134-1135, 1534, 1617, 1630, 1634, 1720-1722

Digital Economy 57, 66, 116-117, 126, 540-544, 548-550, 555-559, 563, 565-569, 576, 578, 581-584, 586-588, 778, 1138, 1149-1150, 1154, 1156-1158, 1217, 1221, 1224-1229, 1231-1232, 1236, 1238-1244, 1251, 1262, 1737, 1749

Digital Ecosystem 463-464, 468, 474, 481, 483-484, 701, 704, 893

Digital Education 49, 59-60, 703, 926, 1938, 1941, 1950

digital empowerment 1616, 1620, 1626-1630

Digital Entrepreneurship 263-278, 1894, 1897

Digital Era 58, 117, 277, 892, 1239, 1242, 1616-1620, 1631, 1634-1635, 1637, 1655, 1916-1918, 1924, 1927, 1929, 1937, 1941, 1944-1945, 1949, 1994, 1999, 2009

Digital Inclusion 74, 1026-1028, 1036, 1119-1120, 1122, 1124, 1130, 1132, 1137

Digital Innovation 67, 121, 775, 905, 1616-1619, 1621, 1627-1630, 1637, 1655, 1744, 1748, 2008

Digital Literacy 23, 37, 49-51, 54-63, 65-67, 544, 1022-1027, 1031-1032, 1228, 1230, 1620, 1638-1639, 1642-1653, 1655-1657, 1659, 1977, 1980-1981, 1983, 1992, 1995-1996

Digital Production 560, 1223

digital productivity 1616, 1618, 1629-1630, 1637

Digital Services 49-51, 57, 59-60, 68, 122, 568, 1227, 1616, 1618-1619, 1623-1626, 1629-1630, 1633, 1636-1637, 1718

Digital Skills 49-51, 55-58, 60-61, 68, 121, 127, 265, 267-268, 271, 275, 277, 543, 558, 711, 1024-1028, 1031-1032, 1227-1228, 1635, 1638-1639, 1642-1645, 1650-1654, 1656, 1658, 1947, 1981, 1983, 1985, 1999

digital supply chain transformation 640-641, 644-645, 650, 653, 659-660

Digital Transformation 23-28, 31, 34, 37-38, 40, 65, 116-121, 123-129, 264-265, 268, 463-465, 472, 478-479, 481, 484, 540, 543, 558, 567-568, 640-641, 700-703, 710, 714, 716-717, 761-769, 771-772, 774-777, 838-841, 844, 852, 856, 859-860, 862, 886-888, 890, 892-893, 903-914, 920-921, 924-926, 929, 1149-1153, 1158, 1200, 1214-1215, 1220-1222, 1231, 1237-1241, 1250, 1264, 1366-1382, 1519-1521, 1527, 1531-1532, 1594-1595, 1600-1601, 1605, 1609-1611, 1618, 1620-1621, 1631, 1636, 1643, 1704-1705, 1712, 1715, 1717, 1737-1749, 1916-1919, 1923-1924, 1927, 1929-1932, 1934-1937, 1939-1940, 1943-1944, 1948-1949, 1951, 1953, 1981, 1992, 1994, 2049

digital transformation strategy framework 886-887, 893, 903

Digital Workplace 24, 26, 29, 1369, 1638-1640, 1642, 1644-1646, 1649-1657

Digitalization 121, 190, 264, 266, 274, 278, 561-562, 567-568, 581, 717, 720, 762-763, 765, 769, 771, 777, 779, 863, 888, 892-894, 901, 910, 913, 1199, 1202, 1224, 1226-1227, 1241, 1250, 1620, 1632-1633, 1714-1718, 1737-1738, 1745, 1749, 1920, 1928, 1935, 1937-1940, 1943-1944, 1949-1950, 1953, 2010, 2036-2037, 2039

digitally empowered worker 1616, 1619-1620, 1623-1626, 1630, 1637

Digitally Revolutionized Economy 886

Digitization 25, 57, 274, 464-465, 482, 484, 560, 568,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

581-582, 585, 700, 762-764, 839, 907-908, 910, 1378, 1620, 1738, 1745, 1935-1937, 1939-1940, 1944, 1949-1950, 1953, 1977-1978, 1980, 1984-1985, 1998-1999, 2007
Disability 70-72, 81, 88, 90-92, 191, 193, 195, 197-198, 200-201, 354-356, 373, 376, 449-452, 462, 505, 798-799, 1029, 1119-1120, 1122-1137, 1386, 1388, 1392, 1403, 1472-1476, 1486, 1489, 1493-1494
Disruption 13, 23, 25-26, 28-29, 31, 34, 37-38, 49-50, 63, 129, 132, 561, 581, 717, 767, 774, 1048, 1216, 1220-1221, 1257, 1356, 1371, 1441, 1584, 1618, 1696, 1737, 1749, 1917, 1953
Disruptive Technologies 120, 122, 762, 1368, 1520, 1737
Distance Learning 1059-1062, 1070, 1078, 1080, 1240, 1499-1500, 1502, 1661, 1951
Distributed Leadership 149, 1431-1432, 1441, 1447-1450
Diversity 5-6, 84, 87, 114, 118, 158, 281-284, 293-297, 305-306, 309, 367, 617, 630-632, 634-635, 688, 829, 868, 926, 933, 943, 945, 948, 953, 964, 1030, 1055, 1060, 1065, 1068, 1071, 1075, 1094, 1108, 1119, 1123-1124, 1127-1130, 1133-1134, 1136-1137, 1144, 1159-1161, 1173, 1175, 1271, 1283, 1285, 1288, 1457, 1491, 1494, 1516, 1536, 1624-1625, 1656, 1679, 1694, 1757, 1834, 1938, 2002, 2008
Document Management 662-663, 665, 667-671, 676, 678, 681-682, 1237, 1663
domestication of telecentres 1720-1721, 1725, 1728
Double-Loop Learning 29-30, 36, 723, 733, 741
DPTS 607-610, 612

E

e-banking 540-541, 544, 548-550, 552, 554-556
E-Commerce 5, 18, 75, 119, 265, 343, 411, 469, 540-542, 544, 548-556, 592, 875, 877-878, 1087, 1224, 1232-1235, 1238, 1241, 1244, 1519, 1536, 1541, 1574, 1578, 1919, 1932-1934, 1983
Ecosystem Strategy 467-468, 475, 878
educational design 910, 912, 916, 929-930
Educause 67, 1296, 1298, 1366, 1369-1370, 1373, 1381-1382, 1384, 1515, 1690, 1952
EEA Grants 1495
e-employment 540-541, 543-544, 548-551, 554
E-Government 76, 86, 88-89, 91, 354-355, 359, 361, 364, 369-372, 410, 412, 611, 713, 780-784, 794-802, 866-867, 871-885, 1136, 1277-1280, 1385-1393, 1396-1403, 1576, 1588, 1642, 1654
E-Government Websites 354-355, 359, 361, 364, 370, 410, 412, 781, 783-784, 794-800, 802, 1385, 1390, 1398-1402
E-Learning 39, 89-91, 544-545, 610, 800, 928-929, 1076, 1078, 1156, 1240, 1497-1502, 1504, 1507-1509, 1512-1517, 1536, 1642, 1654, 1657-1659, 1954
E-Mail 280, 283, 290-291, 334-336, 338, 347, 435, 443, 456, 505, 523, 544, 618, 624, 668-669, 672, 674, 680, 682, 872, 1008, 1147, 1187, 1234, 1382, 1591, 1824, 1917, 1986, 2018
e-mentoring 614-615, 624-625, 628-629, 632-633, 636, 638
Emerging Segments of Telecommunications Market 1264
Emerging Trends 1154, 1223, 1242, 1772, 1782, 1786, 1920, 1948, 2033-2034
Employee Involvement 823, 828, 830-831, 833, 1441-1442, 1444, 1699, 1753
empowering leadership 1616, 1629, 1631, 1635
Enabling Technologies 778, 838, 840, 844-845, 852, 855-856, 859-860, 863, 1245
Enterprise Architecture 1320, 1336, 1704, 1715, 1718, 2008
Enterprise Resources Planning 982, 989, 1384
Enterprise Systems 26, 28, 68, 183, 187, 189, 1593-1595, 1601-1602, 1610, 1612, 1615
Entrepreneur 205, 210, 223, 265, 267-270, 277-278, 484, 869, 1102, 1104, 1106, 1115, 1632, 1890-1892, 1894-1897, 1900
Entrepreneurial Ecosystem 1100, 1102, 1118
entrepreneurial optimism 415, 417, 428
Entrepreneurship 222-223, 263-278, 349, 576, 776, 863, 878, 975, 1099-1102, 1104, 1106, 1108, 1112, 1114-1118, 1156-1157, 1193, 1197, 1222, 1243, 1423, 1619, 1623, 1627, 1632-1633, 1840, 1861, 1889-1900, 1938, 2036, 2045
Environment 1-3, 5, 7-8, 12-13, 15-16, 24, 26, 28, 31, 37, 56, 63, 72-74, 94, 109, 111, 116, 118, 131-132, 142, 152, 154, 166-167, 171, 173, 178, 180-183, 191, 202-203, 205, 207, 210, 212-213, 215, 217-218, 222, 237, 264-265, 267-269, 271-273, 275-276, 284, 288, 290-291, 295, 312-315, 322, 324, 326, 329-330, 332-335, 337, 339, 341, 343-346, 400, 416-417, 427-429, 434, 443-444, 450, 459-460, 463-464, 466-468, 470, 474, 478, 505, 512, 517, 519, 522, 565, 568, 574, 576, 578, 587, 598, 618, 620, 622, 626, 629, 645, 649, 652, 656, 659, 661, 663, 703-704, 706, 710-712, 731, 740, 745, 755, 776, 795, 804-805, 815, 824-825, 828, 830-831, 836, 841, 843, 847-848, 851, 856, 860-863,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

869, 877, 884, 887-888, 890, 892-893, 903-904, 908-910, 913, 917-918, 924, 926-927, 937, 941, 952-954, 961, 970, 976, 985, 994, 997, 999, 1018, 1055, 1063, 1065, 1068, 1073, 1076, 1081-1082, 1084, 1089-1091, 1094, 1097, 1102-1104, 1108, 1113, 1115, 1118-1119, 1122, 1128-1129, 1132, 1139-1141, 1143, 1150-1151, 1153, 1156, 1162, 1176-1177, 1179-1180, 1182-1184, 1190, 1195, 1197, 1202-1203, 1206, 1209, 1213, 1216-1218, 1223-1224, 1227-1228, 1238-1240, 1254, 1258, 1266, 1269-1270, 1272, 1275, 1280, 1283, 1285, 1288, 1290, 1293, 1302-1303, 1311, 1320-1321, 1340-1347, 1349-1351, 1353, 1355-1360, 1375-1376, 1384, 1405, 1407-1408, 1418, 1428, 1442, 1447, 1452, 1457, 1459, 1462-1463, 1465, 1473, 1475-1477, 1482-1483, 1495, 1497, 1499-1502, 1508-1509, 1511-1514, 1549, 1586, 1588, 1590, 1594-1595, 1597, 1615, 1619, 1621, 1623-1624, 1626-1629, 1662, 1665, 1679, 1682-1683, 1685, 1687, 1695, 1701, 1711, 1713, 1715, 1721, 1724, 1729, 1732-1733, 1737-1738, 1741, 1744, 1746, 1750, 1752-1753, 1755-1757, 1764, 1771-1773, 1775-1776, 1778-1779, 1781, 1783, 1785-1788, 1821, 1832, 1834, 1836, 1838, 1840, 1843-1844, 1848-1857, 1860-1861, 1872, 1880-1881, 1893, 1919, 1922, 1924, 1926, 1930, 1944-1945, 1947, 1950, 1979, 1981, 1983-1984, 1990-1991, 1994, 1998-2000, 2002-2003, 2011-2021, 2023-2025, 2027-2031, 2034-2035, 2038-2046

Equality Policies 1022, 1029-1030, 1032, 1036

ERP Implementation 165-190, 1303, 1419, 1422-1423, 1594, 1609

Essential Employability Skills (EES) 1988, 1996

Ethnographic Study 82, 1593, 1600

Eurofound 1161-1162, 1174-1175

Evaluation 2, 10-11, 41-46, 53, 60, 73, 75, 79, 82, 85, 87, 90-91, 127, 166, 172, 183-184, 194, 196-197, 199, 213-214, 230, 241, 303, 316-318, 323, 329, 335, 354-357, 359-365, 367-369, 371, 373, 375, 378-379, 383, 385, 390, 394-408, 410-412, 416, 477-478, 501-505, 509-510, 512-513, 517-521, 526-527, 531, 534, 536, 564, 591, 652, 654, 666, 685, 697, 699, 721, 780, 783-785, 790, 794-802, 817, 830, 849, 871, 895, 901-902, 904, 911, 917, 946, 955, 964, 970, 973, 977, 979, 991, 1016, 1021, 1060, 1079-1080, 1140, 1155-1156, 1203, 1205, 1208, 1211, 1215-1216, 1228, 1240, 1294, 1307-1308, 1310, 1327-1328, 1331-1333, 1335, 1337, 1342, 1357, 1364, 1372, 1380, 1387, 1393-1394, 1398-1401, 1416, 1420, 1477, 1490, 1492, 1494, 1498-1499, 1510, 1536, 1546, 1554, 1575, 1577, 1584, 1591, 1664, 1671, 1693, 1695, 1732, 1735, 1760, 1779, 1781, 1783-1788, 1791, 1799, 1802, 1807, 1811, 1830, 1834, 1837, 1842, 1857, 1859, 1861, 1871, 1875, 1877-1880, 1901-1902, 1904-1905, 1910-1911, 1941, 1949, 1974, 2043-2046

Evaluation Methods 197, 362, 369, 411, 416, 501, 503, 521, 1393, 1398

event oriented 1081, 1089, 1095

Evidence-Based Management 47-48, 239, 241-242, 742, 744, 754, 758, 1694, 1789, 1801-1802, 1804, 1812-1813, 1815-1816, 1818

Evidence-Based Practice 145, 225-226, 240-241, 1470, 1789, 1792-1793, 1801, 1804, 1816

Evidence-Based Research 752, 1451, 1772-1774

E-Work 540-544, 548-550, 553-556, 1266

Experiential Learning 31, 39, 225-226, 230-232, 240, 1982

Expert Evaluation 1901

expert presence 93-95, 100, 102, 105-111

Explorative Learning 734, 741

F

Failure Rate 660, 745, 995, 1406, 1419, 1427-1430, 1437-1438, 1443, 1660, 1795, 1813

FATS 600-602, 607, 609, 612

Feedback 10, 28, 33, 52, 58, 60, 73, 81-83, 149, 183, 244-245, 247, 252-254, 256, 258-260, 293, 301, 306, 328, 398, 404, 432-433, 437-439, 442-445, 447, 450, 459, 503, 524, 526-527, 531-534, 538-539, 565, 576, 601, 608, 659, 682, 805, 827-828, 843, 872, 923, 997, 1068, 1070-1071, 1078, 1141, 1203, 1217, 1371-1373, 1384, 1407, 1455, 1461-1463, 1476, 1483, 1505, 1508, 1524-1525, 1606, 1609, 1653, 1662-1664, 1677, 1696, 1724, 1777, 1780-1781, 1784-1785, 1823, 1929, 2000, 2005-2006, 2019-2020, 2022, 2037, 2043, 2046

Feedback in internal communications 437, 447

female inmates 1022, 1024, 1028, 1032, 1036

Firm Performance 184, 341, 430, 744, 755, 965, 1005-1007, 1009, 1011-1013, 1016-1018, 1020, 1196, 1313, 1746

Flexibility 51, 56, 127, 171, 203, 279-280, 286, 288, 292, 298, 300, 302, 336, 339-340, 344, 348, 350, 450, 491, 625-626, 630, 639, 738, 842, 861-862, 868, 895, 920, 933, 961, 1068, 1076, 1087-1088, 1108, 1114, 1120, 1125-1126, 1129, 1131-1135, 1140, 1151, 1155, 1159-1164, 1170, 1173-1176, 1183, 1194, 1217, 1241, 1272-1273, 1304, 1308-1309, 1340, 1343, 1345, 1356, 1430, 1504, 1513, 1515, 1625, 1634, 1661, 1742, 1855-1856,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1955-1962, 1964-1971, 1973-1976, 1980, 1989, 2000-2002, 2010, 2014, 2016, 2021, 2023, 2027, 2029, 2036
Flexible Work 51, 63, 299, 302, 335, 626, 1119-1120, 1122, 1133-1135, 1159, 1162, 1172, 1174-1176, 1183, 1620, 1792
Flexible Working Time 1172, 1176
Flickr 592, 602, 604-607, 609, 611-612
fluid workforce 1998, 2002, 2005
Formal Flexibility 1176
Frankfurt School 1037, 1040-1041, 1052, 1058
Function 34, 42, 94, 103, 105, 112, 135, 149, 179, 194, 211-212, 218-219, 223-224, 267, 270, 282, 287, 447, 454, 461, 465, 477-478, 567, 593, 597, 600, 630, 635, 641, 688, 690-693, 695-697, 710-711, 728, 738, 748, 778, 795, 816, 826, 847, 866-867, 870, 887-888, 890-892, 898, 901, 903, 936-938, 940, 950, 956, 1006, 1030, 1048, 1050, 1065, 1087, 1091, 1094, 1103, 1107-1108, 1120, 1137, 1144, 1146, 1173, 1178, 1212, 1277, 1320, 1322-1324, 1329, 1335, 1416, 1419, 1506, 1579, 1584, 1596, 1624, 1666, 1698, 1702, 1704-1706, 1708, 1710-1711, 1715, 1741, 1747, 1753, 1794, 1798-1799, 1834, 1841-1842, 1844, 1852-1853, 1855, 1859, 1912, 1925, 1982, 1998, 2000, 2006, 2019, 2023-2024, 2040
Future Skills 1977, 1996
Future Workforce 50, 1623-1624, 1977-1978, 1980-1981, 1983, 1992, 1996

G

Gartner 649, 1199, 1205-1206, 1221, 1226, 1313, 1640, 1654, 1656, 1738, 1748, 1891-1892, 1897, 1926, 1939, 1950, 1995
Gateway 252, 261-262, 784, 802, 844, 927, 1558, 1592
gender gap 1022, 1036
General Relativity 1037, 1040, 1043, 1058
Gig Economy 1998, 2000, 2008, 2010
GIS 311, 314, 322, 324, 326, 329, 1097, 1493
Global 3, 18, 22, 40, 48, 55-57, 59, 64-66, 68, 73, 81, 86, 88-89, 92, 111, 115, 119-120, 129, 137, 142, 151, 164, 188-190, 201-202, 208, 224, 242, 262, 275, 278, 281, 288, 303-305, 307-308, 310-311, 331, 352, 359-360, 372-373, 407, 412, 414, 431, 446, 448, 462, 465, 467, 484, 500, 521-522, 536, 539, 541-543, 556, 558-559, 561, 564, 566-571, 580-581, 587, 589, 613-615, 620, 626, 628, 633, 635, 637, 639-640, 647, 649, 657, 660-661, 664, 684-686, 690, 694, 699-701, 703, 710-711, 721, 724, 741, 757, 760, 779-781, 797, 799, 802, 822-824, 829, 832, 834, 837, 840, 845, 854, 865-866, 868, 870-871, 874-876, 878, 885, 907, 914, 927, 930, 937, 951, 961-962, 964-965, 973, 982, 989, 1004, 1021, 1025, 1036-1038, 1048, 1051-1052, 1054, 1057, 1059, 1065, 1080, 1082, 1094, 1096, 1098-1099, 1105-1108, 1111, 1113, 1118, 1120, 1135-1137, 1154-1158, 1174-1176, 1197-1200, 1209, 1214, 1218-1222, 1225, 1227, 1230-1236, 1238, 1240-1253, 1256, 1258-1259, 1261-1263, 1265, 1274, 1281, 1296, 1299, 1301, 1316, 1338, 1340-1341, 1343, 1352-1360, 1362-1363, 1365, 1384, 1400-1401, 1403-1404, 1408, 1426, 1450, 1468, 1471, 1495, 1514, 1518-1520, 1532, 1550, 1569, 1576-1577, 1592, 1615, 1623-1625, 1630-1632, 1634-1635, 1637, 1643, 1656, 1659, 1670, 1672, 1674, 1676, 1679, 1684, 1689-1691, 1693, 1703, 1719, 1732-1735, 1737, 1740, 1744, 1748-1749, 1757, 1766, 1768-1769, 1771, 1786, 1790-1791, 1815-1817, 1820-1821, 1832, 1840, 1844, 1852, 1855, 1866, 1882-1883, 1892, 1899-1900, 1914, 1920, 1923, 1934, 1937-1938, 1941, 1947-1948, 1951-1954, 1976, 1978, 1986, 1991, 1996-1998, 2002, 2007, 2009-2011, 2025, 2032-2033, 2035-2037, 2039, 2049
Globalization 5-6, 131, 166, 279, 302, 350, 433, 541, 558, 561, 868, 1004, 1037-1039, 1051, 1117-1118, 1157, 1241, 1245-1252, 1259-1262, 1264-1265, 1293, 1340-1341, 1343, 1345, 1354, 1452, 1459, 1619, 1634, 1786, 1792, 1840, 1938, 1993-1994, 2014, 2035
Globalization in Telecommunications 1248, 1265
Green 21, 50-51, 66, 226, 239, 249, 269, 312, 315, 332-336, 339, 341, 344-346, 348, 395, 525, 654, 697, 702, 709, 711, 720, 727, 739, 993, 1001, 1132, 1137-1138, 1141-1153, 1158, 1250, 1254, 1261, 1263, 1369-1370, 1376, 1381, 1573, 1575, 1680-1681, 1689, 1923
Green Country – Australia 1138
Guidelines 64, 70, 73-74, 76, 79, 81-82, 86-90, 92, 101, 191-192, 199, 201, 231, 293, 336, 356-357, 359-364, 367-369, 373-376, 378, 383, 386-387, 390, 393, 395, 397, 400-401, 408-409, 411, 413, 452, 462, 526, 538, 559, 593, 604-605, 663, 736, 744, 777, 782-783, 787, 794-795, 797, 801, 841, 849-850, 863, 927, 1016, 1024-1025, 1220-1221, 1254, 1311-1312, 1385-1389, 1392-1393, 1398-1399, 1477, 1491, 1493, 1495, 1591, 1595, 1753, 1781, 1870, 1883, 1903, 1953

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

H

Hci 197, 261, 590, 598, 1577
HDI 1246, 1385, 1390, 1393, 1396, 1399
health systems 1533-1534, 1536, 1538, 1540, 1548, 1563, 1573
Healthcare 54, 128, 171, 466-467, 561, 576, 615, 702, 772, 778, 823, 868, 1215, 1533-1537, 1540-1546, 1549-1551, 1553, 1557, 1563-1565, 1571, 1573, 1575-1577, 1582, 1590-1591, 1620, 1702, 1704-1706, 1708-1719, 1789, 1801, 1812
Higher Education 6, 37, 50, 55-57, 64-66, 77, 84, 86-87, 89-91, 239, 484, 525, 629, 637, 639, 686, 717, 908, 910-915, 919-920, 925-928, 1057, 1061, 1075-1076, 1078-1080, 1139-1140, 1154, 1162, 1164, 1168-1169, 1171, 1224, 1227, 1247, 1294-1298, 1366-1374, 1376-1377, 1379-1384, 1402, 1464-1465, 1467, 1496-1498, 1504, 1506, 1508, 1513-1516, 1518, 1594, 1601, 1613, 1620, 1673, 1702, 1751, 1753, 1758, 1766-1768, 1812, 1830, 1892, 1912, 1942-1943, 1949-1950, 1952, 1977, 1982, 1984, 1986-1988, 1992-1996, 2034-2037, 2047-2049
hindering factors 1427, 1440, 1442
Homecare 1533, 1535, 1569
HR Practitioners 1417, 1443, 1770-1771
Human Resource 41-42, 47-48, 93, 95, 114, 146-149, 219, 298, 301, 305-306, 308, 348, 351, 445-446, 629, 635, 685, 704, 717, 723-724, 726, 737-738, 740-742, 744, 754-755, 757-759, 809, 818-820, 829, 833, 835, 837, 913, 961-964, 992, 1001, 1067, 1153-1154, 1157, 1174-1175, 1185, 1193, 1195, 1198, 1278, 1280, 1317, 1324, 1330, 1345, 1362, 1411, 1422, 1424, 1427, 1433, 1468-1469, 1608, 1616, 1631, 1634, 1653, 1673, 1675, 1690, 1692-1693, 1699-1700, 1702-1703, 1766-1767, 1770, 1772, 1789-1791, 1793, 1801, 1806, 1813-1820, 1831, 1889, 1899, 1974, 1995, 1998, 2008, 2024, 2031-2032, 2042
Human Resource Development 146, 148-149, 724, 737-738, 740-741, 755, 759, 818, 837, 1195, 1362, 1427, 1468, 1653, 1770, 1772, 1789-1790, 1793, 1801, 1806, 1813-1820
Human Resource Management 41-42, 48, 93, 95, 114, 147, 219, 305-306, 308, 348, 445-446, 629, 685, 704, 717, 726, 738, 742, 744, 754-755, 757-758, 819-820, 833, 835, 913, 962-963, 992, 1001, 1067, 1153-1154, 1157, 1174-1175, 1185, 1193, 1195, 1198, 1278, 1317, 1324, 1330, 1422, 1424, 1433, 1469, 1616, 1631, 1673, 1675, 1690, 1692-1693, 1700, 1702-1703, 1767, 1790-1791, 1815, 1818, 1831, 1889, 1899, 1974, 1995, 1998, 2008, 2031-2032, 2042
Human-Centered Design 191, 1624

I

IBM 4, 38, 73, 91, 250, 363, 371-372, 449, 460-462, 466, 481, 672, 864, 905-906, 975, 1096-1097, 1187, 1220, 1297, 1344, 1647, 1745-1746, 1766, 1895, 1898, 2001, 2008
idiomatic organizational communication practices 939
II-RP 243-245, 251-254, 258
Improvisation 725, 935, 944, 1066, 1593-1599, 1601-1604, 1606-1615
IMS LTI 930
Inclusive Design 81, 87, 191, 200, 371, 449, 453, 1492
Individual Performance 134, 340, 1638-1639, 1642, 1645-1647, 1649, 1651-1652, 1657, 1662, 1785, 1805
Industrial Revolution 25, 39, 51-52, 63, 119, 278, 561-563, 565, 588, 702, 720-721, 838-840, 864, 1037-1041, 1046-1049, 1058-1059, 1214, 1221, 1223, 1636, 1790, 1918, 1935-1937, 1941-1942, 1945, 1951-1952, 1977-1979, 1996
Industry 4.0 65, 560-563, 585, 587, 712, 719, 838, 842-843, 855-856, 859, 863-865, 1223, 1239, 1251, 1578-1579, 1582-1591, 1977-1982, 1985-1987, 1992-1997
infopreneurs 1889, 1894
Informal Flexibility 1176
Information Literacy 56, 62, 1022-1024, 1028, 1032, 1036, 1583, 1588, 1590, 1642, 1983
Information Literacy Policies 1022, 1032, 1036
Information Quality 816, 1578, 1582, 1584-1585, 1587-1591
Information Retrieval 62, 496, 590, 611, 1008
Information Systems 6, 39-40, 68, 116, 118-119, 125-126, 128, 164-165, 170-171, 183-190, 232, 240, 242, 260, 274, 276-278, 303, 307, 314, 330, 347, 349, 356, 371, 373, 445, 480-482, 520, 537-538, 559, 573, 587, 590-591, 610-613, 663, 684, 701, 710, 772-773, 776-777, 795, 797, 802, 804-805, 815-818, 820-822, 848, 873, 888, 890-891, 899, 904-908, 913, 920, 926, 928-929, 972, 981, 985, 987, 1021, 1082, 1084, 1087, 1098, 1231, 1294, 1300, 1314-1315, 1320, 1329, 1332, 1335-1336, 1368, 1374, 1401-1402, 1405, 1415, 1419-1423, 1425-1426, 1491, 1574, 1577, 1589, 1591, 1595-1596, 1598-1601, 1605, 1609-1615, 1636, 1639, 1641, 1647, 1653-1659, 1672-1674, 1676, 1680-1681, 1686, 1689, 1691, 1704-1705, 1715-1718,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1720, 1733, 1739, 1742, 1744-1748, 1829-1830, 1841, 1857, 1859, 1862, 1882-1883, 1897, 1987, 1991, 2008-2009
Informational Architecture 1317
Initiative 33, 35, 37, 42-44, 60, 73-74, 91, 133-134, 136, 165, 192, 201, 206, 348, 352, 357, 361-362, 368, 370, 376, 414, 445, 576, 587, 641, 644-645, 648, 655, 724, 729, 735, 741-742, 744, 746, 752, 783, 801, 824, 826, 828, 830, 832, 875, 877, 883, 893, 899, 917, 926, 943, 963, 1004, 1073, 1110, 1162, 1203, 1226, 1247, 1290, 1356-1357, 1367, 1371, 1388, 1409, 1429, 1445, 1451-1452, 1455, 1460, 1465, 1467, 1498, 1589, 1718, 1753-1754, 1756, 1800, 1805, 1808, 1892, 1908, 1978, 1993, 2001, 2005, 2032, 2036, 2047
Innovation 3, 7, 16, 25, 27-28, 33-37, 39-40, 49-52, 54-57, 59, 61, 63-65, 67-68, 72, 79, 90, 109, 116, 119-124, 126, 128, 133, 147, 150, 184-185, 199, 203-204, 210, 212, 214, 220, 222-224, 241, 264, 269-270, 277-278, 282, 284, 305, 335, 344-347, 351, 415-416, 418-421, 423, 429-430, 467, 469-471, 474, 476-477, 479-484, 524-526, 537, 541, 564, 567-568, 571, 573, 575-578, 580-581, 586-587, 589, 614-615, 617, 628, 666, 684, 688, 700-703, 710-711, 718, 721, 731, 738, 759, 761-762, 764-765, 770-779, 824, 826, 830, 835, 839, 843-844, 854, 860, 863, 890, 897, 899, 902-903, 905, 908-912, 914-916, 926-927, 937, 939, 952, 954, 967, 977, 979, 985, 989, 991, 997, 1003, 1006, 1010-1011, 1013-1014, 1016-1017, 1019, 1021, 1077, 1079, 1096, 1099-1107, 1109, 1112-1118, 1154, 1156-1157, 1175, 1180, 1182-1186, 1191-1198, 1213-1214, 1219, 1221, 1224, 1230, 1235, 1242-1243, 1249-1250, 1262, 1264, 1277, 1287, 1295-1297, 1299, 1313, 1315, 1324, 1355, 1361, 1364, 1366-1367, 1369, 1374-1375, 1378-1379, 1384, 1421, 1424, 1468, 1499, 1502, 1516-1517, 1579, 1590, 1595, 1606, 1610-1611, 1613, 1616-1621, 1624-1625, 1627-1635, 1637, 1640, 1643, 1655, 1657, 1703, 1709, 1713, 1718, 1724, 1727, 1739, 1744, 1748-1749, 1751, 1768, 1776, 1779, 1781, 1786, 1789-1791, 1795, 1805, 1831, 1840, 1864, 1891-1892, 1897, 1900, 1902, 1910, 1927, 1929, 1937, 1945-1946, 1953, 1977-1978, 1984, 1999-2001, 2008-2009, 2025, 2033-2034, 2036-2037, 2039, 2042-2047
Innovative Leadership 1935, 1949, 1953
innovative work behaviours 1177-1178, 1182-1188, 1190
Instrumental Knowledge 225-235, 238, 1801, 1803, 1806-1807, 1811
Integration 47, 71-72, 84, 89-90, 116, 120, 126, 128, 152, 168, 174, 181, 185, 205, 243-245, 275, 280, 355, 375, 411, 430, 450, 460, 465, 468, 526, 561-562, 580, 638, 660, 685, 702, 704, 706, 711, 764-765, 814-815, 819, 839-840, 842-843, 860, 867-868, 874, 881, 883-884, 892, 921, 929, 982-983, 1004, 1006-1012, 1016-1017, 1019, 1023, 1026-1027, 1047, 1053, 1082, 1137, 1174, 1180, 1182, 1184, 1191, 1195, 1202, 1204, 1219-1220, 1232, 1295, 1300-1301, 1306, 1308-1309, 1312, 1330, 1374, 1416, 1418, 1420, 1422, 1448, 1474, 1500, 1502, 1513-1514, 1550, 1579, 1585-1586, 1591-1593, 1598-1599, 1603-1605, 1608-1613, 1635, 1640, 1681, 1691, 1708-1709, 1713, 1719, 1729-1730, 1741, 1880-1881, 1908, 1917, 1926, 1929, 1946, 1955-1956, 1960-1961, 1966, 1973, 1976, 2019, 2024, 2030, 2037, 2042
Integration of ICT's 243-245
Intellectual Capital 719, 966-967, 979-981, 989, 1179, 1288, 1517
intelligent human asset 990
internal communication tools 432-433, 435-444, 447
Internal Communications 432-435, 437-439, 443-447, 1279
International Business 274, 309, 685, 706, 719, 835, 961, 1153, 1264, 1341, 1351-1356, 1358, 1360-1365, 1423, 1985
Internet Of Things (Iot) 116, 119, 463, 481, 561, 838, 840, 846, 1246, 1251, 1258, 1367, 1531, 1579, 1953, 1978-1979, 1982, 2036
Intra-Organizational 1175, 2011, 2018-2019, 2032
intrinsic interest 527, 533, 539
IT Alignment 887-889, 895, 905, 907, 1740-1741, 1744, 1746, 1749
IT Governance 889, 1281, 1366, 1376, 1384

K

knowledge management culture 1282, 1285, 1291-1293, 1299
Knowledge Management System 966-967, 983, 985-987, 989, 991, 1282, 1285, 1642
Knowledge Sharing 281, 445, 533, 620, 968, 991, 1002-1003, 1221, 1224, 1288, 1292-1296, 1298-1299, 1336-1337, 1423, 1587, 1592, 1618, 1627, 1635, 1984, 1995
knowledge spillover 1100-1101, 1103-1107, 1112-1115, 1118
Knowledge Transfer 732, 966, 972, 983, 1103, 1295, 1297, 1496-1498, 1501, 1510-1511, 1513-1517, 1985, 2042

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Knowledge-Intensive Organization 1299

L

Law 25, 65, 74, 79, 88, 93, 191, 203, 205, 324, 337, 352, 354, 360, 556, 631, 674, 690, 700, 703, 714, 717, 777, 814, 820, 870, 938, 946, 1030-1032, 1039-1041, 1105, 1161, 1317, 1328, 1337, 1342, 1388, 1417, 1436, 1489, 1597, 1612-1613
Leadership 16-19, 21, 24, 26-27, 31-35, 37, 40, 61, 68, 80, 98, 112, 121, 130, 133-151, 155, 204, 222, 270, 279-287, 290-291, 293, 295-310, 463, 468, 470, 478, 480, 482, 563, 580, 616-617, 629, 632-634, 636, 647, 649, 653, 655, 657-658, 671, 674, 677, 679-681, 685, 703, 717, 735, 737, 740, 746, 749, 753, 756, 760, 803-809, 811-821, 825-826, 829, 831-832, 834-837, 863, 888, 893, 901, 906, 943, 945, 947-948, 950, 963-964, 969, 990, 992-993, 996-997, 1000-1003, 1097, 1129, 1149, 1156, 1177-1180, 1182-1188, 1190-1198, 1202, 1214, 1218, 1220, 1277, 1340, 1342-1343, 1349-1350, 1352, 1354, 1357-1365, 1367, 1369-1371, 1375-1376, 1380-1381, 1383-1384, 1417, 1420, 1423, 1425, 1427-1428, 1430-1434, 1437, 1439-1444, 1446-1450, 1462-1463, 1467, 1470, 1491, 1514, 1520, 1615-1619, 1621-1623, 1625-1627, 1629-1637, 1670, 1673, 1678-1679, 1682-1691, 1694, 1696-1697, 1699-1700, 1702, 1715, 1740-1741, 1746, 1750-1756, 1758-1762, 1765-1791, 1794, 1797-1798, 1800, 1805-1806, 1809, 1811-1820, 1834, 1840, 1850, 1854, 1913, 1917, 1929, 1935-1939, 1941-1942, 1944, 1948-1949, 1951, 1953, 1979-1980, 2042
leadership coaching 1770, 1773-1775
Leadership Styles 18, 130, 134-138, 140-145, 147-148, 282, 821, 964, 1196, 1354, 1359, 1361, 1363, 1425, 1427-1428, 1431, 1433-1434, 1439, 1446, 1463, 1629-1630, 1632, 1635, 1678, 1686-1687, 1699, 1753
leadership types 1678-1679, 1683-1686
Learning Management System (LMS) 32, 1984, 1996
Learning Organization 16, 205, 723, 732-736, 738-741, 758, 834, 836, 964, 966-967, 979, 981, 987, 989, 1003, 1349, 1515, 1626, 1634, 1790
learning resource management 917-918, 922-924, 930
Learning Technologies 538, 1496-1497, 1499-1503, 1505, 1511, 1516, 1951, 1953
Learship 1340
Leximancer 700, 718-719, 721
Linked Data 1592, 1868-1873, 1875, 1877, 1879-1883
Liquid Project 1998, 2003-2004, 2010
liquid workforce 1998-1999, 2001-2002, 2004-2005, 2007-2010
local authority 1266-1267, 1269, 1271, 1274-1277
local business 1105, 1349-1350, 1352, 1360, 1365
Local Government 88, 719, 780-783, 789-790, 793-794, 797, 801, 1266-1269, 1271-1272, 1276, 1278-1281, 1402-1403, 1449, 1816

M

Machine Learning 493-494, 496-499, 688, 763, 838, 841, 843, 847, 854, 859, 863-864, 1151, 1153, 1225, 1235, 1259, 1261, 1367, 1379, 1511, 1531, 1711, 1739, 1749, 1932
Malawi 1402, 1521, 1720-1723, 1726-1727, 1729-1735
Managed service 1265
Management Education Teaching 1496, 1504, 1513
management information system 967, 971, 982, 989
Management Literature 1, 8, 46, 107, 226, 229, 231, 235, 238, 467, 472, 743, 753, 1296, 1802
Management of a Business Network 479, 484
Management of a Project Network 467, 479, 484
Many-to-Many Conversations 534, 539
Mapping 160, 168-169, 188, 283, 362, 529-530, 652, 706, 711, 718, 720-721, 761-763, 766-767, 770-772, 775-776, 778, 986, 1057, 1089, 1374, 1384, 1494, 1510, 1691-1692, 1774, 1830, 1866, 1870, 1917, 1920
Marker Behavior 310
Market Research 415-419, 422-426, 428, 555, 1160, 1301, 1313, 2045
Marketing Strategy 415, 418, 423, 429-430, 1234, 1590, 1918, 1934, 1949
Matrix 119, 153, 213-218, 222, 531, 551, 686, 692-693, 767, 907, 944, 977, 1053, 1057, 1070-1071, 1384, 1496-1497, 1509-1510, 1513, 1750, 1758
Maturity 128, 152-153, 157-164, 219, 246, 660, 884, 886-887, 889-894, 901-904, 906, 923, 1199-1200, 1202, 1204-1207, 1209-1212, 1215, 1219, 1221, 1390, 1397, 1401, 1506, 1590, 1715, 1741, 1746, 1901-1903, 1905, 1907-1914, 1996
Maturity Model 153, 157, 162-164, 884, 889, 1204-1206, 1221, 1590, 1741, 1901-1903, 1905, 1907-1911, 1913-1914, 1996
Measurement Instrument 301, 540-544, 546-547, 549-551, 555-556
Media 25-27, 51, 54, 56-57, 60, 62, 65-66, 193, 199, 220, 237, 243-247, 251-256, 259, 262, 265-266, 270-271, 275, 278-281, 283-285, 287-288, 290-291, 293, 297, 306, 309, 352, 360, 369-370, 374-376, 380-381, 383, 390, 407-412, 444, 446, 456-457,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

483, 486, 491, 494, 498-499, 506, 524, 528-529, 534, 541, 556, 558, 562, 588, 663, 685, 697, 704, 718, 774, 801, 907, 913, 920-921, 947, 966, 999, 1005-1010, 1012, 1016-1021, 1047-1048, 1053, 1055-1058, 1064, 1078, 1083, 1085, 1088-1090, 1099, 1134, 1222, 1235, 1238, 1242, 1261-1262, 1267, 1313, 1337, 1368, 1381-1382, 1403, 1583, 1590, 1617, 1630, 1642-1643, 1653-1655, 1663, 1673, 1690, 1718, 1724, 1727, 1733, 1738, 1786, 1789, 1854, 1856, 1908, 1912, 1917, 1919-1921, 1923-1924, 1926, 1928, 1931, 1933, 1945-1947, 1949, 1980, 1983, 1990, 1994, 2011, 2018, 2028, 2037, 2043
metacategory 285, 309-310
Meteorological Station(s) 246, 262
Mexico City 1100-1101, 1108, 1114, 1491, 1494
Millennials 26, 673, 1678-1679, 1686, 1690, 1926, 1986-1991, 1996, 2003, 2037
mind mapping 523, 529-530
Mini-Cluster 1102, 1118
mobile information system 243, 254, 258-259
Mobile Phone 248-250, 252, 262, 265, 781, 1481, 1550-1555, 1557, 1563-1565, 1567-1568, 1570, 1574, 1720, 1893, 1974
Mobile Programming 247, 262
Mobile Working 1176
Modernism 1046-1047, 1058
MOOC 50, 59-60, 1065, 1078-1079, 1240, 1637
Multi-Level Governance 866, 871, 883-885
Multi-Perspective 70, 74, 86, 92, 1770

N

NAIS 243-252, 254, 258, 260
NBICs (Nano-Bio-Info-Cogno-Technologies) 580, 589
Newtonian Mechanics 1037, 1039, 1059
Nigeria 59, 277, 1196, 1387, 1399, 1537, 1548, 1750-1752, 1758, 1762, 1764, 1767-1768, 1896, 1898
North Country (Russia) 1158

O

OB 93-95, 98-99, 106, 108-110
On-Demand 846, 921, 925, 1300-1305, 1307-1308, 1310, 1312-1313, 1698, 1926
Online Advertising 568, 1921, 1934
Online Organization 1317-1319, 1329-1335, 1337
online teamwork 1660, 1663, 1665, 1671-1672
Online testing 1821, 1824, 1827
Online Training 629, 1272, 1821, 1824, 1827, 2020
open consultation process 45
Open Data 311, 316, 322, 328, 854, 1869, 1872, 1877, 1880, 1882
Openness Philosophy 1496-1498, 1502, 1507
OPM3 157-158, 160, 162
orchestrated learning activities 917-918, 922, 930
Organisation of Working Time 1164, 1170, 1176
Organisational Change 19-20, 47-48, 94, 107, 146, 445, 447, 752-754, 759, 1135, 1182, 1269, 1362, 1449-1450
Organization Culture 23, 837
Organization Development 21, 44, 112, 114, 147-148, 162, 239, 737, 740, 755, 830, 837, 1448, 1452, 1466-1467, 1470, 1632-1634, 1792, 1794, 1799, 1814, 1820
Organization Theory 113, 868, 1001, 1449, 1889, 1896, 1913
Organizational Change 1-3, 5, 7, 12, 17, 19-22, 41-44, 47-48, 93-96, 98-100, 105-112, 114-115, 128, 130-138, 140-158, 160-162, 166-169, 171-172, 177, 179, 186-187, 189, 206-207, 221-223, 225, 230, 232, 235-237, 239, 241-242, 432-434, 438-439, 443, 445-447, 649, 661, 723-747, 749-760, 803-805, 807-808, 814, 816-822, 824, 829-837, 872, 909, 931-933, 940, 943, 947-950, 952-954, 961-962, 964, 993-996, 1002-1003, 1191-1192, 1195, 1199, 1221-1222, 1277-1279, 1296, 1318, 1340-1343, 1345-1346, 1348, 1350-1358, 1360-1361, 1363-1364, 1383, 1405-1407, 1409-1411, 1416, 1418-1433, 1436, 1438-1439, 1441, 1443, 1446-1453, 1465-1471, 1593-1595, 1597, 1602, 1605, 1609-1611, 1634, 1750-1773, 1775-1776, 1778-1779, 1781, 1783-1784, 1786-1789, 1791-1800, 1805, 1811-1817, 1819-1820, 1914
Organizational Communication Practices (OCPs) 936, 951
Organizational Culture 3, 37, 132, 145-148, 156, 162, 274, 303, 439, 525, 643, 653, 655, 750, 757, 817, 823-828, 830-836, 893, 901, 908, 916, 932, 936, 947, 951, 954, 961, 1002-1003, 1202, 1220, 1283, 1285-1289, 1299, 1325, 1347, 1357-1359, 1362-1363, 1377, 1381-1383, 1442, 1614, 1617, 1626-1627, 1631-1633, 1635, 1654, 1692, 1754, 1766, 1771-1772, 1775-1777, 1779, 1783, 1794, 1798, 1805, 1823, 1841, 1891, 1973, 1987, 2018, 2023
Organizational Development 12, 19, 112, 152, 161, 183, 206, 948, 952-953, 961-962, 990, 992-995, 1000, 1004, 1197, 1470, 1751, 1753, 1768, 1773, 1781, 1786, 1788
Organizational Entity 1321-1322, 1331
Organizational Learning 38, 111, 149, 478, 633, 723-725, 730-741, 743, 748, 751-752, 831, 833-835,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

946, 962, 964-965, 985, 1096, 1195, 1197, 1590, 1817, 1851, 1914, 2023, 2032
Organizational Position 486, 1318, 1321-1323, 1327, 1330-1332, 1336, 1338
organizational semiotics 591, 595, 610, 612
Organizational Studies 146, 148, 150, 188, 309, 952, 963, 1194, 1631, 1635
Overview 24, 49, 154, 156, 158-159, 162, 263, 265, 315, 356, 368, 416, 437, 464, 467, 474, 500, 527, 534-535, 544, 670, 697, 702-703, 707, 759, 771-772, 776, 967, 971-972, 983, 1085-1086, 1097, 1153, 1273, 1280, 1337, 1341, 1403, 1428, 1494, 1554, 1557, 1562, 1579-1580, 1584, 1590, 1606, 1722, 1733, 1738-1739, 1772, 1778, 1842, 1870, 1873-1874, 1909-1910, 1939, 1958, 2011, 2014, 2044

P

P3M3 157-158, 160, 162-163, 1205, 1221
Participatory Design 191-201, 1033
Patents 761-762, 765-767, 769, 773, 775, 1283, 1344, 1703, 2031
peasant farmers 243-247, 250-251, 260
pedagodigital 1061-1062, 1080
Peel Ports Group 1778, 1780, 1782, 1784
Peer Assessment 524-525, 527, 534, 538-539, 1070, 1676
Perceived Infollution 1578
Performance Management 46, 97, 308, 828, 952, 1175, 1594, 1609, 1663, 1671-1672, 1676, 1776, 1779, 1821, 1828
Personal Change History 749
Personalized Learning 32, 918, 1946, 1950, 1981, 2033, 2037, 2039, 2041, 2048
Physical Disability 376, 1128, 1132
Planned Change 1, 6, 8, 10, 18, 22, 132, 136, 145, 168, 226, 237, 642, 661, 740-741, 743, 748, 1342, 1346-1347, 1351, 1430, 1796, 1799, 1803, 1819
Portfolio Project Management 474, 484
Postmodernism 1046-1047, 1059
Power 4, 14, 16, 41, 56, 79, 82, 90, 94, 97-98, 104-105, 107, 110-111, 113-114, 133, 136, 143, 148, 155-156, 192, 198, 201, 203, 220, 228, 242, 270, 281, 344, 355, 372, 433, 445, 450, 463-464, 468-469, 471, 483, 533, 537, 588, 617, 632, 636, 638, 664, 690, 723, 727-728, 736-737, 739, 749, 765, 768, 827-828, 839, 862, 870, 935, 991, 1038, 1040-1041, 1052, 1057, 1087, 1105, 1118, 1148-1149, 1152, 1178-1180, 1182-1183, 1190, 1193, 1201, 1215-1216, 1220, 1230, 1235, 1237, 1250, 1254, 1261, 1264, 1298, 1340, 1353, 1367, 1371, 1391, 1420, 1449, 1490, 1556, 1593-1595, 1597-1599, 1601, 1603, 1606-1615, 1619, 1621-1622, 1627, 1791, 1798, 1805, 1818, 1820, 1828, 1836, 1841, 1846, 1854-1856, 1859, 1918, 1926, 1930, 1939, 1953, 1978, 2001, 2005, 2008-2009, 2026, 2035-2036, 2040
practical inquiry 590-591, 594-596, 602, 608-610
practical methodology 613, 646
practical theory 590, 595, 602, 611
Predictive Analytics 119, 2004, 2010
prisons 1022-1023, 1027-1029, 1031-1032, 1036
Problem-Solving 62, 225-227, 232, 234, 284, 468, 478, 524-526, 532, 617, 826-827, 1103, 1113, 1178, 1337, 1342, 1410, 1624-1625, 1664, 1671, 1681, 1685, 1698-1699, 1980, 2040
Process Improvement 148, 647, 660, 962, 976, 1205, 1374, 1692, 1699-1700, 1901-1902, 1905-1906, 1908, 1912-1914
process perspective 167, 169-170, 190
Product-as-a-Service Business Model 463, 469, 484
professional-research partnerships 238
Project Communication 446, 662
Project Management 58, 128, 152-153, 157-164, 168, 178, 184, 237, 293, 463-464, 467, 469-470, 472, 474-475, 478-484, 660, 662-663, 665-672, 680-682, 684-686, 818-822, 947, 992, 1156, 1200-1202, 1205, 1207, 1210, 1219, 1221, 1377, 1379-1380, 1384, 1422, 1425, 1671, 1674, 1676, 1680, 1690, 1692, 1699-1700, 1703, 1902, 1913, 1993, 2045
Project Management Maturity 152-153, 157-164, 1205, 1221
Project Portfolio 463-464, 476-477, 480, 667, 1199, 1201, 1210, 1213
Project Portfolio Management 463-464, 480, 667
Project web sites 523-524, 532
PROSPELASIS 1472-1473, 1476-1478, 1482-1483, 1486-1487, 1489-1494
Public Administration 146, 303, 307, 355, 360, 362, 370, 567, 801, 817, 834, 866-872, 874-876, 878-879, 881-884, 1228, 1268-1269, 1278-1280, 1391, 1632, 1750, 1768-1769
publication process 1868, 1875, 1877, 1879-1880

Q

quality decision-making 1578, 1581
quality in open online learning 1953
Quasi-Field Experiment 415

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

R

RACI 1371, 1384
Radio Programmes 243-245, 247, 258
Readability 363, 371, 780-782, 784-786, 793-795, 798, 800-801
Readiness For Change 96, 133, 144, 147, 150, 651, 726, 734-736, 745, 757, 1177-1178, 1181-1182, 1184-1188, 1190-1195, 1197-1198, 1755, 1757, 1767, 1805
Real-Time Monitoring 844, 1821, 1824, 1827
Reflective Practitioner 241, 759, 1470
Relocation 280, 1159, 1164-1165, 1176, 1251, 1262, 2013
remote IT assist 1821, 1824, 1826
Research Paradigms 92, 634, 1801
Resistance To Change 1, 6, 9, 11-15, 17, 21-22, 41, 99, 106, 112-113, 134, 144, 206, 218, 234, 434, 648, 723-739, 741, 743, 746, 748, 757-758, 806, 833, 955, 994, 998, 1203, 1279, 1341, 1344, 1351, 1354, 1442, 1451-1453, 1466-1467, 1469, 1709, 1713, 1757, 1805, 1814
Resource Management 41-42, 48, 93, 95, 114, 147, 219, 305-306, 308, 348, 445-446, 629, 685, 704, 717, 726, 738, 742, 744, 754-755, 757-758, 819-820, 833, 835, 913, 917-918, 922-924, 930, 962-963, 992, 1001, 1067, 1153-1154, 1157, 1174-1175, 1185, 1193, 1195, 1198-1199, 1205, 1207, 1210-1211, 1221, 1278, 1317, 1324, 1330, 1334-1335, 1422, 1424, 1433, 1469, 1616, 1631, 1673, 1675, 1690, 1692-1693, 1700, 1702-1703, 1767, 1790-1791, 1815, 1818, 1831, 1866, 1889, 1899, 1974, 1995, 1998, 2008, 2031-2032, 2042
Responsive Design 367, 449, 456, 1920
Restructuring 5, 7, 469, 649, 725, 750, 866-868, 871, 874-875, 910, 952, 995, 1076, 1116, 1245-1265, 1301-1302, 1343, 1346, 1349, 1355, 1361, 1466, 1482, 1778, 1792, 2017
Restructuring in Telecommunications Industry 1265
Rethinking Project Management 463, 467, 472, 481, 483, 1703
rural women 1720-1721, 1723-1725, 1727-1734

S

Schein 44-45, 48, 132, 150, 747-748, 759, 824-826, 835-836, 1383, 1617, 1635
Search Engine Optimization (SEO) 1934
Self-Directed 62, 142, 1626, 1943, 2011, 2016, 2021, 2032, 2043
Self-Efficacy 136, 150, 624, 628, 745, 747, 751, 1423, 1628, 1641-1642, 1650, 1653, 1660-1667, 1669-1672, 1674-1675, 1677, 1723, 1892
self-motivation 1663, 2011, 2021, 2030, 2032
semiotics 590-591, 595-598, 600-602, 604-605, 607, 610-613
Sensemaking 950, 1383, 1451-1457, 1459, 1465-1467, 1469-1471, 1615, 1866
Shared Leadership 282, 674, 1678, 1687-1688, 1690, 1702, 1913
Silos 117, 121, 124, 647, 1212, 1292, 1373-1374, 1376, 1378, 1384, 1713
simulacra 1048-1050, 1056, 1059
Simulation 125, 218, 416-417, 419, 422-423, 428-429, 431, 504, 843, 861, 1048-1049, 1056, 1059, 1070, 1154, 1237, 1336, 1702, 1839, 1843-1844, 1877, 1912, 1953, 1997, 2042-2047
simulation game 416-417, 422, 428, 431
Situational Disability 449
skill mismatch 742-743, 747, 749
Smart City 483, 864, 1102, 1113, 1117, 1575, 1945
smart learning 1935-1937, 1942, 1944-1947, 1950-1951, 1953-1954
smart territory 1100-1103, 1105-1107, 1112, 1114-1115, 1118
smart work 1821-1823, 1827, 1829
SME (Small and Medium Sized Enterprise) 223
SME development 202, 204-205, 207, 209-210, 213-214, 219, 223
SMS 243-244, 248-254, 256, 258-259, 261-262, 1257, 1565, 1567, 1574
SMS Service Provider 243-244, 251
social constructivism 1060-1062, 1071, 1080
Social Entrepreneurship 278, 1100, 1102, 1106, 1112, 1114, 1118, 1197, 1627, 1632, 1894
Social Inclusion 87, 192, 359, 501, 506, 559, 627, 711, 1023-1027, 1030, 1032, 1036, 1122, 1136-1137
Social Innovation 1010-1011, 1013-1014, 1016-1017, 1019, 1100-1103, 1105-1107, 1112-1118, 1627, 1634
Social Media 25-27, 51, 54, 57, 60, 62, 262, 266, 270-271, 284, 297, 486, 491, 494, 498-499, 524, 528, 534, 663, 704, 999, 1005-1010, 1012, 1016-1021, 1047, 1055, 1064, 1078, 1083, 1085, 1089, 1099, 1235, 1242, 1583, 1617, 1630, 1690, 1738, 1786, 1908, 1917, 1919, 1921, 1923-1924, 1926, 1928, 1945-1946, 1949, 2011, 2028, 2043
social revolution 1935-1938, 1940, 1945, 1948
social tagging 590, 592, 596, 602, 611-612
Socialization 623, 625, 628, 755, 984, 1103-1104, 1106, 1373, 1376, 1471, 2011, 2018, 2024, 2030, 2032
Sociotechnical 167, 171-177, 179, 181-183, 190, 1593-

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1595, 1609-1610
Sociotechnical Perspective 167, 175, 182-183, 190, 1609
Socio-Technical Systems 183-185, 192, 200, 1613
Software Tools 329, 334, 375, 414, 488-489, 497-498, 505, 1565, 1868-1871, 1874-1877, 1879-1881
spatio-temporal plasticity 1081, 1095
Special Relativity 1037, 1042, 1059
Sponsorship 525, 823, 825, 827, 1778
Standards 52, 55, 72, 74-80, 88, 131, 152-153, 155, 157-158, 160, 162, 168, 191-192, 194-196, 198, 200, 291, 324, 354-364, 367-369, 371, 449, 451-452, 457, 459, 462, 467, 507, 516-517, 578, 725, 774, 778, 780-782, 784-786, 790, 794-795, 800, 841, 848-849, 854, 858, 864, 877, 976, 994, 1139, 1141, 1150, 1154, 1176, 1226, 1256, 1290, 1314, 1321, 1336, 1374, 1377, 1384-1385, 1387-1388, 1398-1399, 1403, 1458, 1460, 1463, 1475, 1663, 1693, 1700, 1705, 1710-1712, 1877, 1905-1906, 1980, 1990, 2043
STEMM 1620, 1637
stereotype threat 614-616, 618-619, 628-629, 634, 638
strategic changes in telecom 1245
Strategic Changes in Telecommunications 1252-1253, 1265
Strategic Decision Making 987, 1099, 1371, 1466, 1470, 1834-1835, 1838, 1843, 1845, 1850, 1852-1855, 1857-1858, 2000
strategic fit 1737, 1740-1741, 1743-1744, 1749
Strategic Human Resource Management 41, 742, 744, 755, 758, 962, 1153, 1157, 1889, 1899
Strategic Information 482, 904, 907, 923, 987, 1714-1716, 1718, 1744-1745, 1834, 1843-1846, 1848-1850, 1852-1855
Strategic Leadership 1177-1180, 1184-1188, 1190, 1192-1197, 1740, 1771-1772, 1778, 1781, 1787-1788, 1791
Strategy 2-3, 5, 15, 22, 25-26, 31, 34-35, 39, 41, 43-45, 67, 78, 118-121, 127, 129, 155, 164, 166, 173, 183, 186, 202-203, 207-209, 213-215, 217-219, 222-223, 225-226, 230-232, 236-237, 239-240, 242, 268-269, 293, 313, 344, 347, 356, 412, 415-418, 422-423, 428-430, 464-465, 467-469, 471, 475, 477-478, 480-483, 541, 544, 555, 563, 571, 586-588, 643-644, 652, 654, 656-658, 660-661, 695, 719, 725, 740, 744-745, 749, 756, 775, 777, 804, 819, 824-828, 830, 834, 837, 875, 877-878, 886-888, 890, 892-894, 901, 903-907, 911-913, 932, 953, 988, 995, 997-999, 1007, 1017-1018, 1020, 1025-1027, 1029, 1071, 1076, 1085, 1091, 1133, 1140, 1147, 1184, 1193-1200, 1207-1211, 1213-1215, 1217-1221, 1231, 1234, 1238, 1253, 1259, 1261-1262, 1278, 1283, 1285, 1291, 1293-1294, 1309, 1320, 1325, 1342-1343, 1346, 1354-1355, 1357-1358, 1362-1363, 1365, 1372, 1374-1376, 1380, 1385-1386, 1421, 1431, 1447, 1468, 1502, 1512, 1520, 1524, 1532, 1576-1577, 1590, 1595-1597, 1605-1606, 1608-1609, 1611, 1613, 1618-1619, 1636, 1700-1701, 1704-1706, 1708-1711, 1714-1716, 1722, 1738, 1740-1749, 1751, 1766, 1768, 1771, 1773, 1775-1781, 1783, 1785, 1788, 1790, 1794, 1796-1798, 1805, 1813, 1830-1831, 1834-1837, 1839-1844, 1846, 1848-1853, 1856, 1858-1866, 1896, 1904-1906, 1908, 1910-1911, 1918, 1925-1932, 1934, 1942, 1949, 1978-1979, 1996, 2003-2006, 2012, 2019, 2022, 2024-2025, 2027
StratSim 416-418, 423, 429, 431
String Theory 1037, 1044, 1059
Structure 2-7, 13, 18, 22, 31, 82, 111-112, 120, 126-127, 132, 149, 154-155, 165-166, 171-173, 181-182, 194, 201-213, 215, 218-219, 239-240, 284, 288, 305-306, 338, 356-357, 434, 438, 465, 477, 486-488, 505, 535-536, 544-545, 550, 567, 571-572, 578, 581, 592, 599, 604, 607, 643-644, 646-647, 649, 652-654, 660, 671, 675, 677-679, 706, 725-726, 728, 730-733, 737, 741, 761-762, 764-768, 771-773, 776, 804, 819, 825-827, 829, 841, 847, 850, 867-868, 874-875, 878, 881-882, 889, 891, 909-911, 915, 917-918, 921, 927, 934, 936, 938-940, 943-944, 951, 955, 971, 975-976, 994, 1046, 1053-1054, 1057, 1062, 1065, 1067, 1080, 1082, 1089, 1091, 1095, 1097, 1101-1102, 1106-1107, 1112, 1114, 1120, 1137, 1145, 1149, 1152, 1163-1164, 1166, 1178-1179, 1183, 1185, 1188, 1191, 1201, 1203, 1211-1212, 1215, 1218, 1224, 1228, 1230, 1232, 1234, 1240, 1271, 1277-1278, 1283-1284, 1286, 1294, 1317, 1320, 1322, 1325, 1329, 1331, 1340-1351, 1353, 1355-1357, 1359-1361, 1364, 1407, 1422, 1436, 1441, 1449, 1454, 1475, 1491, 1523, 1526-1527, 1541, 1543-1544, 1555, 1586-1587, 1596, 1618, 1706, 1713, 1717, 1740-1741, 1751-1752, 1766, 1773-1775, 1778-1780, 1790, 1811, 1817, 1835, 1837, 1841-1842, 1844, 1855-1856, 1858, 1860, 1863-1864, 1869, 1891, 1905, 1909, 1911, 1914, 1916, 1921, 1934, 1944, 1966, 2012, 2015, 2043
subject oriented 1081, 1088, 1095
Sub-Saharan Africa 261, 370, 783, 802, 884, 1154, 1385-1386, 1401-1402, 1534, 1563, 1576-1577, 1716
Supply Chain 122, 640-661, 840, 845, 855, 860, 1089,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

1301, 1315-1316, 1406, 1591, 1640, 1690, 1702, 1769, 1913-1914, 2006
Surface Learning 524, 539
Survival 31, 103, 106, 123, 202-203, 205, 209-213, 216-221, 434, 726, 730-731, 763, 835-836, 952-953, 961, 989, 1077, 1247, 1249, 1261, 1317-1318, 1355, 1358, 1430, 1520, 1532, 1615, 1655, 1793-1794, 1855, 1939, 1987, 2015, 2041
Sustainability 21, 103, 105, 119-120, 128, 146, 164, 212, 224, 274, 312-313, 338, 348, 481, 484, 700-705, 707-708, 710-720, 774, 843, 868, 870, 879, 963, 970, 1101-1102, 1116, 1178-1182, 1184, 1190, 1231, 1250, 1252-1254, 1258, 1263, 1285, 1296, 1356, 1362, 1372, 1377, 1477, 1591, 1655, 1702, 1734, 1737, 1741, 1751, 1788, 1896, 1908, 1910, 1936, 1938, 1941, 1945, 1995, 2014-2015, 2029
synchronous communications 1081, 1089-1090, 1095
systemic structural constellation 700, 707
Systems Development 184-185, 189, 468, 684, 820, 1595, 1609, 1613, 1678-1681, 1685, 1689, 1691
Systems Theory 39, 183, 205, 220, 224, 1051, 1849, 1855

T

Tacit Knowledge 30, 967, 984, 986, 990, 1102, 1106, 1284, 1298-1299, 1344, 1510, 1513, 1842
tactile models 1482-1483, 1492, 1495
tagging 590-613
tagging system 592-593, 595, 597-599, 601-609, 613
Teaching And Learning 93, 147, 149, 686, 910, 929-930, 1061, 1063-1064, 1067, 1070-1071, 1073-1074, 1139-1141, 1464, 1496, 1499-1500, 1503-1504, 1506, 1513-1515, 1605-1606, 1611, 1657, 1672, 1732, 1757, 1893, 1938, 1943, 1951, 2041
Team Learning 205, 981, 1660, 1673-1674
Technical debt 1376, 1379, 1384
Technology Acceptance 39, 189, 351, 796, 804, 821-822, 911-912, 916, 926, 928, 1406, 1421-1422, 1425-1426, 1638-1639, 1641, 1645, 1649, 1651-1652, 1657, 1659
Technology Adoption 23-24, 27-31, 912, 1197, 1247, 1277, 1594, 1597, 1610, 1638-1639, 1641, 1652, 1654, 1658-1659
technology convergence 761-768, 770-771, 773, 775
Technology In Education 55-56, 81, 1940, 1946, 1984, 1997
technology-mediated teamwork 1660-1663, 1665, 1667, 1669-1671, 1677
Telecentre 1720, 1722, 1724-1727, 1729-1734
telecom management 1245
Telecommunication Management 1265
Telecommunications Industry 699, 776, 1245-1246, 1248-1250, 1253, 1259, 1262, 1265
Telecommuting 63, 303, 305, 308, 310, 336, 339, 346-352, 614-615, 625-628, 632-633, 636, 1119, 1121, 1135, 1137, 1278, 1823, 1830, 1832, 1956, 2024
teleconsultation 1533, 1567, 1572
Telehealthcare 1533, 1535, 1541, 1550, 1555, 1557, 1563, 1569, 1573
Telemedicine 1227, 1533, 1535, 1541, 1549-1550, 1553-1554, 1556, 1568-1569, 1576, 1614
Telemonitoring Virtual Hospital 1533
Telework 279, 281, 283, 303, 309, 333-340, 343, 345-352, 540-544, 548-550, 553-556, 633, 635-636, 1119-1130, 1132-1137, 1161-1162, 1280-1281, 1829-1831, 2024, 2031-2032
Text Messaging 248, 261, 280, 523-524, 528, 1257
Theory 24, 27-31, 34, 37-39, 47, 86, 94, 100, 110-113, 119, 134, 136, 144-147, 150, 153, 161, 167, 171, 173-175, 182-185, 187-188, 190, 194, 205, 220, 222-224, 227-228, 233, 238-241, 267, 273-274, 277, 303, 305, 307, 350, 352, 412-413, 416, 419-420, 423, 427, 429, 445-446, 467-468, 472, 486, 488, 537, 539, 564, 578, 586, 589-591, 594-598, 600-602, 604-605, 607, 610-613, 621, 632, 635, 669, 706, 719, 737-739, 747, 756-759, 775, 796, 801, 807, 817-820, 827, 829, 833-835, 837, 868, 871, 911-912, 915-916, 919, 924-927, 929, 931-937, 941, 946-949, 953-954, 963, 967, 969, 984, 992, 994, 996-998, 1001-1002, 1010, 1020, 1037, 1039-1045, 1049, 1051, 1054-1056, 1058-1059, 1080, 1085-1086, 1090, 1096-1099, 1116, 1135, 1155, 1178-1179, 1182, 1191, 1193, 1196-1197, 1210, 1224, 1278-1280, 1296-1298, 1307, 1346, 1364, 1400, 1408, 1416, 1419-1421, 1431-1432, 1445, 1449-1450, 1456, 1466, 1469, 1499, 1512, 1516-1517, 1522, 1527, 1586, 1591, 1593-1595, 1597-1598, 1600, 1609-1610, 1612, 1614-1615, 1617, 1620-1621, 1629, 1631-1632, 1639, 1641-1642, 1646, 1651, 1653, 1655, 1658-1659, 1665, 1672-1673, 1675, 1692, 1697-1698, 1700-1701, 1703, 1720-1721, 1724-1725, 1727, 1731, 1733, 1745-1746, 1754, 1768, 1772, 1777, 1788, 1794, 1801, 1807, 1811, 1815, 1819-1820, 1830, 1844, 1846, 1848-1849, 1855, 1858-1859, 1861, 1865-1866, 1882, 1889, 1896-1899, 1906, 1913-1914, 1932, 1975-1976, 1982, 1990, 2016-2017, 2042, 2049
theory of action 24, 29, 34
Theory Of Constraints 564, 739, 1692, 1700-1701, 1703

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

traditional practitioner 1562, 1571
Training 14, 27-28, 37, 41-42, 44-47, 49-51, 54, 57-58, 61, 64, 67, 76-77, 79-80, 101-102, 150, 178, 196, 218-219, 227, 260, 269, 275, 283, 297-299, 301, 303, 308, 352, 452, 471, 493, 507, 511, 513, 517-518, 581, 598, 629, 634, 643, 646, 648-650, 653, 659, 664, 666, 680, 690-694, 728, 731, 739-740, 742-744, 747-749, 751-753, 759, 814, 826-827, 841, 847, 858, 908, 912, 915, 921, 924, 930, 942, 985, 1022, 1024-1032, 1036-1037, 1056, 1062, 1064, 1067, 1069-1070, 1072-1073, 1075, 1079-1080, 1122, 1124, 1128, 1131, 1139-1140, 1147, 1150, 1156-1157, 1166, 1174, 1176, 1182, 1186, 1202-1203, 1230, 1238-1240, 1272, 1306, 1323-1324, 1326-1327, 1333, 1345, 1347, 1349-1350, 1358, 1373, 1378, 1429, 1477, 1492, 1498, 1514, 1517, 1536, 1541, 1550-1551, 1553, 1590-1591, 1602-1603, 1607-1608, 1617, 1620, 1623, 1629, 1661-1662, 1665-1666, 1670-1672, 1674-1675, 1677, 1696-1701, 1712-1713, 1726, 1757, 1770, 1785, 1789, 1794, 1797-1800, 1811-1813, 1816, 1819, 1821-1822, 1824, 1827, 1892, 1897-1898, 1906, 1922, 1928-1929, 1944, 1973, 1977-1979, 1982, 1989-1996, 2000, 2003-2006, 2008, 2010, 2020-2024, 2030, 2035-2036, 2038, 2042, 2048-2049
Training Process 742-743, 748, 752-753, 1139, 2042
Transaction Costs 465, 915-916, 919, 924-925, 928, 930, 1842, 1846, 1848-1849
Transactional Leadership Style 130, 135, 138-140, 143, 1686-1687, 1784
Transformation 2-3, 11, 16-18, 23-28, 31-32, 34, 37-40, 43, 65, 96, 114, 116-129, 131-133, 145, 163, 206, 264-265, 268, 331, 463-465, 469, 472, 478-479, 481-482, 484, 493, 540, 543, 557-558, 567-568, 577, 581, 583, 587, 640-661, 700-703, 710, 714, 716-717, 719, 726, 738-740, 744, 754, 761-769, 771-772, 774-778, 825-832, 835, 838-841, 843-844, 852, 856, 859-860, 862, 865-868, 871, 874, 877, 879, 881, 884, 886-888, 890, 892-894, 903-914, 920-921, 923-926, 929, 946, 948, 984, 1024, 1037, 1053-1054, 1079, 1081, 1084-1085, 1090, 1095, 1098, 1103, 1113, 1149-1153, 1158, 1194, 1196, 1199-1200, 1210, 1212, 1214-1216, 1219-1222, 1225, 1231, 1236-1242, 1250, 1261, 1264, 1268, 1279, 1295, 1301, 1337, 1358, 1364, 1366-1384, 1433, 1449, 1519-1521, 1527, 1531-1532, 1587, 1594-1595, 1600-1601, 1605-1606, 1609-1611, 1614, 1618, 1620-1621, 1631, 1635-1636, 1640, 1643, 1657, 1697, 1704-1706, 1712, 1714-1718, 1737-1749, 1753, 1756, 1762, 1765, 1773, 1780, 1817, 1834, 1842, 1853, 1908, 1916-1919, 1923-1924, 1927, 1929-1932, 1934-1941, 1943-1944, 1948-1949, 1951, 1953-1954, 1978-1979, 1981, 1992, 1994, 2001-2003, 2049
Transformational Leadership 17-19, 130, 134-151, 282, 291, 303, 306-308, 803-809, 811-820, 834, 1194, 1196, 1369, 1384, 1420, 1431, 1439-1440, 1444, 1447, 1450, 1629, 1634, 1683-1686, 1690, 1773-1775, 1778-1781, 1784, 1788, 1791, 1813
Transformational Leadership Style 130, 134-136, 138-139, 141-145, 1439-1440, 1444, 1685, 1774
Transhumanism (H+ or h+) 1954
Trust 13, 27, 62, 93, 135, 149, 158, 160, 162, 198, 208, 220, 283-284, 287, 295-296, 303-305, 309, 338, 415, 484, 487, 492, 543, 557-558, 632, 659, 664-665, 685, 704, 729-730, 736, 744, 749, 752, 781, 784, 801, 1008, 1011, 1046, 1094, 1097, 1104, 1119, 1121, 1127, 1131-1132, 1181, 1198, 1218, 1220, 1266-1267, 1269-1281, 1313, 1351, 1355, 1370, 1373-1374, 1386, 1407, 1441, 1452, 1454, 1465, 1571, 1587, 1589, 1591, 1620, 1624, 1631, 1663, 1681-1682, 1687, 1698, 1741, 1756, 1774, 1778, 1780-1781, 1786, 1789, 1828, 1892, 1898, 1903, 1943, 1949, 2017-2018, 2023-2025, 2027
Turkey 1, 11, 75, 147, 375, 411, 780-785, 787, 790, 793-796, 799, 866-867, 874-882, 884-885, 1037, 1057, 1177-1178, 1186, 1340, 1400, 1590, 1889, 1892, 1897

U

UAAG 374-377, 390, 393-395, 397-401, 404-408, 410, 413-414
UAAG 2.0 374-377, 393-395, 397-401, 404, 406-408, 410, 413
Uncertainty Principle 1044, 1059
UNESCO World Heritage List 1491, 1495
Universal Design 196, 369, 1128, 1130, 1472, 1990
Universities 6, 32, 34, 58, 73, 76-77, 86, 92, 235, 375, 411, 520, 660, 794, 799, 878-879, 882, 909-910, 914, 920, 1001, 1030, 1062, 1073, 1079, 1139-1140, 1155, 1232, 1238, 1283, 1286, 1288, 1290-1291, 1294-1295, 1298-1299, 1307, 1367-1377, 1379, 1382, 1449, 1457, 1459, 1464, 1516, 1539, 1593-1594, 1601, 1605, 1609, 1611, 1613-1614, 1673, 1703, 1750-1753, 1755-1758, 1760-1762, 1764-1768, 1799, 1914, 1944, 1950, 1985-1986, 2035, 2037-2038, 2041
Unlearning 180, 723, 731, 733, 736-737, 741, 824
Unstructured Problems 527, 539
updated model 887, 889-895, 900-904

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

Upgrade 268, 420, 424, 426, 428, 1090, 1300, 1302-1305, 1309, 1315, 1388, 1910, 1981, 2045
Urbanization 484, 560, 1141, 1154, 1156, 1223, 1242-1243
Usability 75-76, 87, 186, 201, 324, 369, 371-372, 375, 378, 414, 449, 452, 459, 461-462, 501-507, 509, 511-512, 515-522, 663, 780-787, 793-799, 801-802, 916, 924, 1072, 1080, 1306, 1376, 1390-1391, 1394, 1401, 1403-1404, 1475, 1492, 1495, 1521-1522, 1531, 1546, 1573, 1591, 2038
usability evaluation 501, 503-504, 512, 517-521, 780, 783, 797, 802
User Agents 193, 374-376, 387, 390, 393, 409-410, 414, 452, 1389

V

Values 9, 12, 16, 29-30, 32, 34, 52-53, 63, 75, 80, 96, 99, 103, 117, 119, 132, 135, 137, 140-141, 155, 158, 160, 162, 173, 177-179, 207, 216, 284, 318, 322, 454-455, 470, 476-477, 486, 494, 508, 546, 581, 605, 607, 632, 634, 643, 689-695, 701, 703, 717, 727, 737, 745, 750, 768, 792, 802, 806-808, 823, 825-828, 830-831, 833, 860, 872, 896, 947, 955-956, 961, 979, 992-993, 996-997, 1013, 1047, 1049-1050, 1052, 1066-1067, 1069, 1076, 1084, 1103-1105, 1108, 1116, 1118, 1140, 1142, 1148-1149, 1152, 1154-1156, 1175-1176, 1178, 1180-1181, 1187-1188, 1220, 1241, 1284-1285, 1290-1291, 1293, 1299, 1308, 1323, 1343, 1350, 1355-1356, 1358-1359, 1366, 1376, 1381, 1384, 1408-1410, 1432, 1447-1448, 1465, 1467, 1477, 1557, 1568-1569, 1600, 1609, 1617, 1623, 1636, 1668-1670, 1702, 1724, 1753, 1755, 1762, 1774, 1776, 1779-1780, 1783-1784, 1800, 1813, 1820, 1825-1826, 1836, 1856, 1894, 1916, 1937, 1941-1942, 1944, 2024, 2027, 2032, 2043
Variance Perspective 170, 181, 190
Variety 59, 94, 102, 106, 285, 336, 360, 362, 367, 387, 407, 435, 452-453, 456-458, 461, 491, 496, 628, 701-702, 706, 751, 846, 915, 933-934, 938-940, 942-946, 951, 991, 1070, 1101, 1106, 1113, 1115, 1121, 1139, 1160, 1227-1228, 1253, 1274, 1290, 1295, 1304, 1307, 1389, 1406, 1419, 1431, 1438, 1452, 1474, 1482, 1491, 1579, 1584, 1608, 1731, 1739, 1851, 1909, 1936, 1945, 1983, 1987, 1991-1992, 2001-2002, 2012, 2022
VARK Learning Model 1990, 1997
View Port 407, 414
virtual communication 614-615, 618
Virtual Organization 1081, 1083-1085, 1087-1092, 1095, 1579, 1585-1587, 1591
Virtual Reality 505, 540, 543, 1047, 1052-1053, 1084, 1555, 2033, 2038
Virtual Relationships 1093, 1928
Virtual Team 282-286, 296, 303, 305, 307-310, 618, 628, 663-666, 670, 674, 1096, 1098, 1589, 1633, 1661, 1663, 1665, 1671-1672, 1674-1675, 1678-1691
Virtual Team Effectiveness 303, 305, 307-308, 1678-1679, 1682-1689
Virtual Team Leadership 283-285, 305, 1633, 1689, 1691
Virtual Teams 279-281, 283, 296-297, 303-309, 352, 614-615, 618-619, 628, 632-633, 638, 662-666, 668, 670-671, 680-681, 684-686, 1091, 1096, 1585-1586, 1661, 1663-1665, 1670, 1672-1674, 1676, 1678, 1680-1682, 1684-1690, 1829, 2018-2019, 2030, 2032
Virtuality 282, 305, 308, 351, 1047, 1081, 1083-1090, 1092-1093, 1095-1097, 1099
Vision 16-18, 31, 37, 60, 74, 82-83, 86, 97, 120-121, 124-125, 127, 133-135, 143-144, 153-154, 158, 160, 162, 193, 195, 205, 207-208, 214, 267, 270, 280, 285, 293, 311, 355, 363, 372, 412, 434, 451, 459, 474-475, 478, 480-481, 484, 504-505, 517, 521, 644-645, 651, 656, 726, 728, 734, 797, 804-806, 808, 815, 818, 825-826, 830, 839, 888, 893, 899, 901, 981, 995, 1076, 1106, 1129, 1131, 1179-1180, 1184-1185, 1190, 1202, 1213, 1215, 1230, 1289, 1291, 1306, 1328, 1330, 1347-1348, 1350, 1354, 1357, 1359, 1369, 1375, 1378, 1380, 1384, 1409-1410, 1421, 1430-1431, 1438, 1442, 1479, 1482-1483, 1487, 1490, 1495, 1605, 1621, 1625, 1659, 1697-1698, 1713, 1740, 1742, 1751, 1775, 1778-1781, 1783-1785, 1788, 1796, 1840, 1852-1853, 1869, 1879, 1929, 1945, 1953, 1979, 1999, 2008
Volberda 1160, 1176, 1841, 1861
VosViewer 761, 763, 768, 772

W

WAI 73, 86, 91, 355, 357-358, 361-362, 365, 368, 376, 411, 413-414, 1388
walkability indices 312, 330
WCAG 73-75, 77, 82-83, 86, 89, 199-201, 357, 359-365, 368-370, 374-385, 387-388, 390, 393, 409-410, 412-414, 449, 452-453, 456-458, 462, 782-785, 787, 790, 794-795, 799, 801-802, 1385, 1388-1389, 1393-1394, 1398-1399, 1403
WCAG 2.0 73-75, 77, 83, 89, 357, 359-362, 364-365,

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use

368-370, 374-385, 387-388, 390, 393, 409-410, 412-413, 452-453, 456-458, 782-785, 787, 794, 799, 801-802, 1385, 1388-1389, 1393-1394, 1398-1399, 1403
Web Accessibility 70-74, 76-92, 192, 199-201, 354-362, 364-365, 368-376, 411-413, 780-781, 785, 794-797, 799-801, 1386, 1388, 1400-1401, 1403
web components 374-375, 377, 395, 401, 410, 414
Web-based Surveys 523
WFM 1824, 1826-1827
Wiki 499-500, 523, 532, 887, 907, 922, 1068, 1072, 1883, 1986-1987
women in STEM 614-628, 632, 634, 637, 639
Work Flow 172, 1606, 2015
work organisation 1159-1160, 1162, 1174
Work-Family Boundaries 1955
Work-Family Conflict 302, 614-615, 621, 623, 625-626, 1423, 1955-1957, 1959-1961, 1963-1964, 1967, 1969-1976
Workforce 3-4, 6, 42, 44, 49-50, 53-57, 61, 64, 66, 101, 131, 244, 280-281, 284, 296, 300, 302, 334, 340, 540, 557, 571, 618, 626, 636, 641, 741, 962, 1120, 1122-1123, 1128-1129, 1132-1133, 1135, 1159-1160, 1162, 1174, 1199, 1206, 1217, 1221, 1266, 1268, 1271, 1273-1274, 1343, 1345, 1353, 1360, 1366, 1428, 1535, 1546, 1550, 1573, 1616-1620, 1623-1626, 1631, 1634-1636, 1639-1640, 1644, 1651-1652, 1655, 1670, 1679, 1694, 1773, 1783-1784, 1795, 1821, 1824, 1977-1983, 1985, 1987-1988, 1992-1993, 1995-1996, 1998-2005, 2007-2010, 2012, 2014-2015
Working Time 336, 1159-1161, 1163-1164, 1168, 1170-1172, 1174-1176, 1825
Work-Life Balance 53, 288, 290, 295, 297-298, 307, 340, 349-350, 625, 636, 1132, 1135, 1159-1160, 1162, 1172, 1174, 1176, 1823, 1970, 1973-1976
Workplace 20, 23-29, 38, 49, 51, 54-55, 57, 59, 61, 64, 94, 111, 114, 171, 281, 285, 298, 305, 333-335, 342-346, 349, 351, 444, 446, 614-616, 620-622, 626-629, 631, 633-635, 638-639, 740, 748, 751, 753, 756, 760, 805, 820, 827, 832-833, 964, 977, 1095, 1098, 1116, 1121-1126, 1128, 1130-1135, 1137, 1149, 1152, 1157, 1159, 1168, 1174-1176, 1195-1197, 1298, 1369, 1405-1409, 1416-1419, 1423-1424, 1428, 1432-1433, 1447, 1584, 1591-1592, 1616-1617, 1631, 1633, 1635, 1638-1642, 1644-1646, 1649-1661, 1672, 1679, 1767, 1774-1776, 1795, 1815, 1823, 1959, 1977-1978, 1981-1983, 1988-1989, 1992-1993, 1997, 1999-2000, 2002, 2009, 2011-2016, 2021, 2031, 2037-2038
Workplace Competencies 1997
Workplace Flexibility 1131, 1174-1176
Workplace Learning 20, 24, 446, 1633
workplace social support 1405-1407, 1416-1419, 1423

Z

Zeytinoglu 1160, 1162, 1176

EBSCOhost - printed on 2/8/2023 7:28 PM via . All use subject to https://www.ebsco.com/terms-of-use